Chapter 2 – Alternatives

Changes between the DEIS and FEIS for Chapter 2

Chapter 2 has been generally rewritten based on public comments and internal review. Some sections have been consolidated and some areas of redundancy have been removed. Important specific changes are listed below.

- Some specific PDFs were edited for clarity. Some PDFs were removed because they were found to be unnecessary or redundant.
- Table 13 was updated for clarity based on internal review

2.1 Introduction

Chapter 2 describes and compares alternatives considered for invasive plant treatment on the Wallowa-Whitman National Forest in the states of Oregon and Idaho. This chapter provides a summary of the effects of implementing alternatives and displays how they are responsive to the Purpose and Need for action, and issues identified during public scoping.

A thorough invasive plant inventory was completed in 2006; Forest staff estimate this inventory detected approximately 95 percent of the invasive plant infestations on the Forest (this estimate is based on a poll of invasive plant specialists across the Forest who have conducted inventories over the past 20 years over the majority of likely invasive plant sites). Based on this inventory, the Forest staff proposes to treat approximately 23,000 acres (1,740 individually mapped locations) of invasive plants with an effective, integrated combination of treatments including biological, physical (manual and mechanical), cultural/restoration (competitive seeding and planting) and chemical (herbicide) methods. The project is anticipated to last 10 to 15 years or until conditions substantially change.

The invasive plant treatment sites are widely distributed across all Forest Districts and Hells Canyon National Recreation Area (HCNRA). Each invasive plant site has been mapped – site-specific maps can be viewed at the Wallowa-Whitman Forest Website (www.fs.fed.us/r6/w-w/projects/invasive-plants/maps/locator-map.shtml). The maps indicate the primary treatment method; site-specific prescriptions are integrated and include combinations of treatments such as herbicide application followed by manual/mechanical treatments.

The Proposed Action also includes treatment of invasive plant sites that are presently nonexistent or as yet undiscovered, including new plant species that currently have not been found on the Forest. As described in Chapter 1, detecting and treating new infestations when they are small (referred to as Early Detection/Rapid Response or EDRR) increases effectiveness of the invasive plant program and minimizes adverse effects. Thus, the Proposed Action includes treatment of new detections using methods as those used on known sites.

New sites would be subject to an implementation planning process, which is outlined later in this section, so that the effects of treating new sites are within the scope of the analysis in this EIS.

This EIS considers 10 alternatives for invasive plant treatment. Four alternatives were considered in detail, including No Action (Alternative A) and the Proposed Action (Alternative B). No Action (Alternative A) is defined as the treatments that would currently be approved

under existing NEPA documentation for managing invasive plants on the Wallowa-Whitman National Forest.

The Proposed Action and action alternatives focus on invasive plant treatments. The R6 2005 FEIS addressed standards for invasive plant prevention that are an essential part of the invasive plant management program. The R6 2005 FEIS also discussed the importance of coordination of different land bases through weed management areas and the need for public education about invasive plants. The Proposed Action focuses on the part of the program related to herbicide and other treatments that have become available since the R6 2005 ROD was signed. The analysis assumes that prevention standards related to range, recreation, roads, timber and other land uses will be followed.

2.2 Alternatives Considered in Detail

2.2.1 Proposed Action and Alternative Development Process

The process for developing the Proposed Action included determining the most effective treatment methods for known infested sites, characterizing the risk to people and the environment associated with these treatments, and developing design features that minimize these risks.

Each invasive plant site in the inventory was assigned a primary treatment method (e.g. chemical, biological), a priority for treatment (1 through 5), and a control strategy (e.g. eradicate, contain). Figure 1 displays a map showing a sample of known weed infestations and proposed treatments. Such maps exist for all 1,740 weed sites and can be viewed at the Wallowa-Whitman Forest Website (www.fs.fed.us/r6/w-w/projects/invasive-plants/maps/locator-map.shtml). Treatment methods, priorities, strategies and design features incorporate approaches described in Chapters 2 and 3 of the R6 2005 FEIS. The project was also designed in accordance with USDA Forest Service Handbook (FSH) 2109.14 – Pesticide-Use Management and Coordination Handbook (USDA Forest Service 1994c). The R6 2005 FEIS described adverse effects possible from herbicide and other invasive plant treatments; project design features (PDFs) were developed to address adverse effects associated with the methods necessary to treat known infestations. PDFs provide a layer of caution intended to address the range of possible adverse effects that may occur from the range of treatment methods necessary to treat known sites.[1]

In 2008, the Proposed Action was circulated for scoping. The response to scoping from the public and other agencies centered on cost-efficiency, treatment effectiveness, toxicity of herbicides, and potential adverse effects of herbicides on people and the environment (see Chapter 1.9). A range of alternatives were considered to address public and interagency issues; two of the alternatives were brought forward for detailed analysis. Other alternatives were not carried forward, because they would not effectively meet the purpose and need or because they were similar to one of the alternatives brought forward for analysis or because they would not be consistent with the R6 2005 ROD.

The R6 2005 ROD (Appendix 1) noted that broadcast application in riparian areas and aerial applications inherently pose higher risk to the environment. The two action alternatives analyzed

[1] The treatment methods and PDFs associated with known sites would also be applied to new detections so that the effects of treating new detections are similar to those associated with known sites and disclosed herein.

in this document were developed to avoid these higher risks. Alternative C eliminates broadcast treatment in riparian areas, and Alternative D eliminates aerial treatment altogether.

The action alternatives vary in the following ways:

- Whether or not broadcast methods will be available within approximately 6,345 acres of riparian areas and wetlands
- Whether or not aerial methods will be available anywhere in the project area

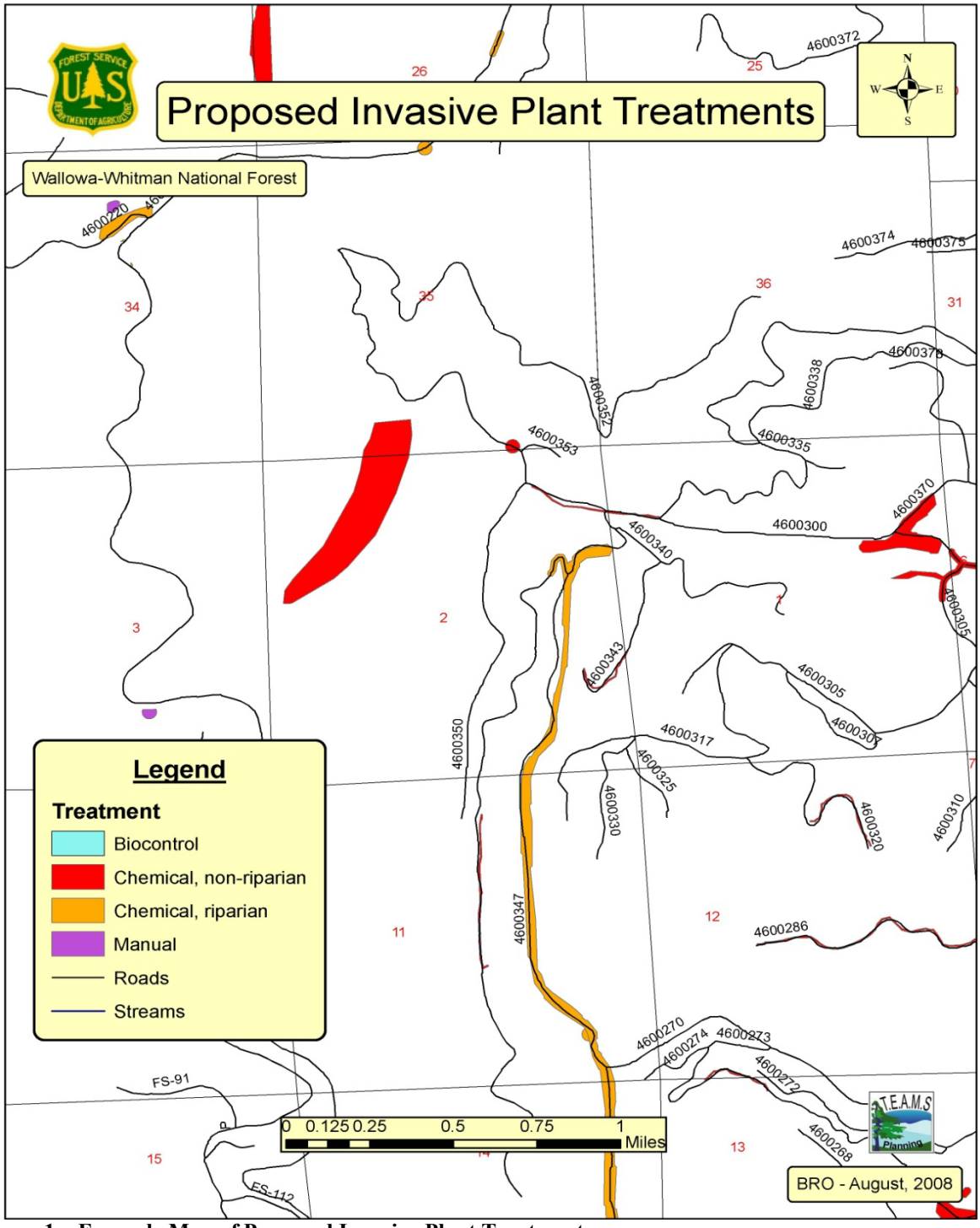

Figure 1 – Example Map of Proposed Invasive Plant Treatments

2.2.2 Alternative A - No Action

The Wallowa-Whitman National Forest has been treating invasive plants according to management direction found in the following documents:

- 1992 decision implementing the Wallowa-Whitman National Forest Environmental Assessment for the Management of Noxious Weeds (USDA Forest Service 1992)
- 1994 decision implementing the Wallowa-Whitman Management of Noxious Weeds Environmental Assessment (USDA Forest Service 1994a)
- *Hells Canyon Comprehensive Management Plan* (CMP) (Forest Plan Amendment #29, (USDA Forest Service 2003c)

The 1994 EA, which incorporated the 1992 EA, identified 5,172 additional acres of weed infestations and 21 invasive plant species for treatment. The Hells Canyon CMP added additional direction to evaluate the extent of nonnative invasive plants, provided additional guidelines for the containment or control of aggressive weeds and implemented additional prevention guidelines to further reduce the spread of weeds (USDA Forest Service 2003, Appendix C, Table C-1, pages 67-68). BAER authority following wildfires has also allowed some invasive plant treatment. The two EAs authorized the use of four herbicides; glyphosate, dicamba, picloram (with restrictions), and triclopyr for use during site treatment. Dicamba was restricted from use by the R6 2005 FEIS and will not be used in the future by the Forest.

Under these documents, manual or mechanical treatments were required on a site for years prior to the use of herbicides (herbicide as a tool of last resort). New or unrecorded infestations or new species were not included for herbicide treatment; herbicides could be used solely on known sites. The Wallowa-Whitman National Forest has completed limited treatments of invasive plants with herbicides after fire disturbance using the Burned Area Emergency Rehabilitation (BAER) authority. Complete information about those treatments is available in the project record.

The treatment approach under No Action has resulted in over 7,000 acres of herbicide application over more than ten years; however, has not resulted in effective invasive plant control. This includes retreatment of persistent populations over a span of years. Some of the treatments approved in existing NEPA documents have been effective; nevertheless, invasive plants have continued to spread throughout the Forest, resulting in the current inventory of 23,000 acres that currently need treatment. For example, existing NEPA does not permit use of effective herbicides to control whitetop or perennial pepperweed. This spread would be likely to continue without a more integrated approach to invasive plant management throughout the Forest.

Under the No Action Alternative, manual and mechanical treatment would continue to be allowed and some herbicide re-treatment could occur within the 5,172 acres currently approved for herbicide use. However, No Action would not be consistent with invasive plant management direction described in Chapter 1, and would not meet the purpose and need for action. No Action provides a baseline to compare the risks and benefits of the action alternatives.

2.2.3 Alternative B - Proposed Action

Alternative at a Glance

Activity	Approximate Value
Acres identified for treatment	22,842
Percent of Total Forest Landbase Affected by Known Sites	0.9%
Maximum Percent of Total Forest landbase treated annually	0.32%
Percentage of treatment sites where full range of effective treatments are available	100
Number of herbicides available for use	10
Acres of proposed herbicide treatments for known sites	20,776
Acres identified for aerial spraying of herbicides	875
Approximate total acres of ground based (hand or boom) broadcast treatments proposed for known sites*	16,660
Acres of hand or nonaerial broadcast treatments within riparian/wetland areas	3,104
Approximate total acres of spot spraying or selective (wicking, wiping, stem injection) herbicide application on known sites	3,241
Number of invasive sites where methods other than herbicides would be effective	313
Acres of invasive sites where treatment methods do not include herbicides	2,066
EDRR includes chemical methods other than aerial	Yes
Cost estimate per effectively treated acre of known sites	$307

*Most ground-based treatments will be applied using backpack sprayers.

Introduction

The Proposed Action (Alternative B) would approve chemical, physical, biological and cultural treatment methods to eradicate, control, and contain existing or newly discovered invasive plants infestations. The Proposed Action includes treatment of 23,000 acres of known infestations, along with sites identified in the future.

Untreated infestations would likely continue to expand at an average rate of 8 to 12 percent each year (R6 2005 FEIS, Asher 2005). Retreatment is often necessary to maintain the control level of initial treatment depending on the species, size and density of an infestation. Thus, treatments may be necessary over a period of 10 to 15 years to achieve control objectives on known sites.

Each invasive plant site is assigned a treatment priority and strategy based on the invasive plant species and site conditions such as ease of access, land allocation, location near special areas, restrictions due to other sensitive resources, or the invasiveness of a plant in a specific habitat. Sites that are identified as high priority would typically be treated with herbicide. Once initial treatment is complete, future potential treatment is evaluated based on the current condition compared to the desired condition. Achieving desired conditions includes future reduction of herbicide treatment methods when site conditions favor effective nonchemical treatments. Strategies for known sites include eradication, control or containment of invasive plants. New detections would be subject to the Early Detection Rapid Response (EDRR) process described in this chapter.

- **Eradicate -** Totally eliminate an invasive plant species from a site. This objective generally applies to small infestations of aggressive species such as yellow star thistle, spotted

knapweed, leafy spurge, and hawkweed; and/or higher priority treatment areas. At some point, larger infestations can become impossible to eradicate.

- **Control -** Reduce the size of the infestation over time; some level of infestation would be acceptable. This objective applies to target species such as Russian knapweed and whitetop.
- **Contain -** Prevent the spread of the weed beyond the perimeter of patches or infestation areas mapped from current inventories.
- **Early Detection Rapid Response (EDRR) -** EDRR refers to newly inventoried invasive plant infestations, including previously undiscovered invasive plant infestations or new infestations that would occur over the life of this project. Ongoing inventory and monitoring would identify these sites, which would likely receive a high priority for treatment to eradicate the invasive plants while the infestation is small and easily treatable.

EDRR is essential to effective invasive plant management. The No Action alternative described above is ineffective partly because it does not allow the full range of treatment options on newly detected sites, allowing infestations to become established over thousands of acres over the last 15 years. Thus, the Proposed Action includes an EDRR strategy to allow treatments of new infestations using methods described below.

Treatment Methods

A range of treatment methods are proposed for the known inventory of invasive plants on the Wallowa-Whitman National Forest: chemical (herbicide), physical, biological, and cultural (see Table 16). A range of herbicide application methods are proposed including: aerial, ground broadcast and spot spraying, as well as selective (wicking, wiping, and stem injection). Nonherbicide methods would be used in conjunction with herbicides for some sites, and approximately 2,000 acres would be treated with methods other than herbicides because biological and/or physical treatments are expected to be effective on these sites.

Detailed 1:24000 scale maps of all known existing treatment sites are available on the Wallowa-Whitman National Forest website at www.fs.fed.us/r6/w-w/projects/invasive-plants/maps/locator-map.shtml (see figure 1 map example). To clarify the geographic location of proposed treatment sites and methods, maps (figures 2-8) show sites and methods and Table 3 displays acres proposed for treatment within each Ranger District. Acres of treatment are estimated based on the existing inventory; density of the infestation within any given acre varies from a few plants to near total coverage. Analysis in Chapter 3 assumes herbicides would cover an entire acre; however, treatments would target individuals and groups of plants, and would likely result in less herbicide actually used per acre. Specific prevention measures have been adopted into the LRMP for the Wallowa-Whitman National Forest that work in concert with invasive plants treatment methods to limit invasive plants across the Forest. The focus of this project is treatment of invasive plants.

Table 3-Acres of treatment methods by Ranger District

Treatment Method	Ranger District							
	Baker	Wallowa Valley	HCNRA	Eagle Cap	La Grande	Pine	Unity	Total Acres
Chemical	951	1,596	6,232	436	1,128	1,762	1,269	13,376
Chemical Riparian	628	555	4,031	300	758	725	403	7,400
Physical	1	10	70	2	3	18	7	111
Biological	90	186	86	123	143	30	1,297	1,955
Total	1,670	2,347	10,419	861	2,032	2,535	2,976	22,842

