Chapter 2 - Alternatives

2.1 Introduction

Chapter 2 describes and compares the alternatives considered for invasive plant treatments on the Umatilla National Forest in the states of Oregon and Washington, including the No Action Alternative, the Proposed Action Alternative, and two additional action alternatives. This Chapter also summarizes the effects of implementing these alternatives, and displays how they are responsive to the Purpose and Need for action and issues identified during scoping.

The Forest staff proposes to control, contain, or eradicate invasive plants on approximately 25,000 acres of inventoried weed sites, and on future weed sites that are presently nonexistent or as yet undiscovered. The project is planned to last 10 to 15 years.

A thorough, forestwide invasive plant inventory was completed in 2006. It includes 2,069 invasive plant sites widely distributed across the four Forest Districts, and accounts for approximately 95 percent of the invasive plant infestations on the Forest.

Each weed site has been mapped and assigned a treatment method based on a complex decision analysis. Figure 1 in this section is an example of one of those maps, and shows some known weed infestations and their proposed treatment methods. Such maps exist for all 2069 weed sites and can be viewed at the Umatilla Forest Website (www.fs.fed.us/r6/uma/projects/readroom/invasive-plants/).

Treatments to control invasive plants would include a variety of chemical, physical, and biological methods. Treatments are proposed for existing or new infestations including new plant species that currently have not been found on the Forest. Treatment methods were developed using *Common Control Measures Invasive Plants of the Pacific Northwest Region* (Mazzu, 2005) and in accordance with USDA Forest Service Handbook (FSH) 2109.14 – Pesticide-Use Management and Coordination Handbook (USDA Forest Service, 1994c). Treatment priorities, methods, and strategies are tiered to the *Pacific Northwest Region Invasive Plant Program – Preventing and Managing Invasive Plants Final Environmental Impact Statement* (Invasive Plant FEIS) (USDA Forest Service, 2005a).

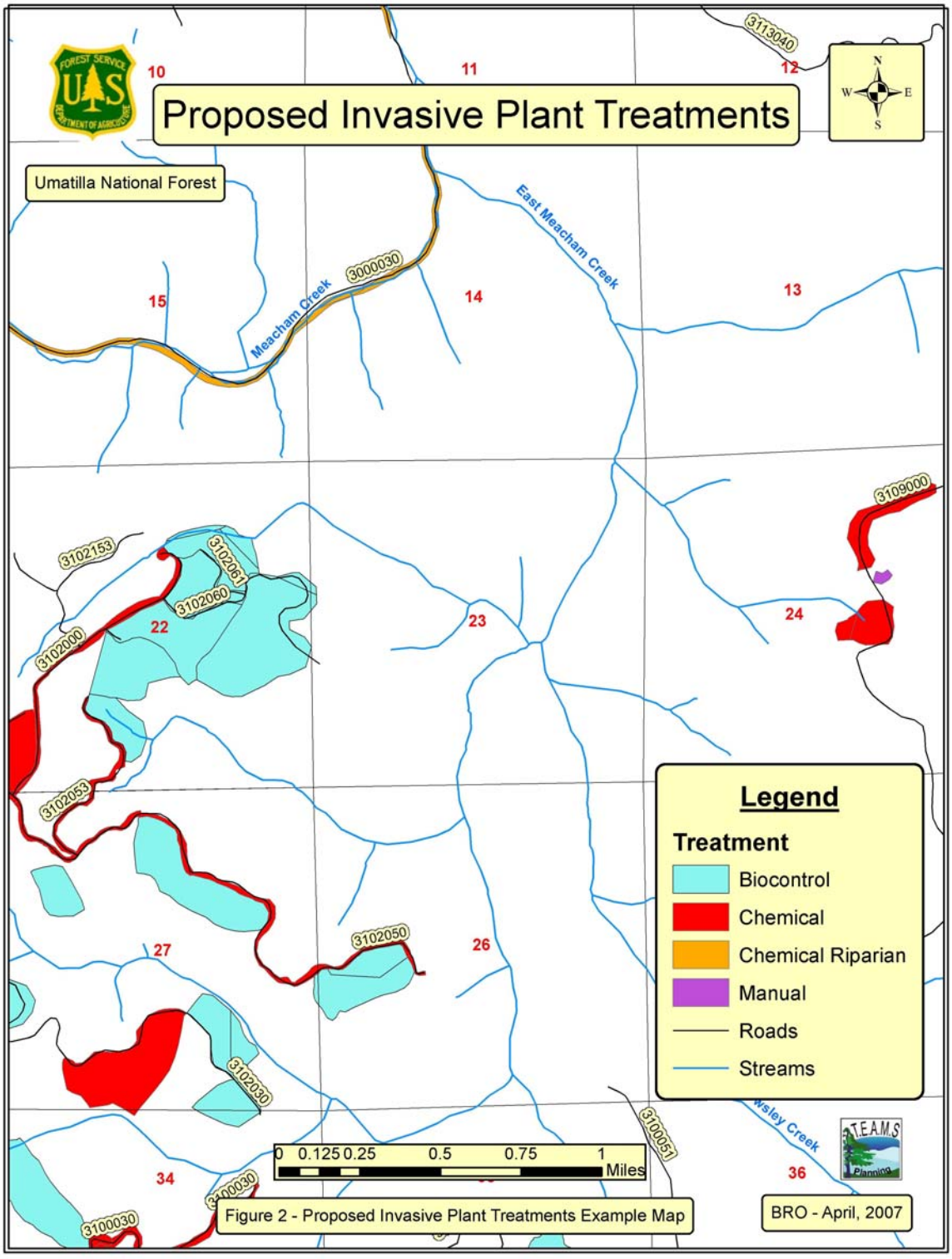

Figure 1 – Proposed Invasive Plant Treatments Example Map

2.2 Alternatives Considered in Detail

2.2.1 Alternative Development Process

This EIS evaluates four alternatives for invasive plant treatment, 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 decisions on the Umatilla National Forest. The Proposed Action would use chemical, physical, and biological methods to treat known and unknown future infestations of invasive plants. All action alternatives have been designed to satisfy the Purpose and Need (see Chapter 1 - Purpose and Need).

Public and interagency issues centered on cost efficiency, treatment effectiveness, toxicity of herbicides, and the potential adverse effects of herbicides on humans and the natural environment. Alternatives C and D were developed to respond to public issues while effectively treating invasive plants according to the management direction in the 2005 R6 Invasive Plant ROD. The action alternatives vary in the following ways:

- The amount of herbicide use allowed
- The location of herbicide use allowed
- The methods of herbicide application allowed
- The likelihood that invasive plant infestations will be controlled and sites restored
- The relative monetary costs to eradicate, control or contain invasive plants
- The perceived risks related to herbicide use and biocontrol agents

Alternatives C does not allow ground-based broadcast herbicide application, and Alternative D does not allow aerial spraying because of public concerns voiced about potential risk of adverse effects to humans, and the potential delivery of herbicides to surface or ground water,. Alternatives B, C and D would treat weed infestations expected to be found in the future using the same methods as analyzed in this EIS. This Early Detection Rapid Response (EDRR) strategy addresses public and interagency issues about long-term effectiveness of restoring native plant communities by reducing weed infestations.

The decision process to select treatment methods favors non-herbicide treatment methods first, but recognizes that most sites will require herbicide treatments initially and perhaps multiple times. The project proposal strives to reduce herbicide use over time, yet the EIS analyzes the effects of primarily herbicide treatments.

Besides the alternatives listed above several other alternatives were developed to address issues raised by the public. These alternatives were designed to resolve public concerns, but were dismissed from detailed study because they would not reasonably meet the Purpose and Need for action. Those alternatives included:

- High potential for spread areas or priority 1 and 2 species (more detail can be found section 2.3.1
- Invasive plants addressed through natural processes (R6 EIS 2-33) (EIS section 2.3.2)
- No Herbicides (R6 EIS 2-34) (EIS section 2.3.3)
- 1995 Guidelines applied Forest-wide (modified no action) (EIS section 2.3.4)
- Restricted Use – No herbicides in riparian or special areas (EIS section 2.3.5)
- Deviations from existing approved herbicide list. (R6 EIS 2.35) (EIS section 2.3.6)

2.2.2 Alternative A – No Action

Description

The Umatilla National Forest has been treating invasive plants under direction found in the 1995 decision implementing the *Umatilla National Forest Environmental Assessment for the Management of Noxious Weeds* (1995*).* This program would continue under the No Action Alternative. The recommended treatment methods took a conservative approach, requiring years of manual or mechanical treatments on a site prior to the use of herbicides. It did not have the ability to respond aggressively to any new or unrecorded infestations or species. Herbicides could only be used on those sites known at the time of the 1995 decision or additional sites that had site-specific analysis completed before treatment was done.

Under the 1995 EA, invasive plant treatments would be limited to approximately 2,771 acres. The "95 EA" approved use of herbicides on 587 sites (1391 acres) on the Umatilla National Forest (USDA 1995). Amendments to this decision added an additional 59 sites (383 acres) approved for chemical treatments (USDA 1998). The total area identified for treatment using all methods was 3154 acres. The total number of sites approved for chemical treatments represents 36 percent of the total number of sites presently mapped. New infestations have been and would continue to be treated with manual and mechanical methods. The 1995 EA (as amended) allowed for biological treatments on 1,339 acres, manual treatments on approximately 41 acres, and a combination of manual, chemical, and cultural methods on an estimated 1,744 acres. Herbicide applications would utilize spot or ground based broadcast methods utilizing Glyphosate, Dicamba, or Picloram. However, the 2005 Regional Invasive Plant FEIS ROD does not allow the use of Dicamba, so herbicide use is limited to the other two chemicals listed. Aerial application of herbicides is not allowed under the current program.

Under this program invasive plant infestations would likely continue to expand (see figure 2 below). The 1995 EA that authorized the present treatment program identified 773 sites totaling 2771 acres needing invasive plant treatments. This inventory, as reported in the EA, was the result of "systematic surveys" that had been ongoing since 1991 (USDA 1995, pg 3). While there may likely have been other infestations unaccounted for in the 1995 inventory, clearly the present inventory of nearly 25,000 acres of weed infestations suggest an alarming expansion of invasives despite the efforts of the existing weed program.

The ID Team reviewed comments and concerns received from the public during the scoping process. From those concerns, issues about the proposed project were identified. Among those, the following issues would be addressed by this alternative:

Human Health:

- There is a concern that herbicides should be used only as a last resort when other methods fail (herbicides are used only as a last resort in this alternative compared to the PA)

Treatment Effectiveness:

- Herbicides as a last resort requires that herbicides be used only if other methods prove ineffective

Non-target Species:

- There is a concern that herbicide exposure, particularly when applied through aerial or broadcast spraying, may harm terrestrial wildlife species (reduced exposure compared to the PA – fewer acres treated than under the PA)

- There is a concern that herbicide exposure, particularly when applied through aerial or broadcast spraying, may harm non-target plants (reduced exposure compared to the PA – fewer acres treated than the PA)

Soil, Water Quality, Aquatic Biota:

- There is a concern that there may be potential adverse effects of herbicide treatment on soils (fewer acres treated than the PA);
- There is a concern that there may be potential adverse effects of herbicide treatment on riparian areas adversely impacting water quality and aquatic ecosystems (fewer acres treated than the PA).

2.2.3 Alternative B – Proposed Action

Description

Alternative B proposes to satisfy the Purpose and Need by using chemical, physical and biological treatment methods to control, contain, or eradicate existing or newly discovered invasive plant infestations. Treatments are proposed for existing or new infestations including new invasive plant species that currently are not found on the Forest. It is believed that the locations for ninety five percent of invasive plant infestations proposed for treatment are known, and only about 5 percent are as yet undiscovered, because of an extensive invasive plant inventory that was completed in 2006, and the thorough compilation of past infestation sites. The strategy to treat presently unknown sites or new invasive species that may invade the Forest in the future is called Early Detection Rapid Response (EDRR) and is described in this section. Current inventory indicates there are approximately 25,000 acres of invasive plant infestations on the Forest in 2,069 invasive plant sites.