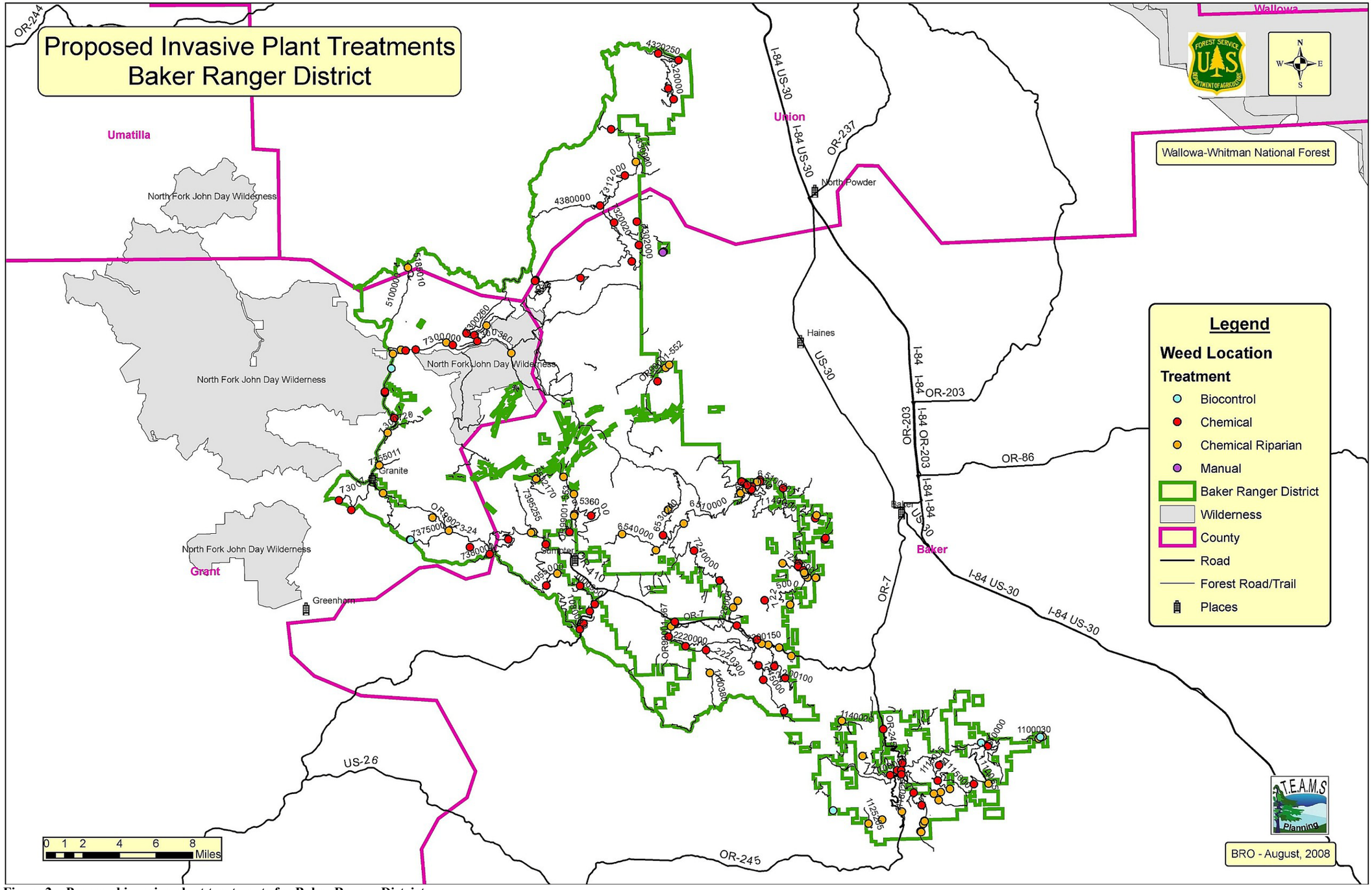

Figure 2 – Proposed invasive plant treatments for Baker Ranger District

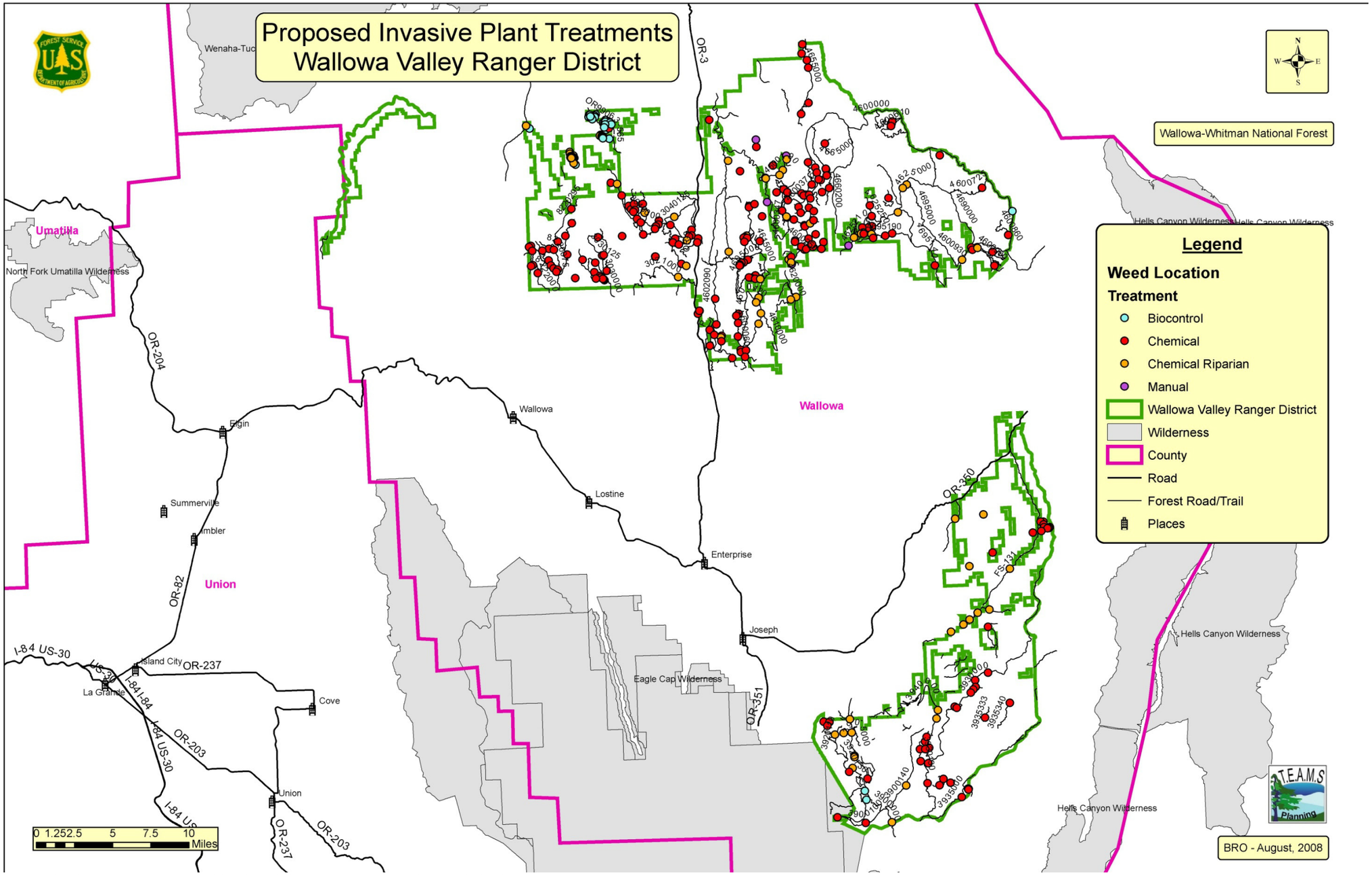

Figure 3 – Proposed invasive plant treatments for Wallowa Valley Ranger District

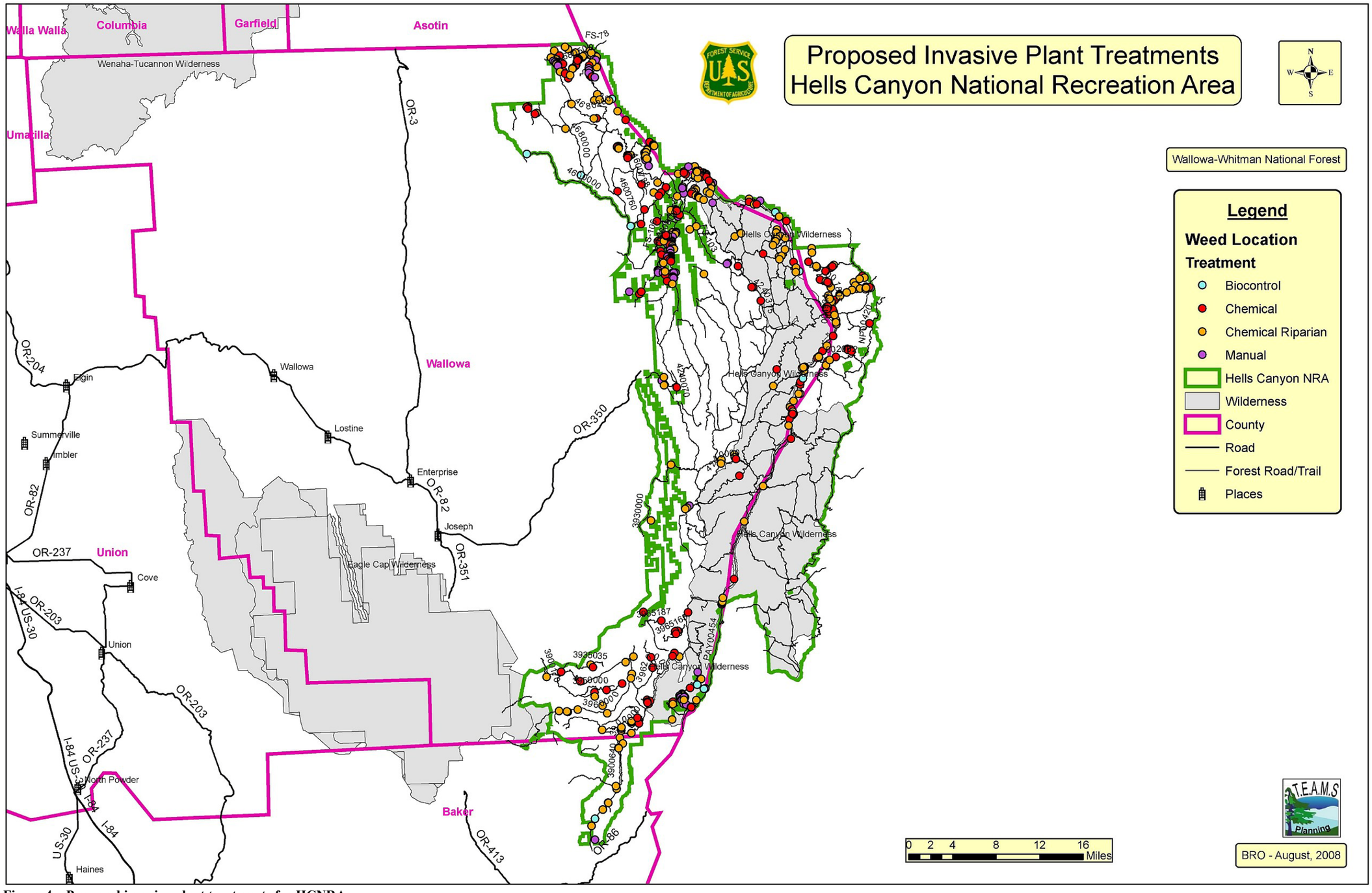

Figure 4 – Proposed invasive plant treatments for HCNRA

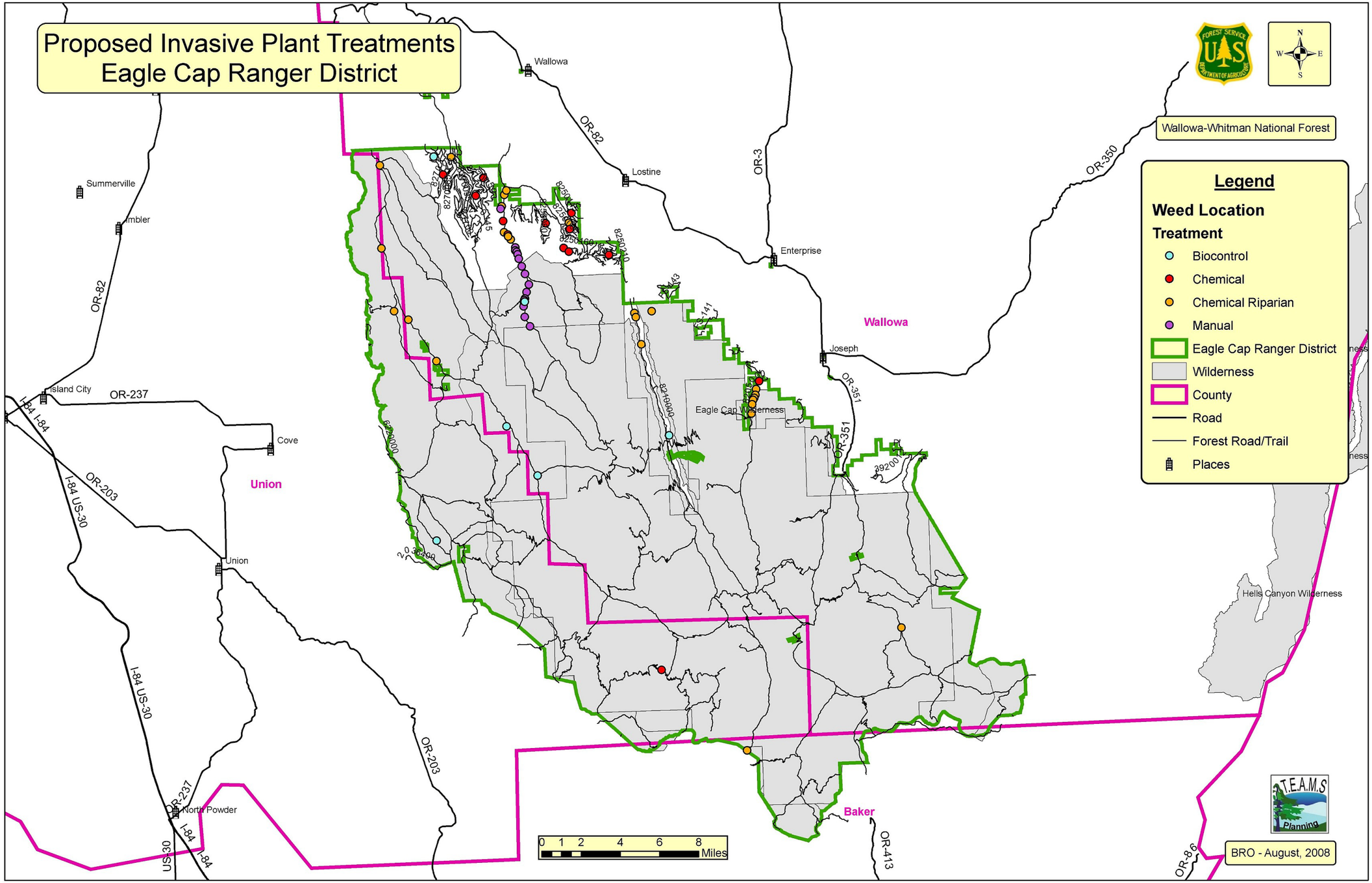

Figure 5 – Proposed invasive plant treatments for Eagle Cap Ranger District

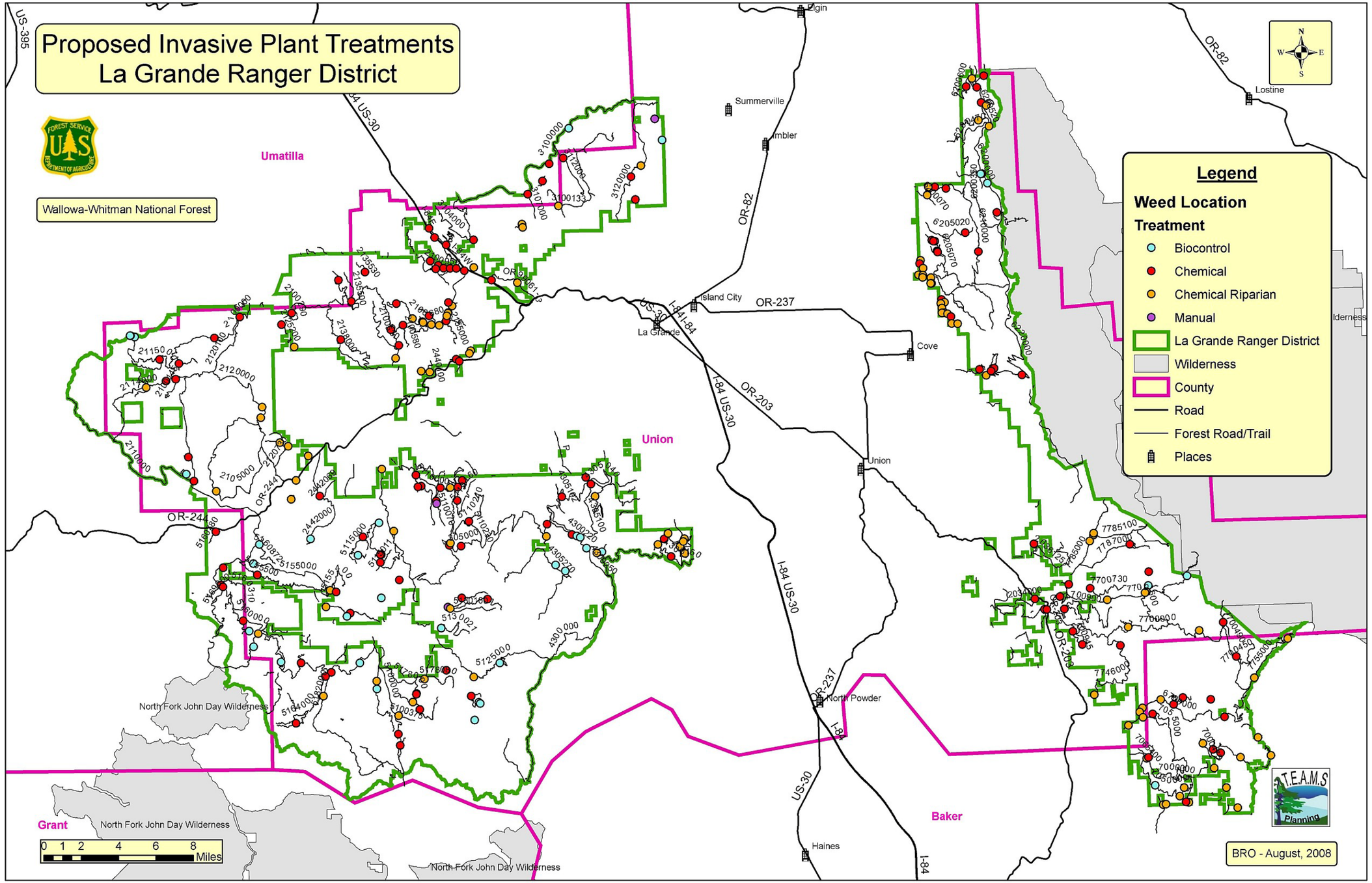

Figure 6 – Proposed invasive plant treatments for La Grande Ranger District

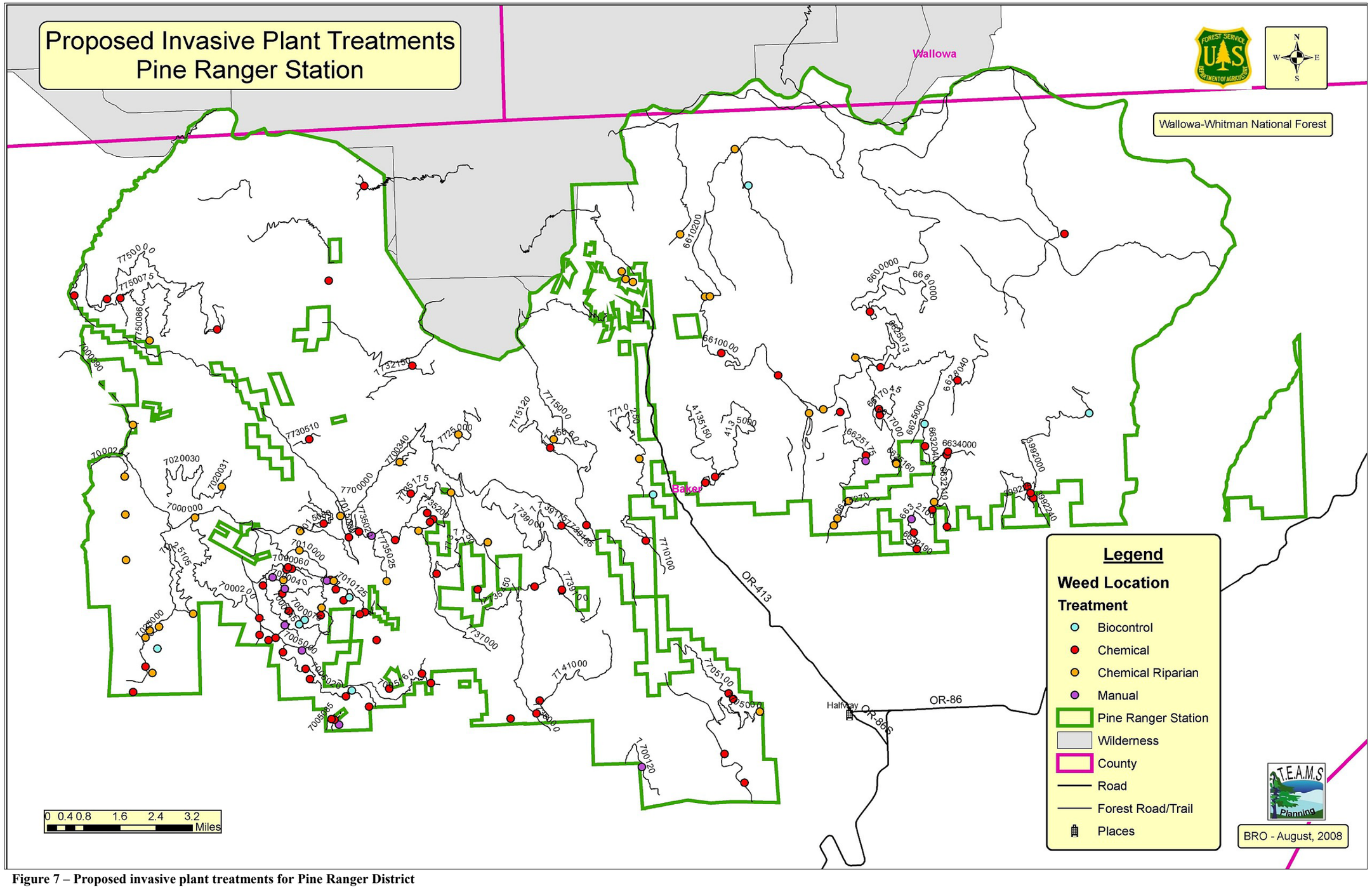

Figure 7 – Proposed invasive plant treatments for Pine Ranger District

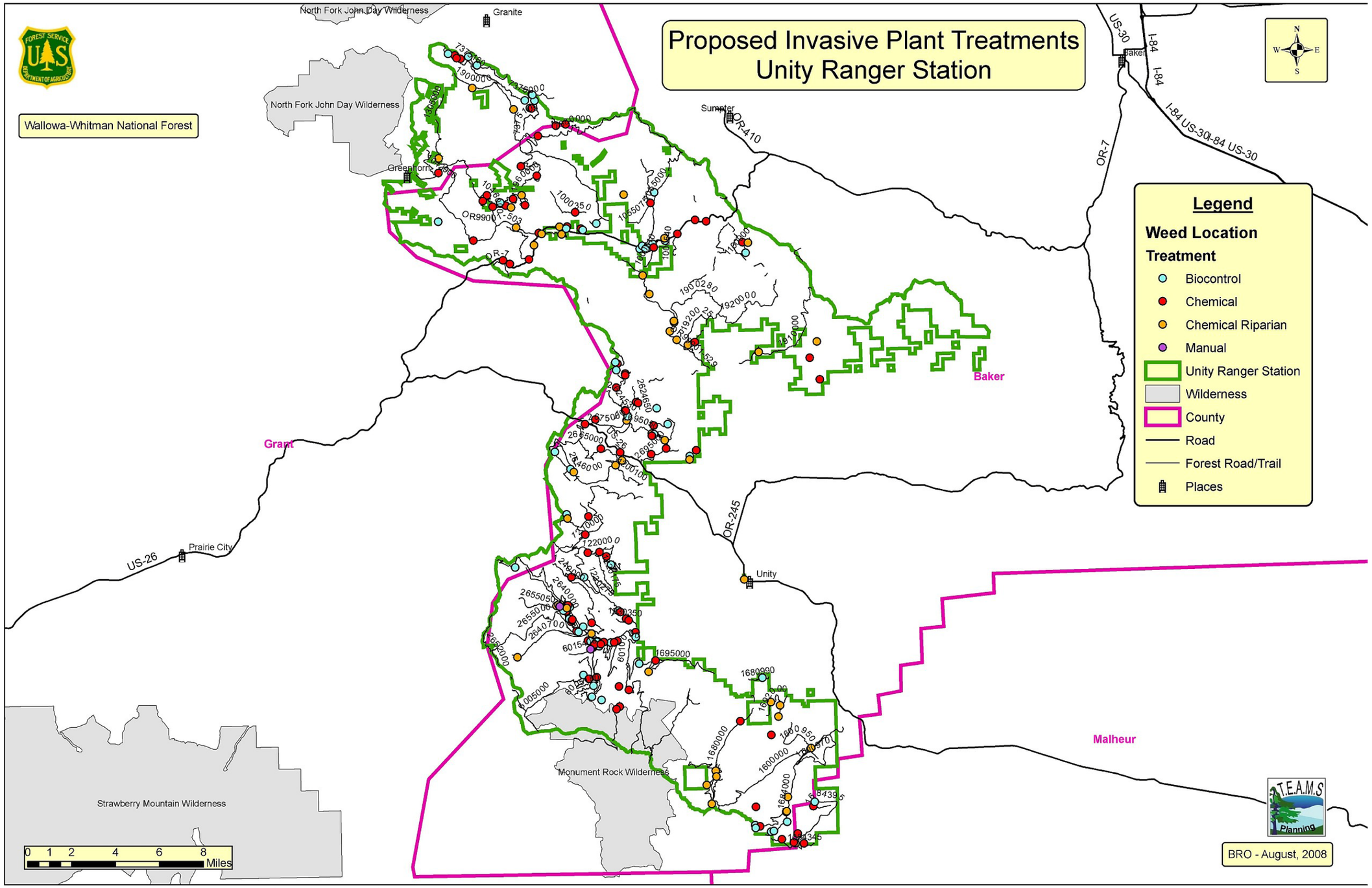

Figure 8 – Proposed invasive plant treatments for Unity Ranger Station

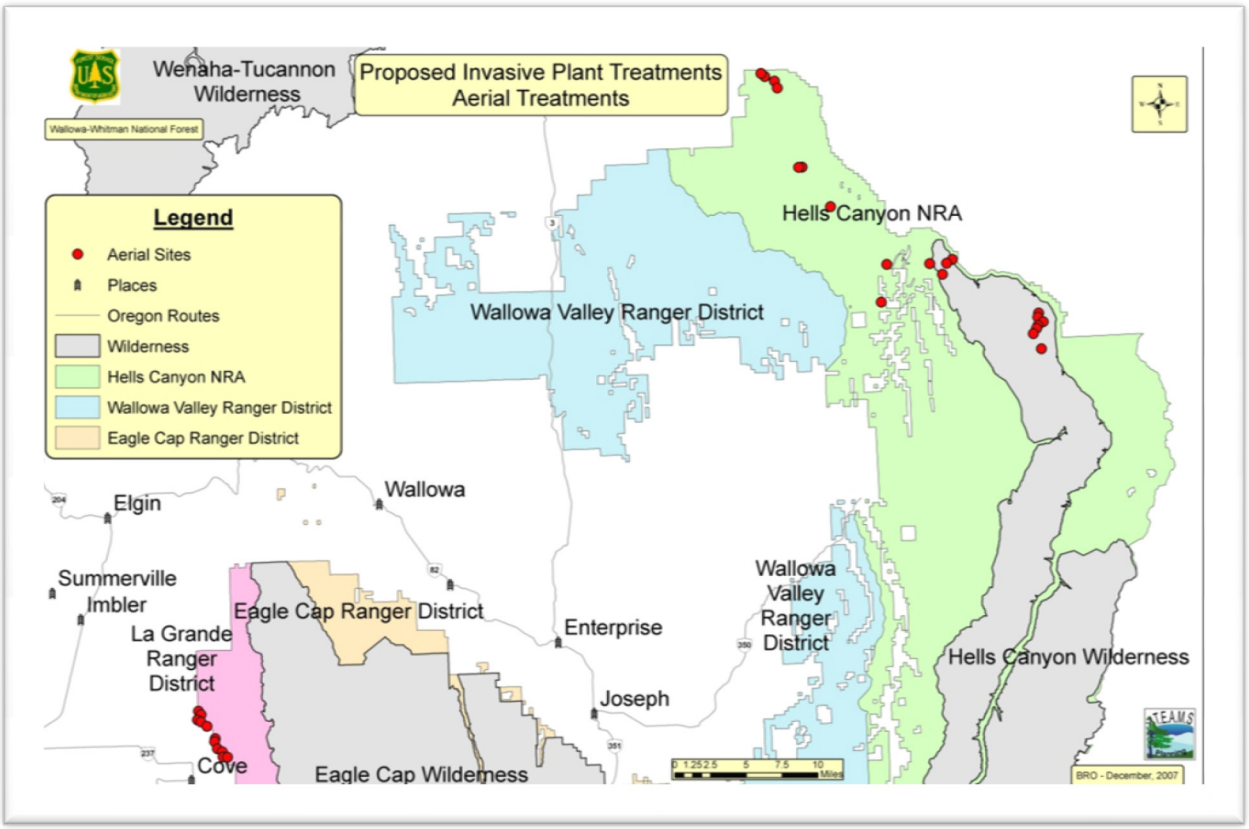

Figure 9 – Proposed herbicide aerial application invasive plants treatments

Chemical Methods

Chemical methods include use of herbicides and surfactants according to R6 2005 ROD standards. The effectiveness, risks and properties of the herbicides and application methods proposed for use vary widely.

Ground-based or aerial application of herbicides would be used based on accessibility, topography, the size of treatment area and the expected efficiency and effectiveness of the method selected. The eventual goal is to reduce dependence on herbicide applications and maintain sites using nonherbicide methods.

The following are examples of the proposed chemical methods of application:

Spot spraying – This method targets individual plants and is usually applied with a backpack sprayer. Spot Spraying can also be applied using a hose off a truck-mounted or ATV-mounted tank, or tanks mounted on pack animals.

Wicking – This hand method 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 contact with nontarget vegetation.

Stem injection – A hand application technique currently is being used on Japanese knotweed in western OR & WA.

Approximately 9,000 acres are currently proposed to be treated with spot or selective methods such as those described above.

Hand broadcast – Herbicide would be applied by hand using a backpack or hand spreader to cover an area of ground rather than individual plants.

Boom broadcast – This 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 in areas where invasive plants occupy a large percentage of cover on the site and the area to be treated makes spot spraying impractical.

In the Proposed Action, approximately 16,600 acres would be proposed for nonaerial broadcast applications.

Aerial applications – In areas where physical features, such as topography, raise applicator safety concerns or where the cost of ground application is prohibitive, invasive plants may be treated with the use of helicopters. Aerial application of the herbicides would occur in the HCNRA and La Grande District covering approximately 875 acres (see Figure 9). Appendix B includes maps detailing aerial application sites.

All treatments would be done in accordance with USDA Forest Service policies, regulations, Forest Plan Standards, and product label requirements. When herbicide use occurs in close proximity to sensitive areas, specific design features, called Project Design Features (PDFs), would be applied so that vegetation treatments do not have an adverse impact on nontarget plants or animals. PDFs are listed in this chapter in section 2.2.3. Chemicals approved for use within or outside riparian areas are listed in the *Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants FEIS* (USDA Forest Service 2005a) and accompanying ROD (USDA Forest Service 2005b).

Herbicide formulations and mixtures can contain one or more of the following 10 active ingredients: chlorsulfuron, clopyralid, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sethoxydim, sulfometuron methyl, and triclopyr. Additional herbicides may be added in the future at either the Forest Plan or project level through appropriate risk analysis and NEPA/ESA procedures per standard 16 of the Wallowa-Whitman NF LRMP as amended by the R6 2005 ROD.

The application rates and method depend on the presence of the target species, condition of nontarget vegetation, soil type, depth to the water table, the distance to open water sources, riparian areas, special status plants, and requirements of the herbicide label. Applications would be scheduled and designed to minimize the potential impacts to nontarget plants and animals (R6 2005 FEIS, Appendix 1-5, 1-6) by applying Project Design Features. Monitoring of treated sites would determine what follow-up treatments would be needed if treatment methods need to be changed or if a more effective herbicide should be used.

Though the invasive plant inventory was thorough, it is reasonable to assume not all invasive plants sites have been located and that new sites will emerge on the landscape. Therefore, ongoing monitoring of treated sites would also look for new infestations. Newly discovered infestations would likely receive a high priority for treatment under the Early Detection Rapid Response (EDRR) strategy. Such treatments would be done under the same guidance of the R6 2005 ROD, other Forest Plan standards, product labels, and PDFs used for known treatment sites.

Table 4 displays 10 herbicides proposed for use in the Proposed Action (PA). The range of application rates for each chemical was derived during the SERA Risk Assessments, which are the basis for the herbicides analyzed in the R6 2005 FEIS. Most of the time application rates would not exceed the typical rate and effects analyses assumes the typical rate; however the actual effective rate may vary depending on application method, target species, and Project Design Features (site-specific measures of protection). Broadcast applications would never exceed typical label rates shown in Table 4. Nonbroadcast methods such as spot spraying, wicking, wiping or stem injection may be applied at rates greater than typical, but that would happen infrequently and only where necessary to be effective.

Table 4-High, Typical, and Low Application Rates for Herbicides

Herbicide	Highest Application Rate Lbs. a.i./acre	Typical Application Rate Lbs. a.i./acre	Lowest Application Rate Lbs. a.i./acre
Chlorsulfuron	0.25	0.056	0.0059
Clopyralid	0.50	0.35	0.10
Glyphosate	7.00	2.00	0.50
Imazapic	0.19	0.130	0.031
Imazapyr	1.25	0.45	0.03
Metsulfuron Methyl	0.15	0.03	0.013
Picloram	1.00	0.35	0.10
Sethoxydim	0.38	0.30	0.094
Sulfometuron Methyl	0.38	0.045	0.03
Triclopyr	6.00	1.00	0.10

Maximum rates reflect the annual cumulative maximum application rate per acre. Some formulations have one-time maximum application rates which can be substantially lower than the annual maximum rate.

Additives, Inert Ingredients, and Impurities

Adjuvants are compounds added to the formulation to improve its performance. They can either enhance the activity of an herbicide's active ingredient (activator adjuvant) or offset any problems associated with its application (special purpose or utility modifiers). For example, Surfactants are one type of adjuvant that makes the herbicide more effective by increasing plant absorption. PDFs have been developed to reduce potential impacts from adjuvants.

Inert compounds are those that are intentionally added to a formulation, but have no herbicidal activity and do not affect the herbicidal activity. Inert additives facilitate the herbicide's handling, stability, or mixing.

Impurities are inadvertent contaminants in the herbicide, usually present as a result of the manufacturing process.

Physical Methods

Physical methods include manual control and hand mechanical.