Unlike the present weed treatment program, (No-Action Alternative) this alternative would expect to reduce the acreage and influence of invasive plant populations over time. Approximately 4,000 of the 25,000 acres of weeds could be treated annually given expected budget levels. Evidence shows that untreated infestations would likely expand their populations at a rate of 8 to 12 percent each year (USDA Forest Service, 1999). The expansion in population size includes natural plant spread and spread caused by vectors such as wind, water, animals, and human activities where they are present. This alternative would overcome weed expansion because the herbicide treatments, expected to be the vast majority of the average annual treatment of 4000 acres, are anticipated to be 80 percent efficient in their initial treatments. While this alternative would reduce weed populations over time, as Figure 2 illustrates, the expansion of untreated infestations and need to retreat some areas makes successfully reducing the forestwide influence of weeds a long-term endeavor. With all factors considered and assuming adequate funding for the life of the project, it is believed that this alternative would successfully contain, control or eradicate the majority of weeds on the Forest.

The rest of this section defines and describes the treatments, strategies for treatment, and the prescriptions that would be used to accomplish this alternative. Included are specific Common Control Measures proposed for each target invasive species, as well as Project Design Features (PDFs). Although the Regional ROD (USDA 2005b), the Forest Plan, and chemical product labels provide direction to protect people and the natural environment during this project, additional Project Design Features have also been added to minimize potential for adverse effects.

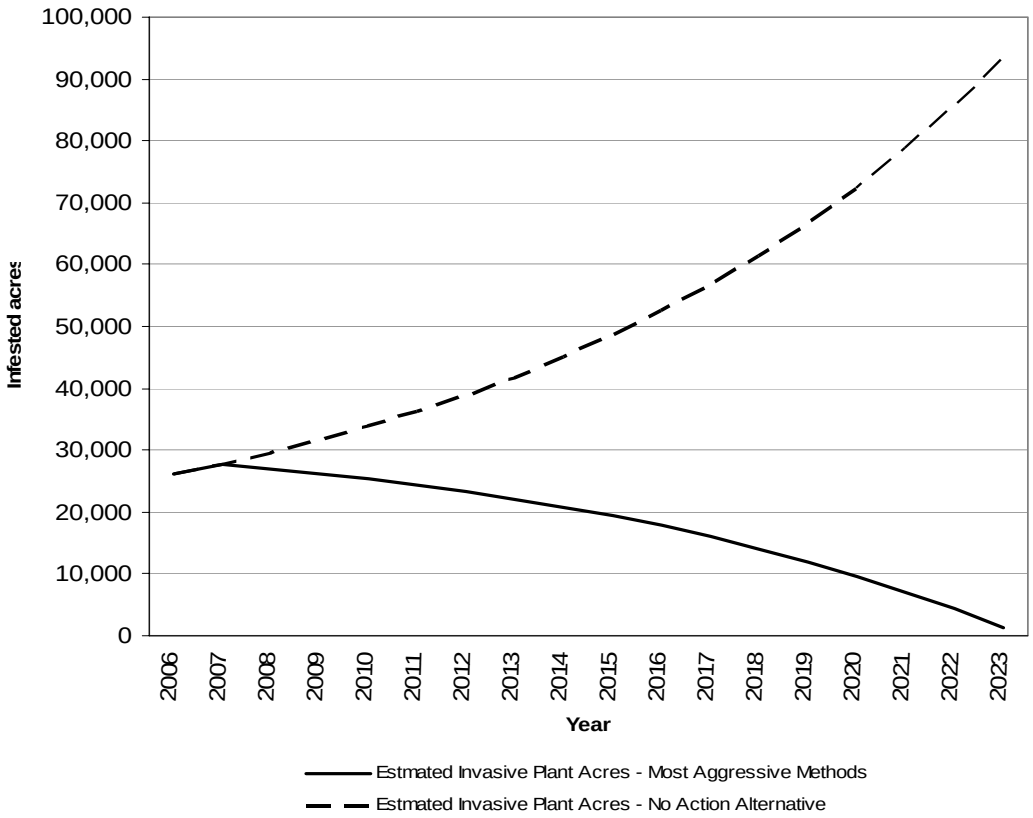

Figure 2 – Estimated Invasive Species Spread - Assumptions include 25% and 80% effectiveness with No Action Alternative and Proposed Action Alternative, respectively.

The ID Team reviewed comments and concerns received from the public during the scoping process and identified issues about the proposed project. The issues raised are thoroughly discussed in Section 1.9 of Chapter 1. The following summarizes the key issues raised regarding this project.

Human Health:

- There is concern by members of the public that exposure to herbicides may have serious human health consequences

Treatment Effectiveness:

- There is a concern that the spread of invasive species will increase if all available treatment methods are not utilized

Non-target Species:

- There is a concern that herbicide exposure, particularly when applied using aerial or broadcast spraying, may harm terrestrial wildlife species
- There is a concern that herbicide exposure, particularly when applied through aerial or broadcast spraying, may harm non-target plants

Soil, Water Quality, Aquatic Biota:

- There is a concern that there may be potential adverse effects of herbicide treatment on soils
- There is a concern that there may be potential adverse effects of herbicide treatment on riparian areas adversely impacting water quality and aquatic ecosystems

The Regional ROD (USDA 2005b), Forest Plan, and herbicide product labels address these issues and concerns. In addition, the ID team developed Project Design Features (PDFs) to further minimize the risk of adverse effects primarily from the use of herbicides. The PDFs are part this alternative and listed, in detail, in Table 6.

Treatment Methods

Proposed treatments include chemical, physical, and biological, methods. This section defines each method and identifies where and how many acres will be treated by each method.

Potential treatments based on existing mapped sites (See Figures 3-6 in this section) include:

- Approximately 17,301 acres of uplands would utilize chemical, physical, or biological methods
- Approximately 3,392 acres of riparian areas would be treated using chemical, physical, or biological methods
- Approximately 3,915 acres would be treated using biological or physical methods
- 41 acres would be treated using physical methods only

Of these acres 675 acres are proposed for aerial chemical application (See Figure 7, in this section for treatment sites proposed for aerial application).

Detailed, 1:24,000 scale maps of all known existing treatment sites are available on the Umatilla National Forest website at www.fs.fed.us/r6/uma/projects/readroom/invasive-plants/). To clarify the location of proposed treatment sites and methods, the following figures were mapped showing sites and methods within each Ranger District. However, the analysis was not completed by Ranger District, but rather depicts treatment methods and resources affected in each geographic location where treatments would occur. Table 2 shows acres proposed for treatment by method by Forest District.

Table 2 – Acres of treatment methods by Ranger District

Treatment Method	Ranger District				
	Heppner	Pomeroy	North Fork John Day	Walla Walla	Total
Biological only	89	46	47	3734	3915
Chemical Physical or Biological	4699	3138	3933	5531	17301
Chemical/Riparian Physical or Biological	839	1130	621	802	3392
Manual/Physical	2	6	26	6	41
Total	**5629**	**4320**	**4625**	**10075**	**24649**