Manual Control Methods - These include nonmechanized approaches, such as hand pulling or using hand tools (e.g., grubbing), to remove plants or cut off seed heads. Manual treatments are labor intensive, effective only for relatively small accessible areas, and would be repeated several times throughout the growing season depending on the species. Manual treatments can be effective for annual and tap-rooted weeds, but are ineffective against perennial weeds with deep

underground stems or roots, or fine rhizomes that can be easily broken and left behind to re-sprout.

Manual treatments are typically used to treat selected plants, small infestations, and sensitive areas to avoid potential toxic impacts to nontarget species or water quality. Where sites are small or there are few individual target species, handsaws, axes, shovel, rakes, machetes, grubbing hoes, mattocks, brush hooks, and hand clippers may all be used to remove invasive plant species. Axes, shovels, grubbing hoes, and mattocks are also used to dig up and cut below the surface to remove the main root of plants. To meet control objectives or reduce the risk of activities spreading invasive plants, seed heads and flowers are removed and disposed of properly. Other manual methods could include mulching, hot water steaming, foaming, or solarization techniques such as using black plastic to cover invasive plants to shade out and kill pieces of roots (i.e. rhizomes). These techniques could be used where minimizing herbicide use is desirable such as areas with an abundance of sensitive wildlife or plant species.

Mechanical Control Methods - This method uses power tools and includes such actions as mowing, weed whipping, road brushing, root tilling methods, or foaming, steaming, infrared and other techniques using heat to reduce plant cover and root vigor. Choosing the appropriate treatment depends on the characteristics of undesired species present (for example, density, stem size, brittleness, and sprouting ability); the size of the treatment area, seedbed preparation and revegetation; the sites location (inside or outside a riparian area); and soil or topographic considerations. These activities would typically occur along roadsides, rock sources, or other confined disturbed areas and dispersed use areas.

Mowing and cutting would be used to reduce or remove above ground biomass. Seed heads and cut fragments of species capable of re-sprouting from stem or root segments would be collected and properly disposed of to prevent them from spreading into noninfested areas.

Biological Methods

Animal and Plant Health Inspection Service (APHIS) and State approved invertebrate plant feeders or plant pathogens that are proven natural control agents of specific weed species would be released to selectively suppress, inhibit, or control herbaceous and woody target species.

The invertebrate plant feeders or plant pathogen attack and weaken targeted weed species and reduce their ability to compete or reproduce. Biological controls would be used when the target species occupies extensive portions of the landscape, other methods of control are prohibitive based on cost and location, and an effective biological control regime exists. Biological weed control activities typically include the release of parasitic and `host specific" insects, mites, nematodes, and pathogens. Treatments do not eradicate the target species but rather reduce target plant densities and competition with desired plant species for space, water and nutrients.

Biological control activities include collection of invertebrate plant feeders, development of colonies for collection, transporting, and transplanting parasitic invertebrate plant feeders, and supplemental stocking of populations. Bio-control agents are transported in containers that safely enclose the agent until release.

In some situations, a suite of biological control agents is needed to reduce weed density to a desirable level. As an example; a mixture of five or more biological control agents may be needed to attack flower or seed heads, foliage, stems, crowns and roots all at the same time or during the plant’s life cycle. Typically 15 to 20 years are needed to bring about an economic control level.

The treated areas would continue to be inventoried and monitored to determine the success of the treatments and when the released bio-control agents have reached equilibrium with the target species. Repeat visits may need to be made several times a season, and over a series of years to determine if additional releases are needed or if a different agent needs to be released.

The use of biological treatment usually results in delayed effectiveness, often requiring 5-10 years for successful reduction of infestations. However, the increase of native vegetation is simultaneously occurring that often eliminates the need for restoration. Because of this fact, it is the preferred method in remote areas where access is limited, and on species where bioagents are available and proven successful.

Cultural Treatment Methods/Restoration

Cultural controls are defined in the R6 2005 FEIS as: "The establishment or maintenance of competitive vegetation, use of fertilizing, mulching, prescribed burning, or grazing animals to control or eliminate invasive plants" (page 10). Any of these methods except prescribed burning and grazing animals may be used in this project.

Cultural treatment methods would be used in the context of encouraging native vegetation to out-compete invasive plants. Some infestations can be treated once and some require multiple treatments to be effective. Mulching, seeding, planting and fertilizing the cultural treatments that could be integrated with chemical, physical or biological methods to encourage native plant growth and spread. Native seed would be used to help native species re-establish, enhance competition over invasive plants, and provide erosion protection. In other areas, where 30 percent or more of the desirable vegetation exists, it may naturally replace target invasive plant species that have been removed.

Typical circumstances for applying cultural/restoration treatments include:

- Seeding will likely apply where herbicide treatments cause openings in native vegetation greater than:
    - .1 acres in uplands
    - .01 acres in riparian areas
- Approved mulch may be applied when concern exists about seed predation or to retain soil moisture
- Fertilization would typically accompany seeding unless concern exists that fertilization will stimulate invasive plants growth and dominance of a site

Project Design Features Group P (in this section) addresses restoration for areas that are highly disturbed within the dry grassland habitat in Hells Canyon National Recreation Area, and for areas where potential re-infestation by new or nearby invasive plants threatens the introduction of, or existing, native vegetation as well as soils. Treatment Restoration Standards from the R6 2005 FEIS and guidelines and techniques outlined in *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al. 2003) are addressed. *This document was printed in full in appendix B for the DEIS and removed for the FEIS printing. Information from this document is available on* http://fsweb.r6.fs.fed.us/nr/native-plants/project-planning/ All PDFs are detailed later in this chapter.

Treatment Methods NOT Included

Additional invasive plant treatment methods exist but are not being considered for this project. They include:

- Prescribed burning
- Plowing/Tilling/Digging with Heavy Equipment
- Grazing
- Flooding/Drowning

Projects utilizing one of these methods would be outside the scope of this EIS.