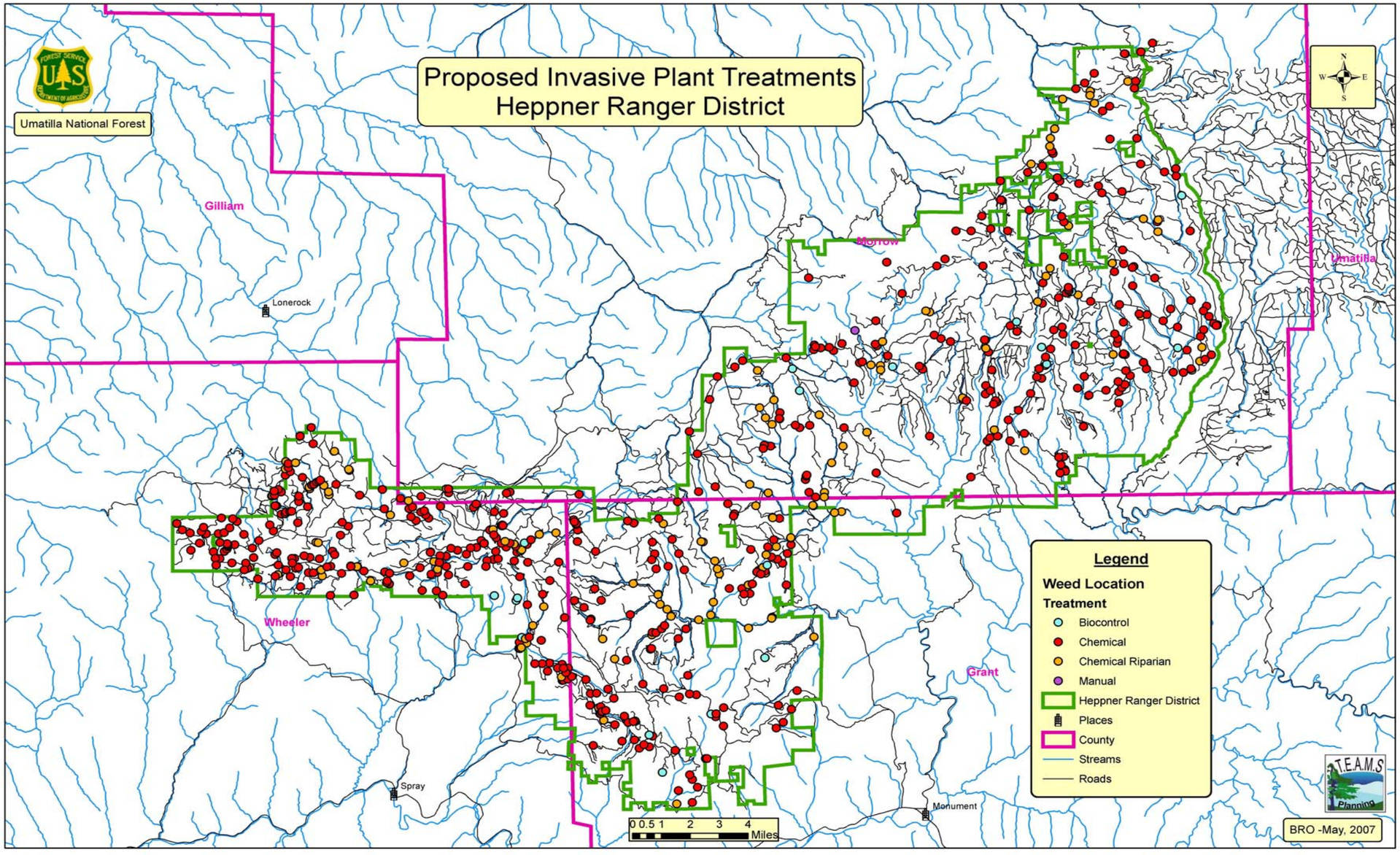

Figure 3 – Heppner Ranger District Proposed Invasive Plant Treatments

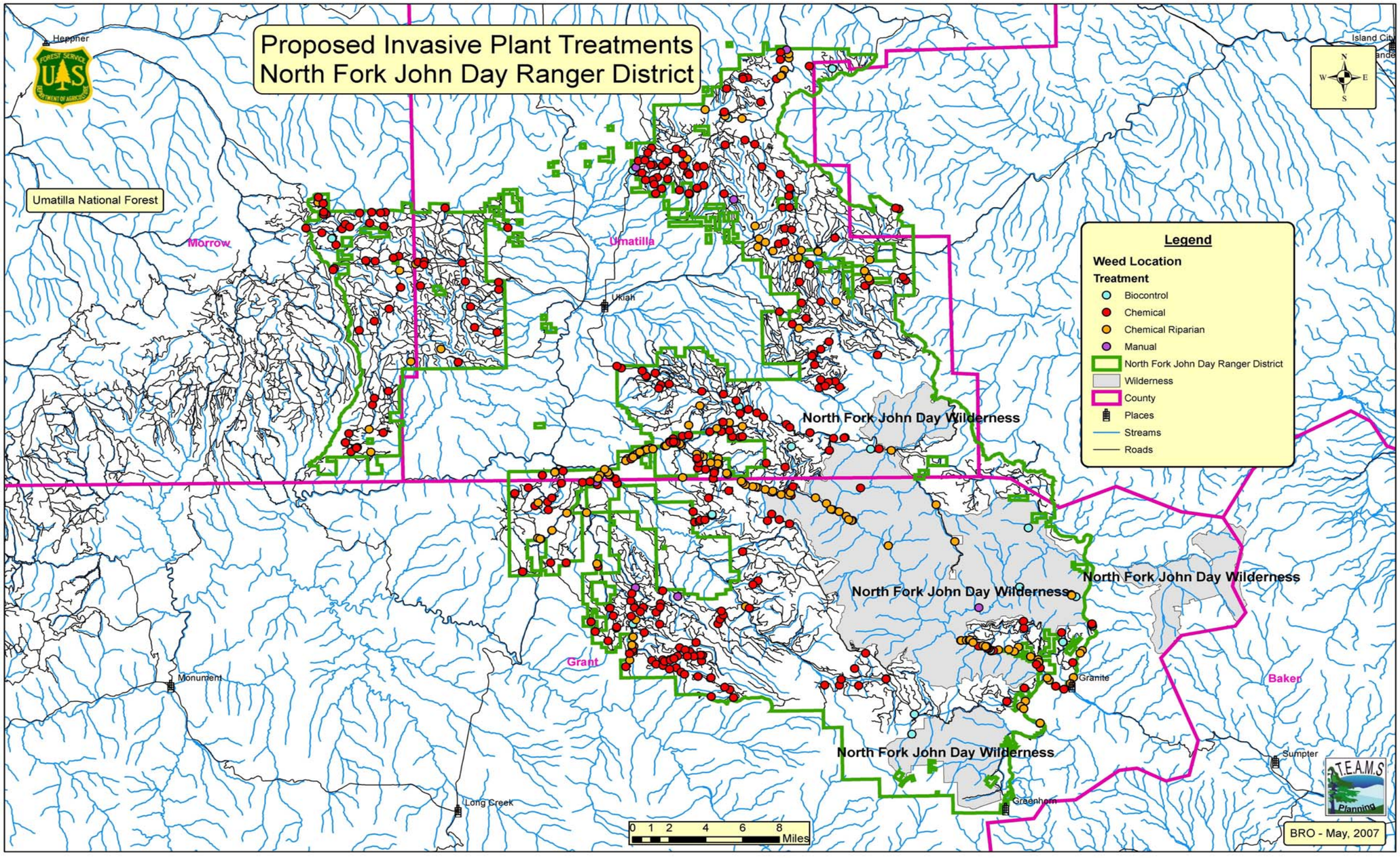

Figure 4 – North Fork John Day Ranger District Proposed Invasive Plant Treatments