Common Control Measures

Table 5, Common Control Measures Summary, shows species-specific integrated control measures that would be applied to known invasive species on the Wallowa-Whitman National Forest. The table shows known acreages infested with each species, the range of effective treatment options, and site-specific considerations important to the final prescription. The priority and intensity of treatment needed varies widely based on site conditions, values at risk from invasion, and the range and aggressiveness of individual target species.

The Common Control Measures summary table (table 5) is a distillation of detailed work shown in Appendix B prepared by Linda Mazzu (R6 2005 FEIS), and updated by Vicky Erickson (Invasive Weed Specialist), Julie Laufmann (TEAMS Botanist), Gene Yates (Forest Botanist), with incorporated comments from M. Porter (Wallowa Resources, Enterprise, OR) D. Sharratt (Oregon Department of Agriculture), *Pacific Northwest's Least Wanted List: Invasive Weed Identification and Management*, Oregon State University Extension Service, EC1563, 2003), and Nature Serve (www.natureserve.org).

This analysis considers a wide range of treatment options applied to a wide range of site conditions so that practitioners are provided necessary flexibility to increase effectiveness of treatment, reduce cost of treatment, and minimize potential for adverse effects from treatment. As we learn from implementation through monitoring, specific control measures are expected to be adjusted. Adjustments would be subject to NEPA Section 18 reconsideration process.

Widespread species such as cheatgrass and ventenata are not shown in this table. Thousands of acres of common nonnative plants are known on the Forest; these are not the focus of treatment in this document. However, some cheatgrass or ventenata sites may be treated if they are associated with other infestations treated within the scope of this document. Widespread invasive plants such as cheatgrass may be included in the treatment plan for some areas, such as wilderness or other natural areas. However, nonnative species such as cheatgrass would not be considered nontarget species for the purposes of protection (i.e. project design features intended to protect nontarget plants).

Table 5-Common Control Measures Summary - Range of Effective Treatment Options and Site-Specific Considerations by Target Species

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Bugloss (ANOF) *Anchusa officinalis*) *Perennial*	5813 ac 1 site	Herbicide in combination with manual and mechanical. Manual/mechanical alone will not eradicate. Use surfactants for herbicide use to penetrate the hairy leaves on the plant 1.Metsulfuron methyl 2. Picloram 3.Clopyralid 4.Chlorsulfuron + Metsulfuron	Cannot aerially spray sulfonylurea herbicides(as per Standard 16), picloram and clopyralid have mobility and soils restrictions Large site that will not be treated aerially due to lack of acceptable, effective herbicide
Canada Thistle (CIAR) *Cirsium arvense*	3395 ac 154 sites	Herbicide treatment is most effective. The only manual technique would be hand cutting of flower heads, which only suppresses seed production. Manual Disposal: bag and remove flower heads form site. Mowing may be effective in rare cases if done monthly (this intensity would damage native species). Covering with a plastic tarp may also work for small infestations, but smothers all plants covered. Yearly revisits would be necessary; the number of which is dependent on the chemical used and the seedbank. Revegetate with desirable species in accordance with the Restoration Plan. 1. Clopyralid 2. Picloram 3. Chlorsulfuron 4. Aquatic labeled Glyphosate (best in fall) Biocontrols proposed for some sites.	Cannot aerially spray sulfonylurea herbicides (as per Standard 16). Picloram and clopyralid have mobility and soils restrictions. Many sites have well drained or shallow soils where alternative herbicides or methods may be necessary (see Appendix D).
Clary Sage (SASC2) **and Mediterranean sage** (SAAE) *Salvia aethiopis* *Biennial*	22 acres 1 site	Manual or mechanical removal of individual plants can be effective. Mowing several times during the growing season will prevent seed production, but the rosettes are low enough to the ground to escape most damage. Biocontrol available and somewhat effective. 1 Metsulfuron methyl 2. Chlorsulfuron 3. Picloram 4. Glyphosate	Cannot aerially spray sulfonylureas, (as per Standard 16). No known shallow or well drained soil sites.
Common Crupina	284 ac 1 site	Manual/Mechanical - handpulling is effective on small infestations prior to seed set (WA DNR) 1.Clopyralid (0.13 lb ae/A) Sequential fall and spring applications provide >95 % control 2.Triclopyr (.25 lb ae/A) Sequential fall and spring applications provide >95 % control	Biological – none

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
		3. Spring application of picloram	
Dalmatian Toadflax (LIDA) *Linaria dalmatica* **And other Linaria sp.**	783 ac 141 sites	Hand-pull or dig if populations are small Manual Disposal: Plants can be left on site, but may reduce germination of desirable species due to mulching effect. If plants have flower heads with seeds (immature as well), bag and remove them from site. Cutting stems in spring or early summer would eliminate plant reproduction, but not the infestation. These treatments may take up to ten years due to long term seed viability. Revegetate with desirable species in accordance with the Restoration Plan. Plant communities in good condition may recover without replanting. Biocontrols available. 1. Metsulfuron methyl (forested sites) 2. Imazapic (in native grasses) 3. Aquatic labeled Glyphosate 4. Picloram	Biocontrols proposed for some sites. Aquatic Glyphosate may be only option for sites near streams (some riparian sites exist). Picloram may be restricted in well drained, clayey and/or shallow soils at some sites.
Dodder *Cuscuta sp.*	10 acres 2 sites	Mechanical control by roughing out host sagebrush	
Field bindweed (COAR) *Convolvulus arvensis*	3 acres 1 sites	Manual/mechanical –is not effective 1. Picloram apply early bud to full bloom for best control[2] 2. Glyphosate,full bloom – early seed[2] 3. Metsulfuron actively growing plants in bloom stage [2]	Biocontrol available
Himalayan blackberry (RUDI) *Rubus discolor*	15 acres 3 sites	Manual or mechanical removal is effective only in combination with herbicides and is best used as a first step to reduce above ground biomass before root crown removal. Fall herbicide treatments alone or on regrowth follwing cane removal is effective. Glyphosate, Picloram, Imazapyr or Triclopyr	
Hounds tongue (CYOF) (*Cynoglossum officinale*) *Biennial*	980 ac 64 sites	Herbicide in combination with manual treatments. Re-vegetate with desirable species. 1. Metsulfuron methyl 2. Chlorsulfuron 3. Picloram 4. Imazapic or Glyphosate	Some known sites are in riparian areas. Several areas of well drained soils where herbicide selection may be restricted (see Appendix D). Six known sites are proposed for manual only.
Japanese knotweed (POCU6) *Polygonum cuspidatum*	78 acres 2 sites	Mechanical treatment is ineffective alone. Cutting in combination with herbicide is most effective since the manual/mechanical treatments will encourage the plant to send up new shoots. The more shoots per linear foot of root, the more likely you will be able to	Not in treatment database.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Perennial		physically pull them out, exhaust their reserves or kill them with herbicide. Manual treatments alone are not effective. Stem injection is labor intensive and less effective than a canopy foliar spray Glyphosate, Triclopyr, or Imazapyr	
Leafy Spurge (EUES) *Euphorbia esula* *Rhizomatous perennial*	102 ac 12 sites	Herbicide treatments are most effective. Manual and mechanical methods must be used in combination with herbicides for successful control. Repeat treatments are usually required. 1. Picloram 2. Glyphosate or Imazapic Biocontrols available	All but one known site is riparian. Several well drained, excessively well drained, and shallow water table sites. Use of picloram may be limited in some areas.
Medusahead (TACA8) (*Taeniatherum caputmedusae*) *Annual grass*	921 ac 22 sites	Repeated cutting/mowing with herbicide treatment is effective. Manual removal can be effective with small populations. A combination of herbicide application and reseeding with native or desirable nonnative grasses is considered highly effective. Follow-up seeding of a competitive desirable nonnative perennial grass may be necessary prior to returning the site to native perennial grasses Herbicide treatment should be done before seed formation or during the fall through early winter. Repeated treatments may be needed. 1. Imazapic 2. Sulfometuron methyl +Chlorsulfuron 3. Sulfometuron methyl 4. Sethoxydim 5. Glyphosate	No known riparian sites. Several sites are well drained.
Musk thistle (CANU4) (*Carduus nutans*) Biennial **Bull Thistle (**CIVU) *Cirsium vulgare*	27 acres 6 sites	Use manual, mechanical or herbicide control or a combination. Biological controls may be helpful to suppress populations in combination with other methods (see Appendix E). 1. Picloram or Clopyralid 2. Metsulfuron methyl 3. Glyphosate 4. Chlorsulfuron	Biocontrols proposed for some sites. No known riparian sites proposed for herbicide use. No sites are known to be well drained or shallow to ground water.
Pepper weed (LELA2) *(Lepedium latifolium)* Perennial	1 acre 1 site	1. Chlorsulfuron, 2. Metsulfuron, 3. Glyphosate 4. Imazapic 5. Triclopyr may only kill top plant and capable of resprouting use after mowing to increase efficacy	Not a riparian site or known to be well drained or shallow to ground water.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Poison Hemlock	7 acres 3 sites	Manual/Mechanical: Handpulling when soils are wet can be effective on small infestations. Mowing at flowering stage can provide some control. Biocontrol available. 1.Glyphosate 0.75 ai/acre at pre-bolt stage2; 2.Metsulfuron 0.6 oz ai/acre to actively growing plants2	Biological: None
Puncture vine (TRTE) (*Tribulus terrestris***)** *Annual*	12 acres 1 site	Manual and Mechanical control effective if collected prior to seed set. Biocontrol available 1. Chlorsulfuron 2. Sulfometuron methyl 3. Metsulfuron methyl 4. Glyphosate or Picloram	Not on known shallow or well drained soils.
Purple loosestrife (LYSA2) (*Lythrum salicaria***)** *Perennial*	3 acres 3 sites	Biocontrols available. Otherwise, combination of herbicide and manual/mechanical treatments. Glyphosate	
Rush Skeletonweed (CHJU) (*Chondrilla juncea*) *Perennial*	390 ac 36 sites	Since any mechanical damage to plants stimulates new growth resulting in satellite plants, such methods are not recommended. Rush skeletonweed is a deep rooted, rhizomatous perennial considered tolerant to herbicides. Therefore, an aggressive follow up program with repeated applications will be necessary. Difficult to apply because of small leaves. Biocontrols proposed for two sites. 1. Clopyralid 2. Picloram	No known riparian sites. No known shallow or well drained soil sites
Russian Knapweed (ACRE3) (*Acroptilon repens*) *Perennial with adventitious shoots*	26 acres 4 sites	Lasting control requires an integration of techniques: mechanical, manual, herbicide and competitive plantings. 1. Chlorsulfuron 2. Clopyralid 3. Clopyralid + Triclopyr (Redeem) 4. Glyphosate, Imazapic, or Metsulfuron Methyl	No known riparian sites.
Russian thistle (SATR12 or SAIB) (*Salsola tragus*) *Annual*	10 acres 1 site	Manual or mechanical removal of plant prior to seed set can be effective in small populations. Repeat visits to areas previously infested likely required. Spot or hand broadcast with backpack sprayer whenever possible. Boom spray larger areas of dense cover, where dominant plant community is nonnative invasives 1. Chlorsulfuron 2. Metsulfuron methyl 3. Glyphosate	No known riparian sites. No known shallow or well drained soil sites.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Scotch Broom (CYSC4) (*Cytisus scoparius*) *Perennial woody shrub*	115 ac 4 sites	Manual treatments can be effective but are labor intensive. -If herbicides are used, manual treatments could be used for follow-up. -Re-vegetate with desirable species. 1. Hand application of Triclopyr 2. Picloram 3. Glyphosate	No known riparian sites. No known shallow or well drained soil sites Biocontrols are untested in eastern Oregon.
Scotch Thistle (ONAC) *Onopordum acanthium* *Biennial*	1844 ac 157 sites	Cutting and mowing can be effective when combined with revegetation of native species. Repeated mowing, in combination with other management methods, often is necessary for long-term control. Manual removal is effective when entire aboveground plant growth is removed. Herbicide treatment is the most effective control. 1. Picloram or Clopyralid 2. Chlorsulfuron 3. Metsulfuron	Some riparian sites and sites with shallow water table or well drained soils. Buffers and PDFs may reduce the herbicides and/or methods available. Manual treatment proposed for some sites
Slender meadow foxtail (ALMY) (*Alopercurus myosuroides*) *Annual*	.3 acres 1 site	Combination of manual, mechanical and herbicide. Glyphosate or Sethoxydim	
Silverleaf nightshade (SOEL) (*Solanum elaeagnifolium*) *Perennial*	11 acres 2 sites	Manual control can be effective in small areas. Shade from crop canopies (60-90% cover) or mulching may also be an effective control tool. Revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. Usually required multiple applications. 1. Picloram 2. Triclopyr or Glyphosate	
Spotted knapweed (CEBI2, CEMA4) (*Centaurea biebersteinii*) **Diffuse knapweed** (CEDI) (*Centaurea diffusa*) **Meadow knapweed** (CEPR2, CEDE5, CENI3) (*Centaurea*	907 qc 169 sites 4150 ac 384 sites 0 acres 1 site	Biocontrols available for some knapweed species (see Appendix H R6 2005 FEIS Appendix H and White Paper-Spiegel, 2006) Herbicide with manual and mechanical treatment. Revegetate with desirable species, at high priority sites when possible. 1. Clopyralid, or Picloram 2. Glyphosate	Several sites are within riparian areas or areas that have shallow or well drained soils. This influences the herbicide and method available. Biocontrols proposed for several sites.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
debeauxii) **Squarrose knapweed** (CEVIS2) (*Centaurea virgata*) **Knapweed species** (CENTA) *Tap rooted Biennials, or Perennials*	7 acres 2 sites 119 ac 25 sites		
St John's Wort (HYPE) *Hypericum perforatum*	603 ac 56 sites	Hand pulling or digging of young plants in small, isolated infestations may be effective. Repeated treatments will be necessary because lateral roots can give rise to new plants. Pulled or dug plants must be removed from the area and burned to prevent vegetative regrowth. Mowing is ineffective, but may discourage the spread of the plant if done before seeds form. Burning may increase the density and vigor of this species. Biocontrols available. 1. Metsulfuron methyl 2. Picloram 3. Glyphosate	Biocontrols proposed for some sites. Some sites are within riparian areas or areas that have shallow or well drained soils. This influences the herbicide and method available.
Sulphur cinquefoil (PORE5) (*Potentilla recta*) *Perennial*	187 ac 34 sites	Hand-pulling is effective on small infested provided the entire root is removed. Repeated applications are needed for the first couple of years to ensure re-establishment does not occur. 1. Picloram 2. Metsulfuron methyl (by itself not a particularly effective treatment)	Several sites are within riparian areas or areas that have well drained soils. This influences the herbicide and method available. Manual treatment proposed for some sites.
Tansy ragwort (SEJA) (*Senecio jacobaea*) And other *Senecio* spp. *Biennial or short-lived perennial*	78 acres 49 sites	Hand pulling usually results in numerous new rosettes forming from the root fragments. Hand pulling is most effective after the population has been brought under control. Mowing is the most common technique and is effective if done prior to flowering. These treatments may take up to ten years due to long term seed viability. Biocontrols available (Appendix E). Ensure biological controls are present nearby or request their introduction. Revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. 1. Clopyralid 2. Chlorsulfuron 3. Picloram 4. Glyphosate	Biocontrols are available in Western Oregon. ODA has made releases of a Swiss strain of the ragwort flea beetle on private land infestations in Umatilla and Union County in the last two years. Results of those releases are not yet known. Some riparian sites. No sites are known to be in sensitive soil areas.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
Teasel (DIFU2 or DISY) (Dipsascus fullonum) *Biennial*	30 acres 2 sites	Manual and Mechanical can be effective alone and in combination with herbicides. 1. Metsulfuron methyl 2. Chlorsulfuron 3. Clopyralid or Triclopyr	All sites are riparian, No known sites in areas with sensitive soils.
Whitetop (CADR) (*Cardaria draba)* *Perennia*l	1489 ac 179 sites	Herbicide with manual treatment as a follow up. Revegetate with desirable species. 1. Chlorsulfuron 2. Imazapic or Metsulfuron methyl Also: Sulfometuron methyl (not ranked)	Several sites are within riparian areas or areas that have well drained soils. This influences the herbicide and method available.
Meadow Hawkweed (HIPR) *(Hieracium caespitosum)*	16 acres 29 sites	Herbicide treatment is most effective. - Some manual removal possible for small infestations. - Manual Disposal: All plant parts should be removed, as new plants can bud from root, stolon, and rhizome fragments. -Covering with a plastic tarp may also work for small infestations but smothers all plants covered. - Nitrogen fertilization after treatment would encourage native plant growth if done in the spring. - Revegetate with desirable species in accordance with the Restoration Plan 1. Clopyralid 2. Picloram 3. Aquatic labeled Glyphosate	All sites are riparian, Aquatic. No known sites in areas with sensitive soils.
Yellow starthistle (CESO3) *(Centaurea solstitialis)* *Annual*	1966 ac 181 sites	Hand-pull small patches or maintenance programs where plants are sporadically located. Otherwise, mechanical treatment to contain and herbicides in combination with other methods to control or eradicate. -Biocontrol available (see Appendix E). - Revegetate high priority sites if needed with desirable species. Aerial proposed for large, remote sites. 1. Clopyralid or Picloram 2. Glyphosate	Some riparian sites. , No known sites in areas with sensitive soils. Biocontrols prescribed for many sites.

Please note: Herbicides listed in numerical order represent a preferential order; no numerical listing indicates no preference for control, no chemical listed indicates no information available.

The common control measures shown above reveal that picloram, clopyralid, glyphosate and chlorsulfuron are the herbicides that are most often prescribed. Table 6 and Figure 10 below show the acreage and percentage of known sites effectively treated by each of these herbicides, as well as the additional six herbicides approved for use in Region 6. PDFs may impact the choice of herbicides via buffers and other limitations. The decision about which herbicide to use would be made as part of the implementation plan. Chapter 2.2.3 displays project design features specific to the ten herbicides approved for use in Region 6, as well as the gross acres and percentage of known sites where each herbicide would be effective.

Table 6-Design features specific to the ten herbicides approved for use in Region 6, gross acres and percentage of known sites where each herbicide would be effective

Active Ingredient Selected Herbicide Brand Names	Acres of known sites where this herbicide may be effective[1]	Percentage of known sites where this herbicide may be effective	Project Design Features Specific to the Herbicides Approved for Use in Region 6
Chlorsulfuron (Telar, Glean, Corsair)	12,841	53	Not labeled for aquatic use. No aerial application proposed. F-7 Soils evaluated prior to treatment. Treatment of powdery, ashy dry soil, or light sandy soil can only be treated if rainfall is expected within 24 hrs of treatment. H -5 Avoid use of chlorsulfuron on soils with high clay content.
Clopyralid (Transline)	18,408	75	Not labeled for aquatic use. May be aerially sprayed but not within 100 feet of dry streams and 300 feet of flowing streams. F-8o: Clopyralid would be broadcast or aerially applied at rates typical or lower application rates. H-4: Avoid use of clopyralid on high-porosity soils (coarser than loamy sand). J-3g: Clopyralid would not be used within 1.5 miles of peregrine nest more than once per year.
Glyphosate35 formulations, including RoundUp, Rodeo, Accord XRT, Aquamaster	15,863	65	Aquatic label available. No aerial application proposed. H-2: No broadcast of nonaquatic formulation on roads that have a high risk of delivery to water (generally roads in RHCAs).
Imazapic (Plateau)	3,325	14	Not labeled for aquatic use. No aerial application proposed.
Imazapyr (Arsenal, Arsenal AC, Chopper, Stalker, Habitat)	15	3	Aquatic formulation available. No aerial application proposed. I-6: Avoid use of imazapyr when vascular or nonvascular SOLI plant species are within 10 feet of saturated or wet soils at the time of herbicide application. F4. Do not exceed a rate of 0.70 lb active ingredient (a.i.)/acre with broadcast and spot applications.
Metsulfuron methyl (Escort XP)	11,287	46	Not labeled for aquatic use. No aerial application proposed. F-7 Soils evaluated prior to treatment. Treatment of powdery, ashy dry soil, or light sandy soil can only be treated if rainfall is expected within 24 hrs of treatment.

Active Ingredient Selected Herbicide Brand Names	Acres of known sites where this herbicide may be effective[1]	Percentage of known sites where this herbicide may be effective	Project Design Features Specific to the Herbicides Approved for Use in Region 6
Picloram (Tordon K, Tordon 22K)	21,406	91	Not labeled for aquatic use. May be aerially sprayed but not within 100 feet of dry streams and 300 feet of flowing streams. H-2: No broadcast on roads that have a high risk of delivery to water (generally roads in RHCAs). F4; F-8o: Lowest effective label rates would be used and broadcast applications would not exceed typical label rates. Aerial application rates for Picloram would not exceed (0.25lb/ai/acre).. H-6: Avoid use of picloram on shallow or coarse soils (coarser than loam.) according to herbicide labels. No more than one application of picloram would be made within a two-year period. I-6: Do not use picloram within 10 feet of botanical SOLI where soils are saturated at the time of application.
Sethoxydim (Poast, Poast Plus)	948	4	Not labeled for aquatic use. No aerial application proposed. H-2: No broadcast on roads that have a high risk of delivery to water (generally roads in RHCAs).
Sulfometuron methyl (Oust, Oust XP)	2,471	10	Not labeled for aquatic use. No aerial application proposed. F-7 Soils evaluated prior to treatment. Treatment of powdery, ashy dry soil, or light sandy soil can only be treated if rainfall is expected within 24 hrs of treatment. H-7: Avoid use of sulfometuron methyl on shallow or coarse soils (coarser than loam.) No more than one application of sulfometuron methyl would be made within a one-year period. O-1b: Backpack Application - Sulfometuron methyl application rate will not exceed 0.2 lb a.i./ac O-1e: Ground Boom Application - Sulfometuron methyl application rate will not exceed 0.12 lb a.i./ac
Triclopyr (Garlon 3A, Garlon 4, Forestry Garlon 4, Pathfinder II, Remedy, Remedy RTU, Redeem R&P)	3,671	15	Aquatic labeled formulation available. No aerial or broadcast application proposed. H-2: No broadcast nonaquatic formulation on roads that have a high risk of delivery to water (generally roads in RHCAs). L-1: Triclopyr would not be applied to foliage in areas of known special forest products or other wild food collection areas. O1a: Triclopyr backpack application rates would be lower

Active Ingredient Selected Herbicide Brand Names	Acres of known sites where this herbicide may be effective[1]	Percentage of known sites where this herbicide may be effective	Project Design Features Specific to the Herbicides Approved for Use in Region 6
			than 1.0lb a.i. per acre.

[1]The totals represent the acres of sites where the herbicide would be effective. Because some invasive plants can be controlled by more than one herbicide, some site's acres have been counted more than once.

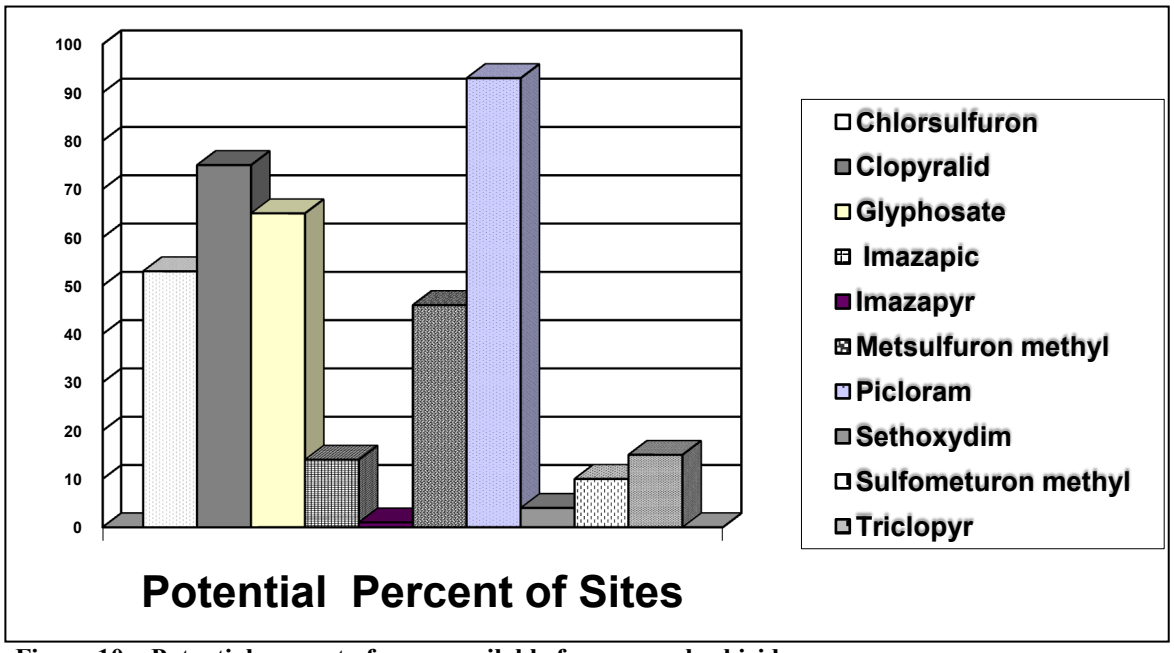

Figure 10 – Potential percent of acres available for use per herbicide

Project Design Features

The following Project Design Features (PDFs) minimize the potential adverse impacts of invasive plants treatment and provide sideboards for EDRR. The PDFs were developed to respond to the site-specific resource conditions within the treatment areas, including (but not limited to) the current invasive plant inventory, the presence of special interest species and their habitats, potential for herbicide delivery to water, and the social environment. Implementation of the PDFs would be mandatory. The analysis assumes buffers approximate horizontal (map) distances.

The effectiveness of the PDFs is addressed throughout Chapter 3. In some cases, the PDFs eliminate an herbicide exposure of concern, for instance, limits the method or rate of herbicide application to avoid a specific type of exposure that risk assessments indicate is over a level of concern for people or the environment. In other cases, the PDFs reduce potential for herbicide exposure to have an effect, but do not necessarily eliminate that potential. The purpose and source of each PDF is provided in the list below.

These PDFs were developed for application to new detections as well as known sites, to ensure that the effects of treating new sites are similar to the effects of treating existing sites.

A-Pre-Project Planning

A-1: Prior to treatment, confirm species/habitats of local interest, sensitive areas (e.g. streams, lakes, roadside treatment areas with higher potential to deliver herbicide to water, municipal watersheds, domestic water sources, shallow water table), recreation and administrative sites, and range allotments. Apply appropriate PDFs described in the following text and all that apply from the Regional EIS/Forest Plan.

For EDRR sites follow the decision process (see figure 12) to determine the type and method of treatment and apply applicable PDFs.

- Purpose: Ensure project is implemented appropriately.
- Source: This approach follows several previous NEPA documents. Pre-project planning also discussed in the previous section.

B-Coordination with Other Landowners and Agencies

Language was added to B-1 to include cooperators within the Forest Service based on public comment

B-1: Work with owners and managers of neighboring lands to respond to invasive plants that straddle multiple ownerships. Coordinate treatments within appropriate distances based on invasive plant species reproductive characteristics, and current use of area. Cooperators within the National Forest System will be informed on any proposed treatments within their areas of interest (such as the PNW Research Station for treatments within or adjacent to Research Natural Areas).

- Purpose: To ensure that neighbors are fully informed about nearby herbicide use and to increase the effectiveness of treatments on multiple ownerships
- Source: A variable distance based on site and species specific characteristics was chosen because it adjusts for various conditions that exist in these areas. All PDFs related to riparian areas and buffer distances will be followed.

C-To Prevent the Spread of Invasive Plants during Treatment Activities

C-1: Ensure vehicles and equipment (including personal protective clothing) does not transport invasive plant materials.

- Purpose: To meet Standards
- Source: Wallowa-Whitman LRMP as amended by the R6 2005 ROD Standard #1

D-Wilderness Areas[2]

D-1: For EDRR in wilderness and Research Natural Areas (RNAs), invasive plants could be treated using nonmechanical hand methods or herbicides. Herbicide treatments may use application methods such as wicking, stem injection, spray bottle, hand pressurized pumps,

[2] Invasive plant eradication within Wilderness meets the "no impact" intent of the Wilderness Act and associated land use policies

battery or solar powered pumps and propellant based systems such as those that use pressurized carbon dioxide.

- Purpose: To reduce the effects of invasive plant treatments on the untrammeled quality of wilderness character

E-Nonherbicide Treatment Methods

E-1: Limit the numbers of workers on any one site at any one time while treating areas within 150 feet of creeks.

- Purpose: To minimize trampling, protect riparian and aquatic habitats, and prevent potential invasive plant spread via waterway dispersal
- Source: The distance of 150 feet was selected because it incorporates the Aquatic Influence Zone for fish bearing streams

E-2: Fueling of gas-powered equipment with tanks larger than 5 gallons would not occur inside the RHCA unless there is no other alternative.

- Purpose: To protect riparian and aquatic habitats
- Source: The distance of 150 feet was selected because it incorporates the Aquatic Influence Zone for fish bearing streams

F-Herbicide Application

F-1: Herbicides would be used in accordance with label instructions, except where more restrictive measures are required as described below. Herbicide applications would 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. Additional chemical formulations may be added only when a formal risk assessment shows them to be less hazardous than existing chemicals that would otherwise be used on the same site. Furthermore, an analysis supplemental to this EIS would be completed to show predicted effects of adding the formulation considered. 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. R-6 2005 ROD Standard 18 permits only the use of adjuvants reviewed in Forest Service risk assessment documents.

- Purpose: To limit potential adverse effects on people and the environment
- Source: W-W LRMP as amended by the R6 2005 ROD Standard 16, Pesticide Use Handbook 2109.14

F-2: Herbicide use would comply with standards in the Forest Plan as amended by the R6 2005 ROD, including standards on herbicide selection, restrictions on broadcast use, tank mixing, licensed applicators, and use of adjuvants, surfactants and other additives.

- Purpose: To limit potential adverse effects on people and the environment

- Source: W-W LRMP as amended by the R6 2005 ROD Treatment Standards (see Chapter 1)

F-3: POEA surfactants, urea ammonium nitrate or ammonium sulfate would not be used in applications within 150 feet of surface water, wetlands or on roadside treatment areas having high potential to deliver herbicide.

- Purpose: To protect aquatic ecosystems
- Source: The distance of 150 feet was selected because it is wider than the largest buffer and incorporates the Aquatic Influence Zone for fish bearing streams. This distance is sufficient to avoid harm to the aquatic environment, based on risk assessments, previous monitoring, and studies related to chemical behavior in the environment (see Chapter 3).

F4: Lowest effective label rates would be used. No broadcast applications of herbicide or surfactant will exceed typical label rates. NPE surfactant would not be ground-based broadcast at a rate greater than 0.5 lbs. a.i./ac (pounds of active ingredient per acre). Favor other classes of surfactants wherever they are expected to be effective.

- Purpose: To eliminate possible herbicide or surfactant exposures of concern to human health, wildlife, and aquatic organisms
- Source: Based on SERA Risk Assessment for imazapyr there would be no exposure concerns

F-5: Herbicide applications would occur when wind velocity is between two and eight miles per hour to reduce the chance of drift. (Appendix F) During application, weather conditions would be monitored periodically by trained personnel.

- Purpose: To ensure proper application of herbicide and reduce drift
- Source: These restrictions are typical so that herbicide use is avoided during inversions or windy conditions

F-6: To minimize herbicide application drift during broadcast operations, 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., nozzle diameter to produce a median droplet diameter of 500-800 microns.

- Purpose: To ensure proper application of herbicide and reduce drift
- Source: These are typical measures to reduce drift. The minimum droplet size of 500 microns was selected because this size is modeled to eliminate adverse effects to nontarget vegetation 100 feet or further from broadcast sites (see Chapter 3 for details).

F-7: Use of sulfonylurea herbicides (Chlorsulfuron, Sulfometuron methyl and Metsulfuron methyl), will require soils on site to be evaluated prior to treatment. Treatment of powdery, ashy dry soil, or light sandy soil can only be treated if rainfall is expected within 24 hrs of treatment.

- Purpose: To avoid herbicide drift caused by wind erosion of dry soils containing sulfonylurea chemical residue
- Source: Label advisory

F-8 - Additional design features specific to aerial application corresponding to Appendix F-Aerial Spray Guidelines:

F-8a: Aerial application of herbicide will not be used for treatment of EDRR sites.

- Purpose: To reduce potential adverse effects to nontarget species

F-8b: Chlorsulfuron, metsulfuron methyl, sulfometuron methyl and triclopyr will not be applied aerially.

- Purpose: To reduce potential adverse effects to nontarget species
- Source: W-W LRMP as amended by the R6 2005 ROD

F-8c: Provide a minimum buffer of 300 feet for aerial application of herbicides near developed campgrounds, recreation residences and private land (unless otherwise authorized by adjacent private landowners).

- Purpose: To minimize impacts to human health
- Source: W-W LRMP as amended by the R6 2005 ROD

F-8d: Prohibit aerial application of herbicides within congressionally designated municipal watersheds[3].

- Purpose: To protect water supplies
- Source: W-W LRMP as amended by the R6 2005 ROD

F-8e: Effectiveness Monitoring required for "a representative sample" of treatments involving aerial application of herbicide.

- Purpose: To insure impacts to nontarget species are within tolerance
- Source: Appendix I, R6 2005 FEIS

[3] Ground based herbicide use is not proposed within the two municipal watersheds on the Forest (Baker and La Grande).

F-8f: Herbicide buffers have been established for perennial and wet intermittent streams, dry streams and lakes and wetlands. These buffers are shown in tables 7, 8, and 9 (this section).

- Purpose: To reduce the likelihood that herbicides would enter surface water in levels of concern
- Source: Buffers based on SERA risk assessments, label advice., and Berg's 2004 study of broadcast drift and run off to streams; monitoring data from other herbicide application project

F-8g: Buffer distances for federally listed SOLIs will follow Recovery Plan recommendations. No aerial application would occur within 300 feet of nonfederally listed SOLIs. Spray cards to monitor drift can be used in conjunction with monitoring to adjust buffers if needed.

- Purpose: To protect SOLIs and reduce nontarget effects. To comply with W-W LRMP as amended by the R6 2005 ROD Standards 19 & 20
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans

F-8h: Aerial spraying of invasive species will not occur in areas with 30 percent or more live tree canopy cover. For live tree canopy cover between 10-29 percent an on-site decision whether or not to aerial spray would be based on factors such as target invasive species, herbicides (specificity) proposed for treatment, and potential impacts to nontarget tree species.

- Purpose: To reduce potential adverse effects to nontarget species
- Source: Common measure

F-8i: Aerial spray units (and perennial seeps, ponds, springs, and wetlands in proposed aerial units) will be ground-checked, flagged and marked using GPS prior to spraying to ensure only appropriate portions of the unit are aerially treated. A GPS system will be used in spray helicopters and each treatment unit mapped before the flight to ensure that only areas marked for treatment are treated. Plastic spray cards will be placed out to 350 feet from and perpendicular to perennial creeks to monitor herbicide presence.

- Purpose: To reduce potential adverse effects to nontarget species
- Source: Common measure

F-8j: Press releases will be submitted to local newspapers indicating potential windows of treatment for specific areas. Signing and on-site layout will be performed one to two weeks prior to actual aerial treatment.

- Purpose: To meet Standard #23
- Source: W-W LRMP as amended by the R6 2005 ROD Standard #23

F-8k: Grazing permittees will be notified at annual permittee meeting that aerial application will be conducted. Permittee will also be notified of specific time frames in which treatment would occur to ensure grazing animals are removed from the area.

- Purpose: To ensure grazing animals are not exposed to aerial herbicide applications

F-8l: Enforceable temporary area, trail, and road closures will be used to ensure public safety during aerial spray operations.

- Purpose: To meet Standard #23
- Source: W-W LRMP as amended by the R6 2005 ROD Standard #23

F-8m: Constant communications will be maintained between the helicopter and the project leader during spraying operations. Ground observers will have communication with the project leader. Observers will be located at various locations adjacent to the treatment area to monitor wind direction and speed as well as to visually monitor drift and deposition of herbicide.

- Purpose: To prevent effects to nontarget species

F-8n: Aerial swath displacement buffers would be applied as needed as described in Table 10 below

- Purpose: To protect resources in the worst case scenario

F-8o: Aerial application rates for Picloram would not exceed (0.25lb/ai/acre), and clopyralid would not exceed typical application rates (0.35lb ai/acre)

- Purpose: To prevent effects to nontarget species
- Source: SERA Risk Assessments, aerial drift modeling (See Appendix B)

G-Herbicide Transportation and Handling Safety/Spill Prevention and Containment

Design Features for G: 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.
-Select transportation routes to minimize exposure to traffic, domestic water sources, and adjacent water sources
-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 150 feet of surface water.
-Ensure safe disposal of herbicide containers.
-Identify sites that may only be reached by water travel and limit the amount of herbicide that may be transported by watercraft (see H12).

- Purpose: To reduce likelihood of spills and contain any spills.
- Source: FSH 2109.14

H- Soils, Water and Aquatic Ecosystems

H-1: Herbicide use buffers have been established for perennial and wet intermittent steams; dry streams; and lakes and wetlands. These buffers are depicted in Table 7, Table 8, and Table 9 below. Buffers vary by herbicide ingredient and application method. Tank mixtures would apply the largest buffer as indicated for any of the herbicides in the mixture.

- Purpose: To reduce likelihood that herbicides would enter surface waters in concentrations of concern
- Source: Treatments within RHCAs are allowed if they meet Riparian Management Objectives (RMOs) including minimizing adverse effects to listed fish; therefore, buffers are based on label advisories, SERA risk assessments and Berg's 2004 study of broadcast drift and run off to streams. Buffers are intended to demonstrate compliance with WAW LRMP as amended by the R6 2005 ROD Standards 19 and 20.

H-2: No broadcast of high aquatic risk herbicides on roads that have a high risk of delivery to water (generally roads in RHCAs). These herbicides are picloram or nonaquatic triclopyr (Garlon 4®), non aquatic glyphosate, and sethoxydim.

- Purpose: To ensure high risk herbicides are not delivered to streams in concentrations that exceed levels of concern
- Source: SERA Risk Assessments, R6 2005 FEIS Fisheries Biological Assessment

H-3: In riparian and aquatic settings, vehicles (including all terrain vehicles) used to access invasive plant sites for invasive plants treatment, apply foam, or for broadcast spraying would remain on roadways, trails, parking areas to prevent damage to riparian vegetation, soil, water quality and aquatic habitat.

- Purpose: To protect riparian and aquatic habitats
- Source: Common measure

H-4: Avoid use of clopyralid on high-porosity soils (coarser than loamy sand).

- Purpose: To avoid leaching/ground water contamination
- Source: Label advisory

H-5: Avoid use of chlorsulfuron on soils with high clay content (finer than loam).

- Purpose: To avoid excessive herbicide runoff
- Source: Label advisory

H-6: Avoid use of picloram on shallow or coarse soils (coarser than loam.) according to herbicide labels. No more than one application of picloram would be made within a two-year period.