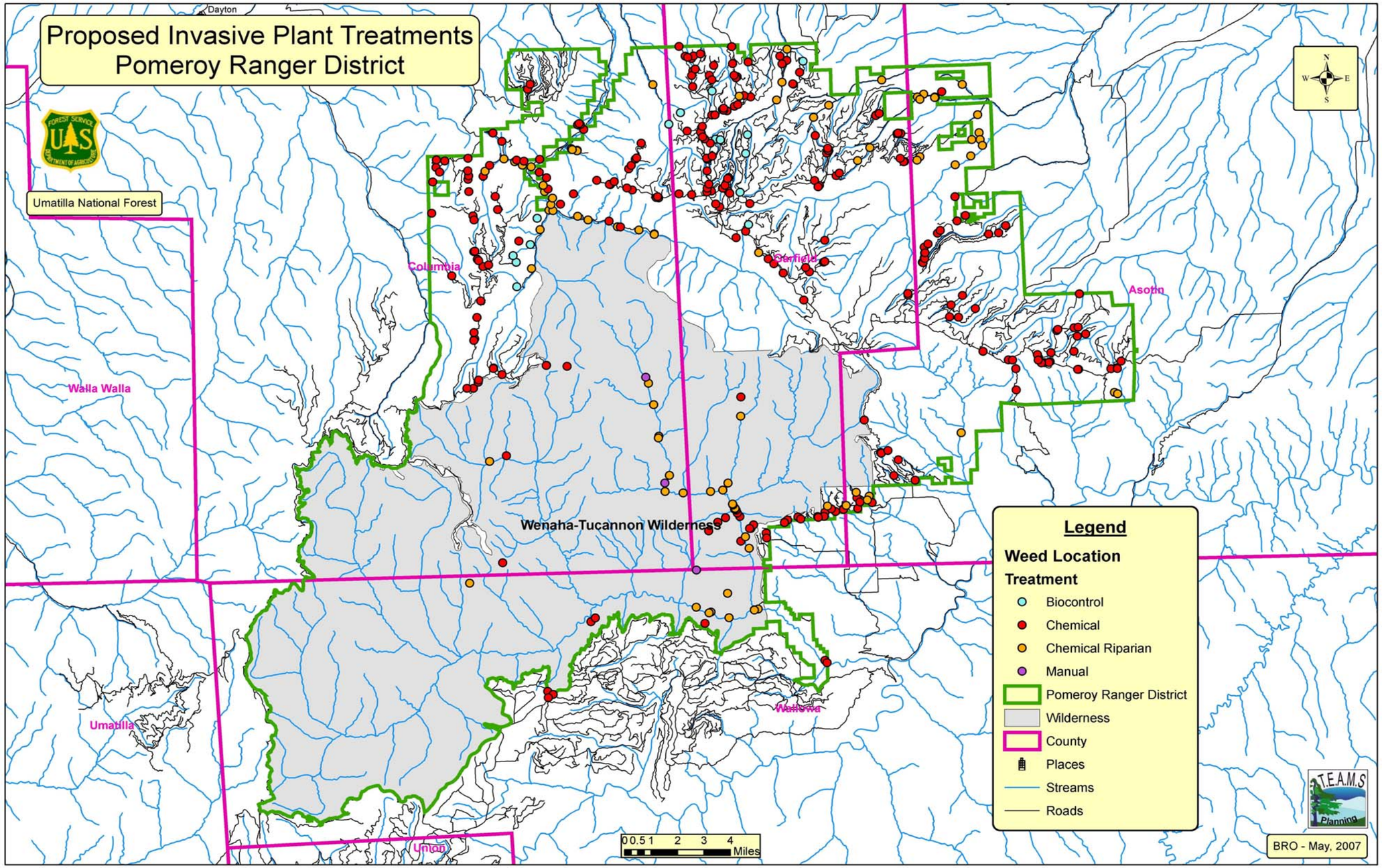

Figure 5 – Pomeroy Ranger District Proposed Invasive Plant Treatments

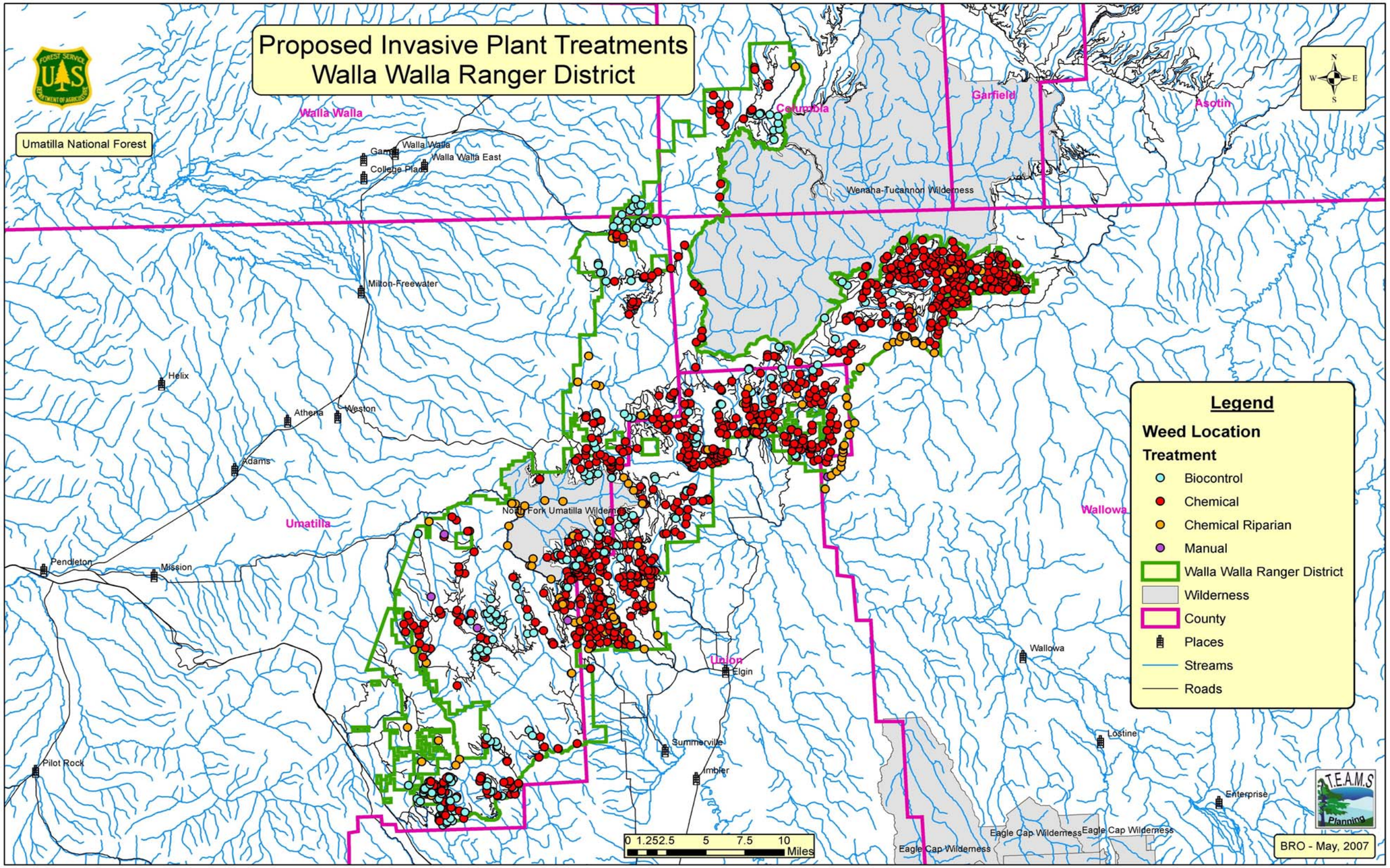

Figure 6 – Walla Walla Ranger District Proposed Invasive Plant Treatments

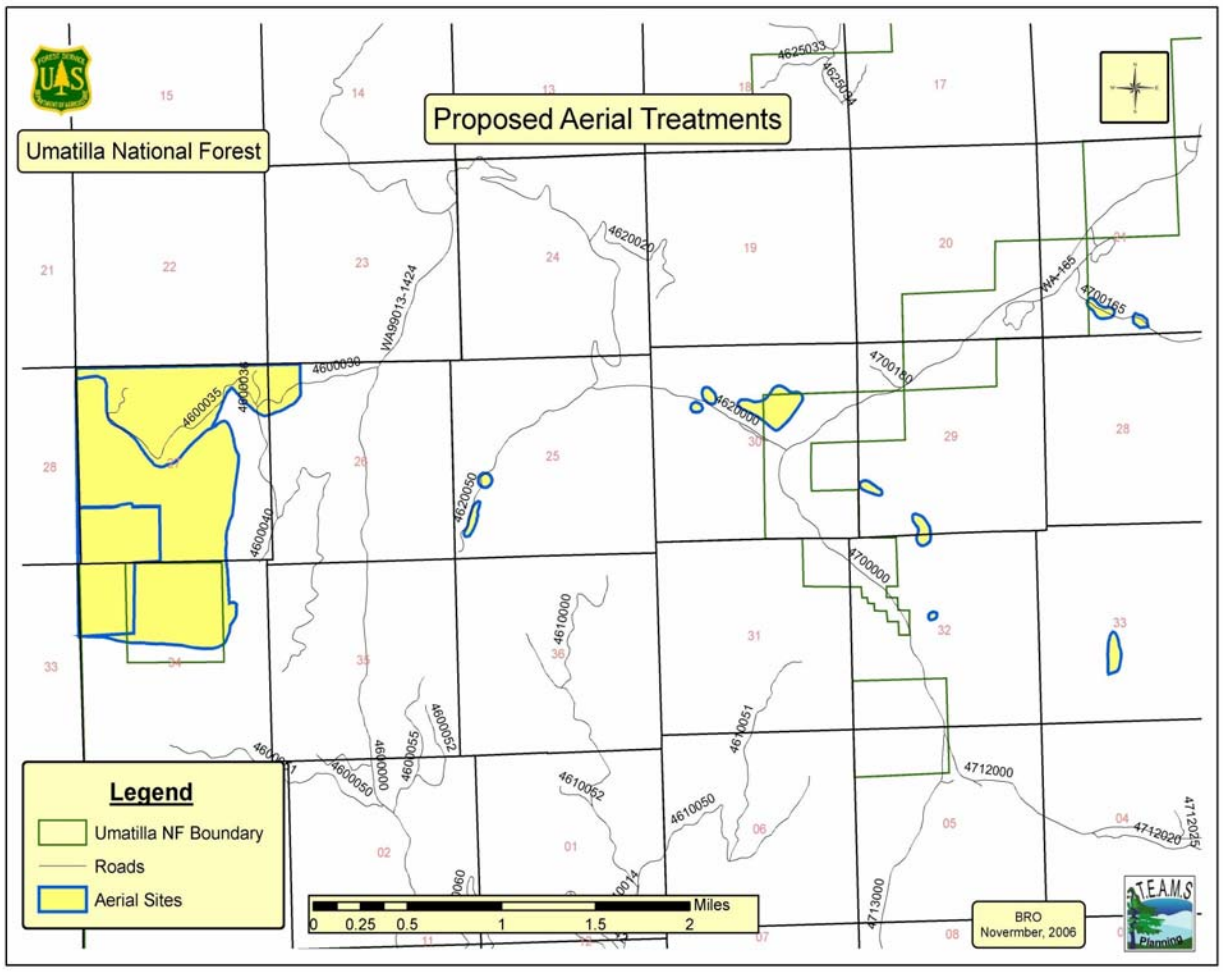

Figure 7 – Acres Proposed for Aerial Application of Herbicide on the Pomeroy Ranger District

Chemical Methods

Methods of 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 following are examples of the proposed 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 horse mounted spray tanks with pumps, or a hose off a truck-mounted or ATV-mounted tank.

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 non-target vegetation, soil, or water.

Stem injection – A new hand application technique currently is being used on Japanese knotweed in western Oregon and Washington.

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.

Aerial broadcast – This involves herbicide being applied from a helicopter with a nozzle attached. Typically, this method is used where sites are too steep or otherwise inaccessible.

When herbicide use occurs in close proximity to sensitive areas, specific PDFs would be applied so that vegetation treatments do not have an adverse impact on non-target plants or animals. Herbicides approved for use within or outside riparian areas are listed in the *Pacific Northwest Region Invasive Plant Program Preventing and Managing Invasive Plants FEIS*, April 2005 (USDA 2005), and accompanying ROD (USDA 2005a).

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.

The application rates depend on the density and size of the target species, presence and composition of non-target vegetation and wildlife areas nearby, soil type, 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 non-target plants and animals (USDA 2005a, 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.