- Purpose: To reduce the potential for picloram to enter surface and/or ground water and/or accumulate in the soil. Picloram has the highest potential to impact organisms in soil and water, and tends to be more persistent than the other herbicides.
- Source: SERA Risk Assessment. Based on quantitative estimate of risk from worst-case scenario and uncertainty

H-7: Avoid use of sulfometuron methyl on shallow or coarse soils (coarser than loam.) No more than one application of sulfometuron methyl would be made within a one-year period.

- Purpose: To reduce the potential for sulfometuron methyl accumulation in the soil; sulfometuron methyl has some potential to impact soil and water organisms and is second most persistent.
- Source: SERA Risk Assessments: Based on quantitative estimate of risk from worst-case scenario and uncertainty

H-8: Lakes and Ponds – No more than half the perimeter or 50 percent of the vegetative cover within established buffers or 10 contiguous acres around a lake or pond would be treated with herbicides in any 30-day period. This limits area treated within riparian areas to keep refugia habitat for reptiles and amphibians.

- Purpose: To reduce exposure to herbicides by providing some untreated areas for some organisms to use
- Source: SERA Risk Assessments: Based on quantitative estimate of risk from worst-case scenario and uncertainty regarding effects to reptiles and amphibians

H-9: Wetlands – Wetlands would be treated when soils are driest. If herbicide treatment is necessary when soils are wet, use aquatic labeled herbicides. Favor hand/selective treatment

methods where effective and practical. No more than 10 contiguous acres or fifty percent individual wetland areas would be treated in any 30-day period.

- Purpose: To reduce exposure to herbicides by providing some untreated areas for some organisms to use
- Source: SERA Risk Assessments. Based on quantitative estimate of risk from worst-case scenario, uncertainty in effects to some organisms, and label advisories

H-10: Foaming would only be used on invasive plants that are further than 150 feet from streams and other water bodies.

- Purpose: To limit the amount of foam that may be delivered to streams and other water bodies
- Source: No label regulations are associated with this naturally occurring organic compound. The distance of 150 feet was selected because it incorporates the Aquatic Influence Zone for fish bearing streams

H-11: Herbicide use would not occur within 100 feet of wells or 200 feet of spring developments. For stock tanks located outside of riparian areas, use wicking, wiping or spot treatments within 100 feet of the watering source.

- Purpose: Safe drinking water. Also to reduce the potential chance of herbicide delivery to watering systems used for grazing animals
- Source: Label advisories and state drinking water regulations

H-12: When chemicals need to be carried over water by boat, raft or other watercraft, herbicides will be carried in water tight, floatable containers.

- Purpose: Lower the risk of herbicide being delivered to streams in concentrations that exceed levels of concern

H-13: In aquatic settings, herbicide applications from water's edge to bank-full width will be limited to 2 acres for every 1.6 miles of stream length per 6th field HUC. Treatments above bankfull, within the aquatic influence zone (riparian area), would not exceed 10 acres along any 1.6 mile of stream length per 6th field HUC.

- Purpose: Limits the extent of treatment from the water’s edge through the aquatic influence zone so that adverse effects are within the scope of analysis
- Source: Analyses based on SERA risk assessment worksheets. Ten acres is based on GLEAM model factors.

I - Vascular and NonVascular Plant and Fungi Species of Local Interest (SOLI)

I-1: Botanical surveys may be necessary prior to treatment applications to identify vascular and nonvascular SOLI occurrence in or near areas proposed for invasive plant treatments. Lists of target SOLI to include in each treatment area will be developed by qualified botanical personnel based on the range and distribution of SOLI species and the presence of suitable SOLI habitat. If surveys are deemed necessary, they will be conducted within the proposed treatment area and immediately adjacent to the treatment area as follows: 300 to1000 feet of planned aerial treatments (see I-7), 100 feet of planned broadcast treatments, and 10 feet of planned spot treatments and/or 5 feet of planned hand herbicide treatments.

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans

I-2: If circumstances will not permit surveys prior to treatment then all suitable SOLI habitat identified to occur within and around the treatment area will be managed as if the habitat were occupied by SOLI species. In absence of botanical surveys: no aerial herbicide treatment will occur within 300 to 1000 feet of SOLI habitat (see section I6), and no ground based broadcast, spot, or hand treatments will occur within 100 feet of SOLI habitat.

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans

I-3: Modify treatments to protect SOLI occurrences based on their distance from the treatment area:

Greater than 100 feet: All ground based treatments are permitted (see I-6 and aerial section for additional buffer restrictions) 100 to 10 feet: Manual and mechanical methods permitted. Broadcast herbicide methods permitted if SOLIs can be completely protected using a protective cover, otherwise use other protective measures such as low-pressure spot-spray, directed spray applications or hand application methods to eliminate any potential for drift.

Less than 10 feet: No broadcast spraying is permitted. Spot treatment using hand application methods is permitted. For saturated or wet soils see I-6. Manual treatment methods are permitted. Precautions must be taken to avoid any contact with individual SOLI.

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans

I-4: Picloram will not be used within 50 feet of the threatened plant species *Silene spaldingii* and *Mirabilis macfarlanei.*

- Purpose: To ensure protection of emerging seedlings and potential nontarget plant root uptake due to herbicide soil persistence
- Source: US FWS Conservation Strategy (2004).

I-5: In the vicinity of *S. spaldingii, M. mirabilis* and all other SOLI, restoration and cultural treatments, including seeding and/or use of fertilizer, will be under the direct supervision of the district or forest botanist to ensure that plant communities are restored to their desired condition without negative impacts to existing SOLI populations or individuals. The vicinity areas will be evaluated on a case by case basis.

- Purpose: To ensure soil chemistry/biology is not negatively impacted which can potentially alter the subsequent establishment of resident seedbank species.
- Source: Professional judgment

I-6: When vascular or nonvascular SOLI plant species are within 10 feet of saturated or wet soils at the time of herbicide application, only hand methods (wiping, stem injection, etc.) would be used.

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans.

I-7: Aerial herbicide applications will follow Recovery Plan recommendations for listed species (FWS). Presently, two federally listed species (*Silene spaldingii and Mirabilis macfarlanei*) are documented on the forest. Recovery plan recommend no aerial herbicide within 1000 feet of occurrence for *S. spaldingii* and not adjacent to *M. macfarlanei*. A 1000 foot buffer for aerial application will be used for both species. For nonfederally listed SOLI, no aerial herbicide applications would occur within 300 feet of known location of SOLI and spray cards to monitor drift would be used to monitor drift and adjust buffers if needed (See I-8 and section F8-Aerial PDFs).

- Purpose: To ensure SOLI are protected and surveys are conducted when appropriate
- Source: Forest Service Manual 2670 and applicable federally listed recovery plans. Aerial drift buffers were derived from various scientific publications (See aerial application methods Appendix F)

I-8: A USDA Forest Service botanist would use monitoring results to refine buffers in order to adequately protect vascular and nonvascular plant species of local interest.

- Purpose: To prevent any repeated effects to SOLI populations, thereby mitigating any long term effects
- Source: Broadcast buffer sizes are based on Marrs 1989 tests on vascular plants. Spot and hand/select buffer distances are based on reports from experienced applicators. Uncertainty about effects on non vascular plants would be addressed through monitoring (See I-9)

I-9: The impacts of herbicide use on plant Species of Local Interest (SOLI) are uncertain, especially regarding lichen and bryophytes. The potential for variances in aerial drift due to uncontrolled weather conditions during treatment may also be uncertain. To manage this

uncertainty, representative samples of herbicide treatment sites adjacent to vascular and nonvascular plant SOLIs would be monitored. Nontarget vegetation within 1000 feet of aerial treatment sites, 500 feet of herbicide broadcast treatment sites and 20 feet of herbicide spot and hand treatment sites would be evaluated before treatment, immediately after treatment, and two to three months later as appropriate. Treatment buffers would be expanded if damage is found as indicated by: (1) Decrease in the size of the SOLI plant population, or (2) Leaf discoloration or chlorophyll change

- Purpose: To prevent any repeated effects to SOLI populations, thereby mitigating any long term effects

I-10: Compliance monitoring would occur before implementation to ensure that prescriptions, contracts and agreements integrate appropriate Project Design Features. This will be done via a pre-work review.

I-11: Implementation monitoring would occur during implementation to ensure Project Design Features are implemented as planned. An implementation monitoring form will be used to document daily field conditions, activities, accomplishments and/or difficulties. Contract administration mechanisms would be used to correct deficiencies. Herbicide use will be reported as required by the Forest Service Health Pesticide Use Handbook (FSH 2109.14)

I-12: Effectiveness monitoring would occur before, during and after treatment to determine whether invasive plants are being effectively controlled and to ensure nontarget vegetation, especially native vascular and nonvascular species of local interest are adequately protected.

- Source: Tiering to PNW ROD and PNW FEIS Appendix M: Inventory and Monitoring Plan Framework

J - Wildlife Species of Local Interest

J-1: Bald Eagle

J-1a: Treatment of areas within 0.25 mile, or 0.50 mile line-of-sight, of bald eagle nests would be timed to occur outside the nesting/fledging season of January 1 to August 31, unless treatment activity is within ambient levels of noise and human presence (as determined by a local specialist). Occupancy of nest sites (i.e. whether it is active or not) would be determined each year prior to treatments.

- Purpose: To minimize disturbance to nesting bald eagles and protect eggs and nestlings
- Source: Bald Eagle Management Guidelines for OR-WA (Anonymous); U.S. Fish and Wildlife Service 2003, p. 9

J-1b: Noise-producing activity above ambient levels would not occur between October 31 and March 31 during early morning or late afternoon near known winter roosts and concentrated foraging areas. Disturbance to daytime winter foraging areas would be avoided.

- Purpose: To minimize disturbance and reduce energy demands during stressful winter season
- Source: Bald Eagle Management Guidelines for OR-WA (Anonymous); t Programmatic BO (U.S. Fish and Wildlife Service 2003, p. 9)

J-2: Grey Wolf

J-2a: Treatments within 1 mile of active wolf dens would be timed to occur outside the season of occupancy (April 1 through June 30)

- Purpose: To minimize disturbance and reduce energy demands on denning wolves
- Source: Federal Register, Vol, 68, No, 62 4(d)

J-2b: Treatments within 0.50 mile or 0.50 mile line-of-sight of occupied rendezvous sites would be timed to occur outside the season of occupancy unless treatment activity is within acceptable ambient noise levels and human presence would not cause wolves to abandon the site (as determine by a local specialist)

- Purpose: To minimize disturbance/impacts to wolves at rendezvous sights.
- Source: Buffer is based on expected range of disturbance

J-2c: Consultation with FWS would be reinitiated (unless determined otherwise by FWS) if/when wolf dens or rendezvous sites are discovered in the vicinity of treatment sites.

J-3 Peregrine Falcon

J-3a: Seasonal restrictions (J3-c to g) will be applied based on the spatial and temporal factors listed in J3-b. Restrictions would apply to all known peregrine falcon nest sites for the periods listed below based on the following elevations:

Low elevation sites (1000-2000 ft 01 Jan - 01 July

Medium elevation sites (2001 - 4000 ft) 15 Jan - 31 July

Upper elevation sites (4001+ ft) 01 Feb - 15 Aug

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006.

J-3b: Seasonal restrictions would be waived if the site is unoccupied or if nesting efforts fail and monitoring indicates no further nesting behavior. Seasonal restrictions would be extended if monitoring indicates late season nesting, asynchronous hatching leading to late fledging, or recycle behavior which indicates that late nesting and fledging would occur. The nest zones associated with those nest sites are described below:

(1) Primary: average of 0.5-mile radius from the nest site. Site-specific primary nest zones would be determined and mapped by a local Biologist for each known nest site.

(2) Secondary: average of 1.5- mile radius from the nest site. Site-specific secondary nest zones would be determined and mapped for each known nest site.

(3) 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 three-mile radius.

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3c: Protection of nest sites would be provided until at least two weeks after all young have fledged.

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3d: Invasive plant activities within the secondary nest zone requiring the use of machinery would 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.

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3e: Nonmechanized or low disturbance invasive plant activities (such as spot spray, hand pull, etc.) within the secondary nest zone would 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. Nonmechanized 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.

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3f: All foot and vehicle entries into Primary nest zones would be seasonally prohibited except for the following reasons:

(1) Biologists performing monitoring in association with the eyrie and coordinated with the District Biologist.

(2) Law enforcement specialists performing associated duties with notice to the District Ranger.

(3) Access for fire, search/rescue, and medical emergencies under appropriate authority (Forest Service line officer or designee).

(4) Trail access, when determined by a biologist to be nondisturbing.

(5) Other exceptions on a case-by-case basis as determined by the Deciding Official

- Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-3g: Picloram and clopyralid would not be used within 1.5 miles of peregrine nest more than once per year.

- Purpose: To reduce exposure to hexachlorobenze, which has been found in peregrine falcon eggs
- Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

J-4 Painted Turtle

J-4a: The local Forest Service Biologist will review treatment locations, timing, and methods to minimize adverse impacts to painted turtles PDF H10 defines herbicide treatment limitations to protect amphibian habitat.

- Purpose: To minimize disturbance, trampling, and herbicide exposure to painted turtles
- Source: David Anderson, WA Dept. of Fish and Wildlife, personal communication, 2005

J-5 Greater Sage Grouse (If discovered and documented on the W-W NF)

J-5a: Do not use NPE-based surfactants in areas where sage grouse may forage.

- Purpose: To minimize exposure to disturbance, herbicides and surfactants that could pose a risk

J-5b: 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.

- Purpose: To minimize exposure to disturbance, herbicides and surfactants that could pose a risk

J-5c: Do not conduct any vegetation treatments or improvement project in breeding habitats from February 15 – June 30.

- Purpose: To minimize exposure to disturbance, herbicides and surfactants that could pose a risk

K-Public Notification

K-1: The public would be notified about upcoming herbicide treatments via the local newspaper or individual notification, fliers, and posting signs. Forest Service and other websites may also be used for public notification.

- Purpose: To reduce the risk of inadvertent public contact with herbicide
- Source: W-W LRMP as amended by the R6 2005 ROD Standard 23

L-Special Forest Products

L-1: Triclopyr would not be applied to foliage in areas of known special forest products or other wild food collection areas.

- Purpose: To reduce the chance that people might be exposed to harmful doses of triclopyr
- Source: Appendix Q of the R6 2005 FEIS

L-2: Special forest product gatherers would be notified about herbicide treatment areas when applying for their permits. Flyers indicating treatment areas may be included with the permits.

- Purpose: To reduce the risk of inadvertent public contact with herbicide
- Source: W-W LRMP as amended by the R6 2005 ROD Standard 23

M- American Indian Tribal and Treaty Rights

M-1: American Indian tribes would be notified annually as treatments are scheduled so that tribal members may provide input and/or be notified prior to gathering cultural plants.

- Purpose: To ensure that no inadvertent public contact with herbicide occurs and that cultural plants are fully protected.
- Source: Government to government agreements between American Indian tribes and the Wallowa-Whitman National Forest

M-2: The Forest Archaeologist will annually assess areas where mechanical treatment that could cause damage to cultural resources is proposed. Weed wrenching and grubbing techniques will not be used in known archaeological sites. Instead, treatment methods that would have no potential to affect cultural resources will be used.

- Purpose: To avoid adverse impacts to cultural resources
- Source: Common practice

N-Rangeland Resources

N-1 was removed since the draft because N-2 describes the appropriate process

N-2: Permittees will be notified of annual treatment actions at the annual permittee operating plan meeting, and/or notified within two weeks of planned treatments of infestations greater than one acre in size. See PDF section K.

- Purpose: To ensure permittee has knowledge of activities occurring within the allotment
- Source: Common practice

N-3: Follow most current EPA herbicide label for grazing restrictions

- Purpose: To ensure grazing animals are not exposed to chemicals
- Source: EPA labeling requirements

O-Human Health (See R6 2005 FEIS, Appendix Q for more information)

O-1: Backpack application rate for Sulfometuron methyl will not exceed 0.2 lb a.i./ac., and for NPE surfactant it will not exceed 1.67 lb a.i./ac

- Purpose: To reduce the potential of adverse effects to human health

O-2: Spot spray application rate for Picloram will not exceed 0.35 lb a.i./ac., and for Sulfometuron methyl it will not exceed 0.12 lb a.i./ac

- Purpose: To reduce the potential of adverse effects to human health

O-3: Triclopyr application rate will not exceed 1.0 lbs a.i./ac. Use spot spraying techniques to further reduce dermal exposure. Favor other herbicides wherever they are expected to be effective

- Purpose: To reduce the potential for adverse effects to human health from dermal contact or consumption of contaminated vegetation

P-Restoration

The "Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest" (Erickson et al.2003) document referenced in the PDFs below was printed in full in appendix B for the DEIS and removed for the FEIS printing. Information from this document is available on http://fsweb.r6.fs.fed.us/nr/native-plants/project-planning/

P-1: Long-term site strategy for highly disturbed areas that have high potential for weed invasion such as old fields or old homesteads, follow guidelines and techniques outlined in *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al.2003)

- Purpose: To ensure highly invisible/disturbed sites are successfully restored or revegetated with desirable vegetation
- Source: Treatment Restoration Standard 12 (RFEIS)

P-2: On dry grassland habitat below 3000 feet in the Hells Canyon National Recreation Area and other highly disturbed areas where live vegetative groundcover will be reduced by 70 percent of existing vegetation by herbicide treatment, restoration and/or revegetation would occur following *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al.2003) and R6 2005 FEIS standards

- Purpose: To ensure highly invasible/disturbed sites are successfully restored or revegetated with desirable vegetation
- Source: Treatment Restoration Standard 3, 12 (RFEIS), *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al. 2003; see information in P-2 above), Water Erosion Prediction Project (WEPP) erosion data, and Goodwin et al. 2002

P-3: In areas where broadcast herbicide is used to treat highly infested areas, evaluation of potential re-infestation by new or nearby invasive plants would be considered, and restoration and/or revegetation measures would be implemented to ensure protection of native vegetation and soils. Also see Treatment Restoration Standard #12 in the R6 2005 FEIS and ROD.

- Purpose: To ensure those sites are successfully restored with desirable vegetation
- Source: Treatment Restoration Standard 3, 12 (RFEIS), and *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al. 2003)

Herbicide Use Buffers

Herbicide treatments would be more restrictive close to water. PDFs and herbicide use buffers within the aquatic influence zone were developed based on label advisories; SERA risk assessments, and various studies of drift and runoff to streams such as Berg 2004. The scientific basis for establishing no-treatment buffer widths is based on research on inherent risk of chemical contamination due to herbicide application (Moore 1975; Norris, Lorz and Gregory 1991; Bissin, Ice, Perrin and Bilby 1992). In general, research has demonstrated that the risk of aquatic organism exposure to chemical herbicides is dependent on three key factors: (1) chemical behavior, (2) the rate and methods of application, and (3) site characteristics. Tables 7, 8 and 9 specify buffers according to treatment methods, herbicides used, risk, and type of aquatic zone. Table 10 addresses buffer widths used for aerial application. Buffers identify distances from various water bodies where treatment activities are not allowed. Ephemeral streams exist in the project area. Label direction and PDFs would be followed for treatments along ephemeral streams, which flow during high water events when herbicide use would not likely occur.

Table 7-Herbicide Use Buffers in Feet -Perennial and Wet Intermittent Streams -Proposed Action

Herbicide	Perennial and Wet Intermittent Stream			
	Aerial	Broadcast	Spot	Hand/Select
Aquatic Labeled Herbicides				
Aquatic Glyphosate	Not proposed	100	Water's edge	Water's edge
Aquatic Triclopyr-TEA	None Allowed	None Allowed	15	Water's edge
Aquatic Imazapyr*	Not proposed	100	Water's edge	Water's edge
Low Risk to Aquatic Organisms				
Imazapic	Not proposed	100	15	Bankfull
Clopyralid	300	100	15	Bankfull
Metsulfuron Methyl	None Allowed	100	15	Bankfull
Moderate Risk to Aquatic Organisms				
Imazapyr	Not proposed	100	50	Bankfull
Sulfometuron Methyl	Not proposed	100	50	5
Chlorsulfuron	Not proposed	100	50	Bankfull
High Risk to Aquatic Organisms				
Triclopyr-BEE	None Allowed	None Allowed	150	150
Picloram	300	100	50	50
Sethoxydim	Not proposed	100	50	50
Glyphosate	Not proposed	100	50	50

Table 8-Herbicide Use Buffers in Feet -Dry Intermittent Streams -Proposed Action

Herbicide	Dry Intermittent Stream			
	Aerial	Broadcast	Spot	Hand/ Select
Aquatic Labeled Herbicides				
Aquatic Glyphosate	Not proposed	50	0	0
Aquatic Triclopyr-TEA	None Allowed	None Allowed	0	0
Aquatic Imazapyr*	Not proposed	50	0	0
Low Risk to Aquatic Organisms				
Imazapic	Not proposed	50	0	0
Clopyralid	100	50	0	0
Metsulfuron Methyl	None Allowed	50	0	0
Moderate Risk to Aquatic Organisms				
Imazapyr	Not proposed	50	15	Bankfull
Sulfometuron Methyl	None Allowed	50	15	Bankfull
Chlorsulfuron	None Allowed	50	15	Bankfull
High Risk to Aquatic Organisms				
Triclopyr-BEE	None Allowed	None Allowed	150	150
Picloram	100	100	50	50
Sethoxydim	Not proposed	100	50	50
Glyphosate	Not proposed	100	50	50

Table 9-Herbicide Use Buffers in Feet – Lakes and Wetlands

Herbicide	Wetlands			
	Aerial	Broadcast	Spot	Hand/ Select
Aquatic Labeled Herbicides				
Aquatic Glyphosate	Not proposed	100**	Water's edge	Water's edge
Aquatic Triclopyr-TEA	None Allowed	None Allowed	15	Water's edge
Aquatic Imazapyr*	Not proposed	100**	Water's edge	Water's edge
Low Aquatic Hazard Rating				
Imazapic	Not proposed	100	15	High water mark
Clopyralid	300	100	15	High water mark
Metsulfuron Methyl	Not proposed	100	15	High water mark
Moderate Aquatic Hazard Rating				
Imazapyr	Not proposed	100	50	High water mark
Sulfometuron Methyl	None Allowed	100	50	5
Chlorsulfuron	None Allowed	100	50	High water mark
Greater Aquatic Hazard Rating				
Triclopyr-BEE	None Allowed	None Allowed	150	150
Picloram	300	100	50	50
Sethoxydim	Not proposed	100	50	50
Glyphosate	Not proposed	100	50	50

*Aquatic Imazapyr (Habitat) may not be used until the risk assessment (currently underway) is completed for inert ingredients and additives.
** If wetland, pond or lake is dry, there is no buffer.

Table 10-Buffer widths required for aerial applications

Buffer width for a 25 foot release height, 7-8 mph winds	Buffer width for a 35 foot release height, 7-8 mph winds	Buffer width for a 50 foot release height, 7-8 mph winds
Designated buffer	Add 1 swath width to buffer	Add 2 swath widths to buffer

Ensure little to no drift by applying these buffers and low drift technology (i.e. nozzle design and/or additives), as directed in PDFs

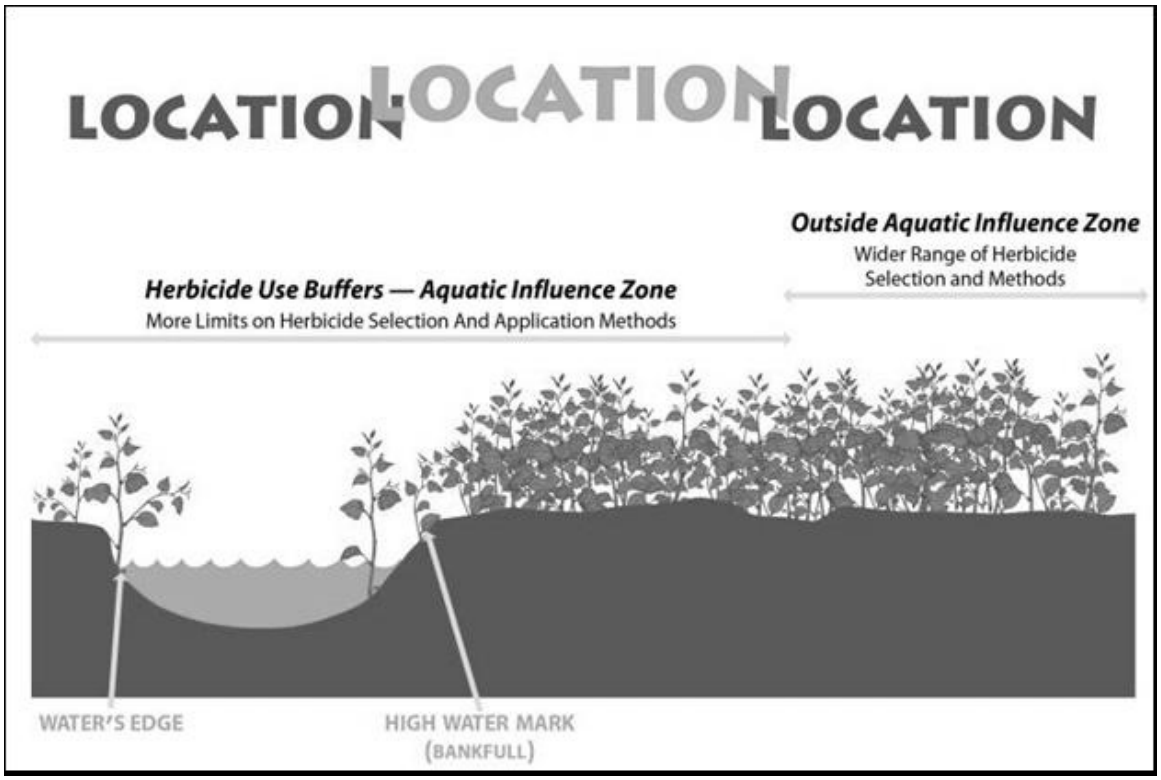

Figure 11 – Illustration of how herbicide selection and application methods in the established buffer widths are more limited in Aquatic Influence Zones

Figure 11 illustrates how the Aquatic Influence Zone restricts application methods and herbicides to only those approved for use in aquatic areas. "Aquatic Influence Zone" is not equal to the "buffer widths" listed in the tables above. For purposes of analysis in this EIS, the Aquatic Influence Zone is defined by the innermost half of the RHCA. For instance, a 300 foot RHCA would have an Aquatic Influence Zone of 150 feet. Establishing buffer widths reduces the potential for herbicides to come in contact with water via drift, leaching, and runoff at or near concentrations of concern.

Early Detection and Rapid Response

As described previously, Early Detection/Rapid Response (EDRR) is aimed at controlling new infestations that are small in size thus decreasing cost and the need for repeated applications. It is also advantageous because: 1) the precise location of individual target plants is subject to rapid and/or unpredictable change; and 2) presently known infestations may grow during the time it typically takes to complete the NEPA process. The 2006 inventory is estimated to include 95 percent of the existing sites; however, these sites may be spreading and new sites may likely become established during the life of the project. The estimate of 95 percent is based on a poll of invasive plant specialists across the Forest who conducted inventories over the past 20 years in the majority of likely invasive plant sites.

The Proposed Action would allow treatment of new detections, as long as the treatment method is within the scope of this EIS. Limitations associated with the PDFs would apply to new as well as existing sites. Invasive plant sites that are discovered subsequent to the current invasive plant inventory would require evaluation to determine that the invasive plants treatments and environmental impacts are consistent with those analyzed in this EIS.

New sites would be treated under the auspices of this project, even if it involves a new invasive species, as long as the effective treatment is similar to the common control measures and treatment methods described previously. The exception to this is aerial treatment; no aerial treatment is authorized under EDRR. New sites that require aerial treatment would be subject to additional NEPA analysis. If a new site needs a treatment that has not been analyzed in this document, or if PDFs cannot be applied effectively to a new site, additional NEPA analysis would also be required.

New detections are usually small in size and would likely have a higher priority for treatment. The annual treatment cap of 8,000 acres and life of the project treatment cap of 40,000 acres includes the sum of EDRR sites as well as known sites. EDRR sites would be subject to the following herbicide use decision process.

1. Is the target population associated with a size, phenology, density or distribution that warrants herbicide use (alone or in combination with other methods)? Consider whether or not herbicides are required for treatment effectiveness and/or whether or not the use of herbicides substantially increases cost-effectiveness of treatment? Consult common control measures. Consider whether volunteers may be available to reduce the cost of manual treatments.

Yes (use herbicides): List potential herbicide choices and integrated prescription. Review label directions and project design criteria. Consider nontarget vegetation surrounding treatment sites and use selective herbicides as appropriate. Consider soil conditions at the treatment site. Consider previous treatments that have occurred on the site. Were they effective? Would another herbicide or combination of methods be more effective? Also note that triclopyr may not be used in areas of known special forest product or subsistence collection. Go to 2.
No: Use nonherbicide methods.

2. Do the size, density and/or distribution of invasive plants warrant the broadcast application method? Would another herbicide besides triclopyr be effective? (Please note that triclopyr may not be broadcast)

Yes: Is the treatment site within the aquatic influence zone and/or on a road that has high potential to deliver herbicide to surface waters? Is the site in a wildlife habitat that has specific restrictions to broadcasting? Go to 3a.
No: Go to 3b.

3a. Apply surface water buffers as appropriate. Is this site within an area where broadcasting is prohibited?

Yes: Do not broadcast. Go to 4.
No: Go to 3b.

3b. Are there botanical species of local interest/suitable habitat within 100 feet of the proposed broadcast site?

Yes: Survey as needed within suitable habitats. Apply botanical buffers as appropriate (see table 25). Broadcast may still be acceptable if botanical species of local interest are covered by barrier. Go to 4.
No: Broadcasting is an acceptable treatment method for herbicides except triclopyr. Use lowest effective label rates for each given situation. Do not exceed typical label rates. Favor other surfactants besides NPE and do not broadcast NPE at a rate exceeding 0.5 lbs. active ingredient per acre. Do not broadcast spray NPE in animal habitats (see table 35). Do not broadcast imazapyr at a rate greater than 0.7 lbs per acre. Consider wildlife habitats in the area and implement seasonal restrictions if required.

4. Will spot and/or selective methods be reasonably effective in this situation?

Yes: Apply spot/selective buffers and use aquatic labeled herbicides as appropriate. **No:** Seek approval for treatment through additional decision process (NEPA Section 18 or a new NEPA process).

Figure 12 – EDRR Herbicide Use Decision Tree Process

Annual Implementation Planning

This section outlines the process for making sure the selected alternative is properly implemented. The method follows Integrated Weed Management principles (R6 2005 FEIS, 3-3) and satisfies pesticide planning requirements at FSH 2109.14. It applies to currently known and new sites found during ongoing monitoring (EDRR).

1. Characterize the invasive plant infestation to be treated. This includes:

- Map and describe the target species, density, extent, treatment strategy, and site conditions.
- List any resource of concerns and determine if additional surveys are needed. Coordinate with resource specialists to get additional information or new information about specific locations. Identify and perform pre-treatment surveys for species of local interest and/or their habitats.

2. Develop site prescriptions

- Use Integrated Weed Management principles to identify possible effective methods of treatment. Nonherbicide treatments should be considered when sites are small or target plant densities are low, particularly after several years of herbicide treatments. Prescribe herbicides as needed based on the biology of the target species and size of the infestation (for instance, manual treatment alone cannot effectively eradicate rhizomatous species). **Determine that the prescribed treatment is within the scope of those analyzed in the EIS. If treatments would not be effective once Project Design Features are applied, further NEPA would also be required to authorize the effective treatment.**
- Apply appropriate Project Design Features. Consider the soil texture and type and potential for ground water contamination to ensure that label guidance and PDFs related to soils are followed. Consider the presences of small unmapped small wetlands and ensure PDFs are appropriately applied.
- Determine that the prescribed treatment is consistent with the ESA consultation.
- Review compliance criteria for the Forest Plan and any other environmental standards indicated by the label or state regulations. Develop an Invasive Plant Prevention Plan, a public notification plan, and coordinate with local Tribes.
- Complete Form FS-2100-2, Pesticide Use Proposal. This form lists treatment objectives, specific herbicide(s) that would be used, the rate and method of application, and Project Design Features that apply. Apply for any herbicide application permits when needed for treatments in Riparian Areas.
- Confirm that acceptable plant or mulch materials are available for cultural treatments/restoration. If the prescription includes extensive site preparation, additional NEPA is required.
- Coordinate with adjacent landowners, water users, agencies, and partners.
- Apply annual caps Forestwide, a cap for the life of the project, and an annual cap for riparian areas including individual watersheds. (Cap acreages refer to first-time treatment acres and do not count retreatment of those same acres). The Caps include:
    - A maximum of 8,000 acres per year Forestwide

- A maximum for the life of the project of 40,000 acres (combined treatment acreage of known, presently undetected, and future new infestations)
- A maximum of 4,000 acres of riparian treatment per year

3. Accomplishment and Compliance Monitoring

- Develop a project work plan for herbicide use as described in FSH 2109.14.3. This plan presents organizational and operational details including treatment objectives, the equipment, materials, and supplies needed; the herbicide application method and rate; field crew organization and lines of responsibility, and a description of interagency coordination. The plan will also include a job hazard analysis to assure applicator safety.
- Ensure contracts and agreements include appropriate prescriptions and that herbicide ingredients and application rates meet label requirements, Standards 16 and 18, and site specific Project Design Features.
- Document and report herbicide use and certify applicator information in the National Pesticide Use Database, via the Forest Service Activity Tracking System (FACTS) to determine the amount, type and location of herbicide use annually, and also whether the goal of reducing herbicide use over time is achieved.
- Document the implementation of the public notification plan.

4. Post Treatment Monitoring

- Post-treatment reviews would occur on a sample basis or when required by a Project Design Feature to determine whether treatments were effective, if damage to nontarget species occurred, or whether or not passive restoration occurred as expected.
- Post-treatment monitoring would also be used to detect whether Project Design Features were appropriately applied and effective. Contract administration and other existing mechanisms would be used to correct deficiencies.
- Additional monitoring may be done consistent with the R6 2005 ROD.

2.2.4 Alternative C – No Broadcast Spraying in Riparian

Alternative at a Glance

Activity	Approximate Value
Acres identified for treatment	22,842
Percent of Total Forest Landbase Affected by Known Sites	0.9%
Maximum percent of Total Forest landbase treated annually	0.32%
Percentage of treatment sites where full range of effective treatments are available	86%
Number of herbicides available for use	10
Acres of proposed herbicide treatments for known sites	20,776
Acres identified for aerial spraying of herbicides	875
Approximate total acres of ground-based (hand or boom) broadcast treatments proposed for known sites (all in uplands)	13,556
Acres of hand or nonaerial broadcast treatments with riparian/wetland areas	0
Acres of spot or selective herbicide application on known sites (all in riparian areas)	6,345
Number of invasive sites where methods other than herbicides could be effective	313
Acres of invasive sites where methods other than herbicides could be effective	2,066
EDRR includes chemical methods other than aerial	Yes
Average Cost per effectively treated acre	$312

Alternative C was developed to respond to concerns that detrimental effects could occur from broadcast spraying herbicide in riparian areas. Invasive plants have been inventoried on about 6,300 acres within riparian area and wetlands. This alternative would not allow broadcast applications of herbicides in these areas. The features of this alternative are the same as Alternative B with the exception of the limitations imposed on broadcast spraying in riparian areas. New detections in riparian areas would be subject to the same limitations as the known sites under this alternative; therefore broadcast herbicide applications would not be allowed.

Broadcast of herbicide in riparian areas was identified as a high risk in the R6 2005 ROD (Appendix 1). Alternative C avoids this higher risk, while still allowing herbicide treatment applications in riparian via lower risk spot spraying, wicking, foliar applications, injections, etc. These application methods target specific invasive plants, apply the herbicide to the plant or small group of plants and have little possibility of contact with other plants, animals or nonorganic matter. With this level of control specificity, potential contact with water or aquatic organisms from chemical drift is virtually eliminated. For these reasons, spot and selective application treatments were NOT considered high risk in the R6 2005 ROD.

However, along with lower risk, Alternative C increases costs, which could reduce effectiveness, including potentially treating fewer acres of invasive weeds compared to Alternative B (see Table 12 for cost comparison). This is because broadcast applications are more cost-effective in dense and/or extensive infestations such as roadsides.

Alternative C includes all of the PDFs and buffers associated with Alternative B; though, eliminates all broadcast treatments in riparian and wetland areas. These areas could still be treated, but fewer acres would likely be treated because of the higher average cost of spot spraying or selective treatments.

2.2.5 Alternative D – No Aerial Spraying

Alternative at a Glance

Activity	Approximate Value
Acres identified for treatment	22,809
Percent of Total Forest Landbase Affected by Known Sites	0.9%
Percent of Total Forest landbase treated annually	0.32%
Percentage of treatment sites where full range of effective treatments are available	96%
Number of herbicides available for use	10
Acres of proposed herbicide treatments for known sites	19,901
Acres identified for aerial spraying of herbicides	0
Approximate total acres of ground-based (hand or boom) broadcast treatments proposed for known sites (all in uplands)	13,556
Acres of hand or nonaerial broadcast treatments with riparian/wetland areas	3,104
Acres of spot or selective herbicide application on known sites (all in riparian areas)	3,241
Number of invasive sites where methods other than herbicides could be effective	341
Acres of invasive sites where methods other than herbicides could be effective	2,908
EDRR includes chemical methods other than aerial	Yes
Cost per effectively treated acre	$334

Alternative D was developed to respond to concerns that detrimental effects could occur from aerial spraying of herbicide. Alternative D is the same as the Proposed Action, except approximately 842 acres would be treated using methods other than aerial. About 33 acres would not be treated at all, because aerial is the only reasonable method for these acres.

Aerial application of herbicide was identified as a high risk in the R6 2005 ROD (Appendix 1). Alternative D avoids this higher risk type of project. The benefits and risks associated with broadcast and other herbicide application, along with other treatments would be allowed in this alternative.

However, along with lower risk, Alternative D increases costs, which could reduce effectiveness, including potentially treating fewer acres of invasive weeds compared to Alternative B (see Table 12 for cost comparison). This is because broadcast applications are more cost-effective in dense and/or extensive infestations such as roadsides.

Alternative D includes all of the PDFs and buffers associated with the Proposed Action but goes beyond them by eliminating all aerial spraying. With the exception of the eliminating aerial application of herbicide, the features of this alternative are the same as Alternative B.

2.3 Alternatives Not Considered in Detail

2.3.1 High Potential for Spread Areas or Priority 1 and 2 Species

There is a concern the herbicide treatments proposed are unnecessarily extensive. By potentially treating so many acres for so many years, the concern is that cumulatively there would be detrimental environmental effects. Some of those concerned reason that many invasive plant sites don't pose as serious threat to the human environment as the herbicides proposed to control them. To respond to this issue and reduce the amount of acres proposed for treatment an alternative was developed to limit herbicide use to high priority areas only. That is, areas with high potential for weeds to spread, or areas with priority 1 or 2 invasive weed species.

When it was determined that only approximately 300 acres would be dropped from herbicide treatment this alternative was dropped from detailed consideration because that few acres is insignificant compared to the approximately 20,691 acres proposed for herbicide treatment in the Proposed Action.