Some alternatives would also allow treating invasive plant infestations that have not yet been discovered or do not yet exist. Though the invasive plant inventory was thorough, it is reasonable to assume not all weeds have been located and mapped. Invasive plants are often easily and quickly dispersed and can be expected to spread and establish in unknown locations in the future. Therefore, ongoing monitoring of treated sites would also look for new infestations. Newly discovered infestations would likely receive a high priority for treatment (See Figure 8 – Treatment Decision Tree) to eradicate the invasive plants while the infestation is small and easily treatable. This strategy of detecting and treating new infestations is called Early Detection Rapid Response (EDRR). Such treatments would be done under the same guidance of the Regional FEIS, Forest Plan Standards, product labels and PDFs used for known treatment areas.

Table 3 displays herbicides proposed for use in the Proposed Action (PA) and a range of application rates for each chemical. Effects analysis assumes that typical rates would be applied; however the actual effective rate would vary depending on application method, target species, and PDFs. Broadcast applications would never exceed typical label rates shown in

Table 3. Non-broadcast methods such as spot, wicking or wiping may be applied at rates greater than typical but that would happen infrequently and only where necessary to be effective.

Table 3 - 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	0.5	0.35	0.1
Glyphosate	7	2	0.5
Imazapic	0.19	0.13	0.031
Imazapyr	1.25	0.45	0.03
Metsulfuron Methyl	0.15	0.03	0.013
Picloram	1.0	0.35	0.1
Sethoxydim	0.38	0.3	0.094
Sulfometuron Methyl	0.38	0.045	0.03
Triclopyr	10	1.0	0.1

Additives 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 absorption into the plant. Project Design Features 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.

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 herbicide would occur on the Pomeroy District covering approximately 675 acres on 17 sites ranging in size from 1 to 290 acres.

Monitoring of treated sites would determine if follow-up treatments would be needed. For sites treated with herbicides, follow-up treatment could include herbicide application and or manual treatments. However, the goal is to become progressively less dependent on herbicides and to use more of the alternative control methods for continued treatment if a site requires it.