2.3.2 Invasive Plants Managed through Natural Processes

Some commenters believe that if National Forest use is restricted enough, natural processes will displace invasive plant infestations with native plant populations. Specifically, suggestion was made to remove livestock and ORVs from the National Forest. It was reasoned that removing resource uses or activities would allow native plant communities to recover where invasive weeds now dominate.

National Forests exist to provide a variety of goods and services to the American people. National Forests are managed through many programs to provide these benefits to national forest visitors and users. These uses are acknowledged by the Forest Plan and are permitted uses. The proposed invasive plant treatment program (Alternative B) would focus on directly reducing weed populations, not on limiting existing national forest programs or establishing prevention measures for other activities (see Purpose and Need in Chapter 1). While preventative measures would be incorporated in this project at specific locations needed for treatment or removal of invasive plants, weed prevention measures for other activities will be administered through other programs such as livestock grazing and transportation management when those activities occur to meet Forest plan Standards and Guidelines for invasive plants.

A project based on weed prevention alone would not satisfy the Purpose and Need of this project to contain, control or eradicate existing and future invasive plants populations. Invasive plants have been expanding for decades. The present weed treatment program has had some success, yet invasive plant populations continue to expand. It is doubtful that a passive, prevention program alone, would reverse this trend because the species are wide spread and occur in many high use areas. Furthermore, it is beyond the scope of this analysis to review actions approved by the Forest Plan and not limit other national forest programs benefiting forest visitors and users. For these reasons, this alternative was not considered in detail.

2.3.3 No Herbicides

Some commenters expressed the belief that herbicide use is unacceptably toxic to the human environment and to native ecosystems. They acknowledge that herbicides kill target weeds, but are concerned that containing, controlling or eradicating weeds using herbicides comes at an

unacceptable cost to humans and the natural environment. Therefore, they propose an invasive plant treatment project that uses methods other than herbicides to address weed populations.

The 1994 Environmental Assessment for the Management of Noxious Weeds (USDA Forest Service 1994a) and the R6 2005 FEIS considered alternatives to manage weeds without using herbicides. The 1994 EA considered such an alternative in detail. That alternative was rejected because the likelihood of controlling weeds without herbicides was low (USDA Forest Service 1994a). The alternative that was selected allows herbicide use, but only after other methods prove to be ineffective. The current invasive treatment program has been based on this alternative. It also represents the No Action, or 'no change from the current program' alternative (Alternative A) in this EIS. Because invasive plant populations continue to grow, this alternative has not contained, controlled or eradicated weeds as we now hope to do under the current Purpose and Need statement. Therefore another alternative proposal to treat weeds without herbicide applications will not be considered in detail because its ineffectiveness has been predicted by past analysis.

2.3.4 1994 Guidelines Applied Forestwide

The current program established by an environmental assessment (EA) completed in 1994, allows herbicide treatment on 5,172 acres only if nonchemical treatment proved ineffective. Some believe that the safeguards of this program, limiting how and when herbicides can be used should be continued without restricting where herbicides can be used. In other words, the current program should be continued without limiting herbicide use to pre-designated sites. Instead, other features of that integrated weed management (IWM) program would limit herbicide treatment.

This alternative would not take advantage of the advances made both in herbicide effectiveness and safety, because it would only allow two of the nine chemicals approved by the R6 2005 FEIS. In fact, dicamba, approved for use in the 1994 EA has been removed from the list of US Forest Service Region 6 approved chemicals because of toxic concerns. Other limitations of this program would require that nonchemical treatments be used on new sites first. Herbicide application would only occur if nonchemical treatment proved ineffective.

The present inventory of invasive plants suggest that the weed problem is growing, not shrinking. The present program has successfully addressed some weed sites. However, overall, the program has not been as effective because it has severely restricted the type and circumstances of herbicide use. Because only two herbicides would be used and because the present program would not likely satisfy this project's Purpose and Need, this alternative was not considered in detail.

2.3.5 Restricted Use – No Herbicides in Riparian or Special Areas

Some members of the public expressed concern that use of herbicides in riparian areas would have adverse effects to aquatic species and amphibians. Further, they believe it is inappropriate to use herbicide in special areas such as wildernesses, wild and scenic river corridors and municipal watershed. Other suggestions for excluding herbicide treatments included where there are certain SOLI plants within 100 feet of known invasive infestations, areas where native plant materials are gathered for cultural purposes and where riparian or biodiverse habitats exist. Therefore an alternative was considered that would not allow herbicide applications in any of these special areas or riparian areas. Table 11 compares acres of herbicide treatment proposed

under Alternative B to this "Restricted Use" alternative, which would not use herbicides in riparian or special areas.

Table 11-Comparing acres of proposed herbicide treatment for Alternative B and "Restricted Use" alternative

Treatment Methods	Alternative A No Action1	Alternative B Proposed Action	Restricted Use biological, Alternative
Chemical Methods			
Upland Areas			
Ground based broadcast and spot (spraying)/selective (wicking, wiping, and stem injection) treatments	2,577[1]	13,556	10,303
Aerial Treatments	0	875	875
Riparian Habitat Conservation Areas²			
Ground based broadcast treatment	1,932[1]	3,104	0
Spot/selective treatments (includes: spot spraying, wicking, wiping, and stem injection)	663[1]	3,241	0
Upland and Riparian Habitat Conservation Areas			
Bio-Control only	See note	1,955	1,955
Manual/mechanical only	0	111	111
Bio-control or manual/mechanical	0	0	9,598
Total Acres Treated	5,172	22,842	22,842

1No action alternative includes '92 Environmental Assessment for the Management of Noxious Weeds and the '94 Environmental Assessment for Management of Noxious Weeds and Forest Plan Amendment #4.
2Riparian Habitat Conservation Areas (RHCA) are, for the purposes of this exercise, 300' on either side of perennial streams and 100' on either side of intermittent streams. This is as designated under PACFISH, INFISH.

Biocontrol note: The '94 EA approved the use of biocontrol agents, however, all sites were analyzed for chemical treatments to attain highest amount of flexibility and greater invasive species control. The Forest has also released APHIS and State of Oregon approved biocontrol agents on approximately 2,500 acres for the control of invasive weeds (Yates 2007 personal communication).

Instead of approximately 20,776 acres of predominately herbicide treatment (Alternative B), about 11,178 acres would be similarly treated, a reduction in herbicide treatment of about 46 percent or 9,598 acres. The following assumptions were made to arrive at these acreages:

- Special areas included the four wilderness areas, the wild and scenic river corridors (both eligible and designated), and the two congressionally designated municipal watersheds
- Because Alternative B (Proposed Action) would not use herbicides in municipal watersheds either, there is no treatment difference proposed between the two alternatives
- Because wild and scenic corridors are ¼ mile on either side of the river bank, most of the corridor area is in uplands. Therefore it is assumed that the weed infestations are in the uplands
- The invasive plant inventory has cataloged 2,274 acres of weeds in the 221 miles of wild and scenic river corridor on the Forest. Wild and scenic river corridors, both eligible and designated, total approximately 35,360 acres.
- Because most of the wilderness land area is uplands, it is assumed that the weeds are in the uplands

- The invasive plant inventory has cataloged 979 acres of weeds in three of the four wilderness areas. The North Fork John Day, Baldy Creek Wilderness has no inventoried weeds at this time
- The total area of the four wilderness areas is 582,700 acres (includes semiprimitive)

Notice in Table 11 that the total acres treated between the two alternatives remains the same (22,842 acres), just the methods of treatment change. It is assumed that the treatment in the early years of the project would heavily favor upland herbicide treatment of the high priority invasive plants and areas (see Appendix B for discussion of assumptions). Some manual/mechanical treatment would occur on high disturbance sites like trail heads. But most of the 9,598 acres would remain untreated, until the majority of lands available for herbicide treatment had been successfully treated. Using the treatment schedule (Appendix B), herbicide treatment on areas available for treatment would be done by about year 5 because most acres previously untreated and eligible for herbicide treatment would have been treated. By year 5 project strategy would be shifting to focus on treatment of riparian and special areas using bio-control and manual/mechanical methods. That is to say that while some follow-up retreatment with herbicides would undoubtedly continue most of the funding and treatment efforts would occur in riparian or special areas using nonherbicide treatment methods.

By year 7, assuming the same annual project budget, the number of acres treated each year drops from about 4000 acres to about 2400 acres because the treatment cost per acre increases dramatically (again see Appendix B for a complete analysis discussion and display of weed treatments over time). Besides treating fewer acres, treatment effectiveness would drop of from about 80 percent (effectiveness of herbicide treatments) to about 25 percent (effectiveness of manual/mechanical treatments). Figure 13 displays the resultant change beginning in year 5 from steadily reducing acres of weeds to weed increasing every year thereafter. The result is that by year 15 the acres of invasive plants has nearly doubled (see Appendix B for details and discussion of modeling limitations).

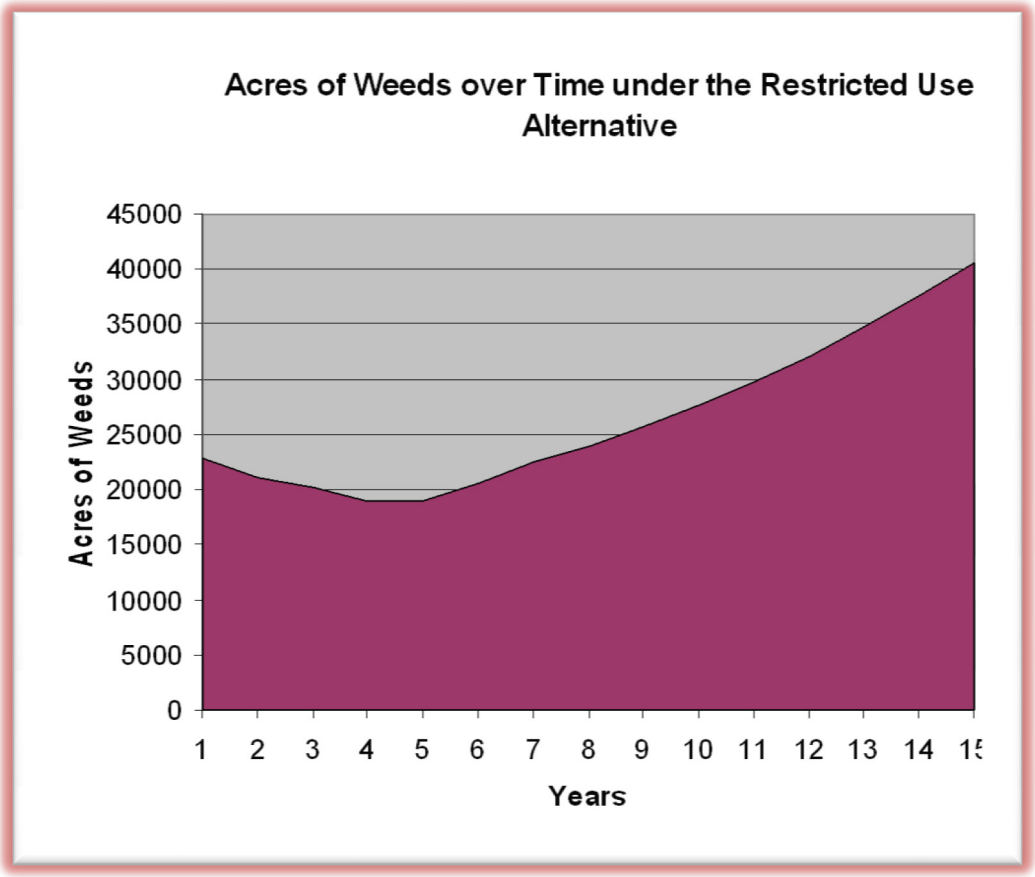

Figure 13 – Acres of invasive plants over time - treatment effectiveness

Excluding treatment of invasive plants within 100 feet of certain SOLIs would scatter a number of known infestations across the landscape to be potentially ineffectively treated or untreated. Treating with herbicides may impact individuals but would not threaten SOLI populations. Rather, nonherbicide treatments may be ineffective, threatening SOLI habitat by allowing the spread of invasive plants. Leaving cultural gathering areas untreated could threaten culturally important plants. Diverse habitat in riparian or other areas could be threatened by aggressive invasive species. Many weed species can displace native species. This can simplify diverse plant communities and displace plants important to amphibian and other aquatic species with invasive plants that may not be usable by animals we are trying to protect.

Riparian and special areas have approximately 6,345 acres of invasive plants; however, their total land area is approximately 340,000 acres. These National Forest System lands along with exclusions for SOLIS and culturally important areas would be off limits for herbicide treatment under this alternative. Allowing for the invasive plants that are already present, these areas would become an unacceptable ‘safe harbor’ for invasive plants. Riparian areas are a long narrow network of lands across the forest. Special areas such as wilderness and wild and scenic corridors have large land bases. Eliminating the herbicide treatment option in riparian and special areas would allow invasive plant species to persist and eventually expand throughout the forest. This is contrary to the Purpose and Need for the project area, to contain, control or eradicate invasive plants. Therefore this alternative was not considered in detail.

2.3.6 Deviations from Existing Approved Herbicide List

There is a concern that limiting herbicide use to the approved list provided by the R6 2005 ROD prevents use of effective herbicides coming on the market and future chemicals that may be developed during the life of this project.

Therefore, an alternative was considered that would add new EPA approved herbicides that were not available or not analyzed at the time of the Regional assessment.

While future improvements in herbicide products may be attractive, it is costly and time consuming to do a chemical assessment for each new product. This diverts funds and staff from the primary Purpose and Need of containing, controlling or eradicating invasive infestations. The current list of approved herbicides is considered safe and effective for most priority invasive plants in most circumstances. For these reasons this alternative was not considered in detail.

2.4 Alternatives Compared

Tables 12 and 13 display information about each of the alternatives.

Table 12-Alternatives compared by activity

Activity	Alt A	Alt B	Alt C	Alt D
Acres identified for treatment	5,172	22,842	22,842	22,809
Includes EDRR for new sites (all methods within the scope of the project, except aerial).	No	Yes	Yes	Yes
Percentage of sites where all effective methods are available	0	100	86	96
Acres of proposed herbicide treatments	5172	20,776	20,776	19,901
Number of herbicides available for use	2	10	10	10
Percent of Total Forest Land Base Treated with Herbicides	Apprx: 0.23%	Apprx: .9%	Apprx: .9%	Apprx: .8%
Percent of Total Forest Land Base treated annually	<0.02%	0.32%	0.32%	0.32%
Average Cost Per Acre	$820	$307	$312	$334
Degree to which adverse effects to people and the environment are minimized	Minimal risks from project	Minimal risks from project: Aerial and broadcast include inherent risks	Minimal risks from project: Broadcast in riparian areas eliminated	Minimal risks from project: Aerial treatment eliminated

Table 13-Alternative comparison relative to significant issues

Issue Component	Unit of Measurement	(No Action) Alternative A	(Proposed Action) Alternative B	Alternative C	Alternative D
1. Human Health					
1- There is concern by members of the public that exposure to herbicides may have serious human health consequences. Of particular concern is toxic chemical exposure and chemical contamination of drinking water.	Character of PDFs that apply to Human Health	Do not follow PDFs. Application of 3 chemicals allowed limited by label instructions	Forest Plan standards and project design features eliminate plausible harmful exposure scenarios in all alternatives. The R6 2005 FEIS displayed herbicide exposure scenarios that could result in human health impacts (such as nausea, skin rash, breathing trouble) based on risk assessments. Worst case exposure scenarios for workers and the public were studied. This project does not involve any exposure scenarios of concern for people. Rates of herbicide and surfactant application are limited in the PDFs, which eliminate the worst-case scenarios that could hurt people. The only scenario of concern remaining is drinking out of a pond contaminated pond by a direct spill of large proportions. This is not likely to occur given all of the safeguards associated with the project. In addition, there are many PDFs related to coordination with landowners, tribal members, forest products gatherers, and others to make sure inadvertent exposures do not occur. Public notification and sign posting would occur (see implementation plan).		
2 – Treatment Effectiveness					
2 - Limitations on the availability of treatment methods and herbicide options reduce the potential for invasive plants to be effectively treated.	Number of herbicide options	3	10	10	10
	Percentage of known sites where all effective treatments are available	0 (does not include new herbicides)	100	86	96
	Degree of limitation on integrated treatment options	5,172 acres treated chemically only after other methods shown to be ineffective. Very limited.	Least limited, allows for aerial and broadcast treatment where needed according to PDFs and buffers.	Second most limited, allows for aerial treatment of 875 acres. No broadcast herbicide applications allowed in Riparian , which decreases cost-effectiveness compared to Alternative B.	Second least limited, does not allow effective aerial treatment on 875 acres. This reduces the cost-effective of this alternative compared to Alternative B.
	Does not allow EDRR treatments	Allows EDRR treatments	Same as Alternative B	Same as Alternative B	Treatment of new infestations, including new invasive plant species found in

Issue Component	Unit of Measurement	(No Action) Alternative A	(Proposed Action) Alternative B	Alternative C	Alternative D
					the future (EDRR)
	Degree to which threats to botanical species of local interest are abated	Least likely to abate risks – treatment approved in 11 of 80 sites where invasives threaten species of concern.	Most likely to abate risks – treatment would be approved in all 80 sites where invasives threatened species of concern.	Same as Alternative B	Same as Alternative B
3. - Economic					
3 - Cost of each treatment acre influences the number of acres that can be treated with the same total budget.	Undiscounted Cost to Treat All Acres Proposed for Treatment One Time	$1,485,190	$5,601,390	$5,693,200	$5,863,880
	Cost per Effectively Treated Acre (Currently Inventoried Infestations)	$820	$307	$312	$334
4 – NonTarget Species					
4 - There is a concern that herbicide exposure, particularly when applied through aerial or broadcast spraying, may harm terrestrial wildlife species and non target plants.	Character of PDFs that apply to wildlife and plants	Herbicide exposure limited because herbicide treatment limited by only being used if nonherbicide treatments are ineffective; PDFs not specifically applied to this alternative	PDF Groups H, I and J are all intended to minimize herbicide exposure to wildlife and nontarget plants. The net result is that impacts from aerial and ground broadcasting would largely be limited to the time and place of application.	In addition to alternative B, herbicide exposure further minimized by eliminating broadcast applications methods in riparian areas. The net result is no impact from ground broadcast in riparian areas	In addition to alternative B, herbicide exposure further minimized by eliminating aerial application of herbicides and the potential for associated drift. The net result is no impact from aerial spray.
	Acres of broadcast spraying	5,172	17,535	14,431(no riparian broadcast spraying	16,660 acres potential maximum of ground-based broadcast methods
	Acres of Aerial Spraying	0	875	875	0

Issue Component	Unit of Measurement	(No Action) Alternative A	(Proposed Action) Alternative B	Alternative C	Alternative D
5 – Soil, Water Quality, Aquatic Biota					
5a-There is a concern that there may be potential adverse effects of herbicide treatment on soils and the potential for leaching into ground water.	PDFs that apply to soils to minimize or prevent these impacts	Herbicide options and treatments are limited.	PDF group H-4 through H-7 restrict use of clopyralid, chlorsulfuron, picloram and sulfometuron methyl due to their potential to impact soil biology and/or leaching	Same as Alternative B	Same as Alternative B
5b- There is a concern that there may be potential adverse effects of herbicide treatment on riparian areas adversely impacting water quality and aquatic ecosystems.	Acres of broadcast herbicide application within riparian areas	1,932 acres of treatment in riparian areas.	3,104 acres of treatment in riparian areas. PDF group H and buffers (Tables 7-10) protect water and aquatic ecosystems	0	Same as Alternative B
	Acre of aerial treatment	0	875	875	0