Physical Methods

Physical treatment type includes manual and mechanical control methods.

Manual Control Methods: These include non-mechanized 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 areas, and require repeated treatments several times throughout the growing season or in future years depending on the species.

Manual treatments can be effective for annual and tap-rooted weeds, but are less effective 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 negative impacts to non-target 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 species in order to shade out and kill pieces of roots (i.e. rhizomes). These techniques could be used in specific areas where there is a desire to minimize herbicide use such as areas with an abundance of sensitive wildlife or plant species.

Mechanical Control Methods: This method uses hand 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 need for small scale, less than 100 square feet (Forest Plan Standard for Detrimental Soil Condition), 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 may be collected and properly disposed of to prevent them from spreading into uninfested areas.

Biological Methods

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

The insect or plant pathogen attacks and weakens the targeted weed species and reduces its ability to compete or reproduce. Biological control release 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 plant-feeding, host specific insects, mites, nematodes and pathogens. Presently, insects are the primary biological control agent in use. 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 may include collection of insects, development of insect colonies for collection, transporting, and establishing insects in new locations and supplementing stocking of existing 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, it is expected that 15 to 20 years are needed to bring about a successful 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.

Treatment Methods Considered but 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 proposed to utilize one or more of these methods would require separate, project-specific NEPA analysis.

Treatment Strategies

Based on the invasive plant species and site-specific conditions such as ease of access, land allocation, location near special areas, restrictions due to other sensitive resources, or invasiveness of the plant in a specific habitat, each weed infestation site is assigned a treatment strategy. Once initial treatment is complete, future potential treatment is reevaluated based on the current condition compared to the desired conditions.

Strategies include eradication, control or containment of invasive plants. Treatment cost estimates and assumptions vary by strategy. For instance, treatments of infestations with a strategy to eradicate would tend to be the most costly and labor intensive, and may require more recurring treatments. Another example of strategy would be Early Detection Rapid Response (EDRR) of new weed species or new weed sites discovered during the life of this project.

- **Eradicate:** Totally eliminate an invasive plant species from a site. This objective generally applies to small infestations of aggressive species such as yellow starthistle, 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 treatments of newly inventoried invasive plant infestations, including previously undiscovered invasive plant infestations or new infestations that would occur during the life of this project. Ongoing inventory and monitoring would look for new infestations of invasive plants, or new locations of existing weeds. Newly discovered infestations would likely receive a high priority for treatment to eradicate the invasive plants while they are small and easily treatable (See Treatment Decision Tree, Figure 8).

Such treatments cost less, can be successfully treated using a greater variety of treatment methods and abbreviates the potential adverse impacts of the invasive plants. Because the current inventory of weed sites thoroughly covered the Forest, treatment under the EDRR strategy is expected to be small; probably 5 percent or less.

This strategy is needed 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.

Invasive plant sites that are discovered subsequent to the invasive plant inventory completed in 2006 would require evaluation to determine that the invasive plant treatments and environmental impacts are consistent with those analyzed in this EIS.

Therefore, EDRR treatments may occur across the Forest and may include invasive species that are not analyzed in this EIS because sites with common characteristics and common potential environmental effects from treatment have been analyzed.

If the sites and impacts are found to be consistent, then these new infestations could be treated under this NEPA document. The EDRR is based on the premise that the impacts of similar treatments are predictable, even though the precise location or timing of the treatment may be unpredictable. If the proposed EDRR treatments are not consistent with this EIS, new NEPA analysis and disclosure would be required. Examples of when new NEPA would be required include:

- Conducting invasive plant treatments that could not be fully mitigated using the PDFs
- Aerial spraying herbicides on, as yet, undiscovered infestations (this EIS only authorizes the 675 acres of known, mapped aerial treatment sites)
- Using prescribed burning, tilling, plowing, or cattle grazing as invasive plant treatment methods
- Applying herbicides not analyzed in this EIS to newly discovered weed sites

Besides treatment strategies of individual weed sites, there is a broader strategy covering invasive plant management. In this broader context there are several topics covered in this EIS that are discussed more thoroughly in section 3.2.4 and include the following:

- **Integrated Weed Management (IWM):** It is recognized that a single weed treatment may not succeed at containing, controlling or eradicating target infestations. IWM combines various treatment methods, timing of treatments, and monitoring to achieve management success for the long term.
- **Cooperation with Public and Private Landowners, and Other Agencies:** By partnering with other landowners and agencies involved with invasive weed control, treatment effectiveness can be optimized. Recognizing this, the Umatilla Forest staff has, and will continue to cooperate with others regardless of what alternative is adopted.
- **Prevention:** Weed prevention practices are outlined by the regional FEIS and adopted by the Forest Plan. Furthermore, other programs sponsored by the Umatilla National Forest have adopted weed prevention practices, especially addressing site-disturbing activities.

Process and Determination of Treatment Prescriptions

After determining the appropriate treatment strategy, a treatment prescription is developed for each weed infestation. Given adequate funding, approximately 4,000 acres could receive treatment with chemical, physical or biocontrol methods annually. The treatments would occur over approximately 10 to 15 years. The invasive plant treatment prescriptions follow the IWM approach described in the previous section. All herbicide treatments require the completion of the Pesticide-Use Proposal Form FS-2100-2 (Appendix E of the R6 FEIS) to document the use of pesticides on National Forest system lands. All recommended treatment methods would be documented and approved by the appropriate responsible official(s).

To develop a treatment prescription for each weed infestation requires consideration of many factors. First, The Umatilla National Forest compiled extensive information on each site including:

- Invasive plant species and its relative spread and invasiveness characteristics; that is, how aggressively it displaces native plant composition and/or the deleterious effects of the species on native plants and animals
- Location and approximate size of the infestation
- The density of the invasive species coverage within the infestation site
- The location of weeds in relation to important landscape and resource features such as water and riparian areas, sensitive or T & E plants, critical habitat of T & E species
- The location of weeds in relation to manmade improvements where weeds can be spread by human activity such as roads, rock quarries, campgrounds, constructed trails and trailheads
- The location of weeds in relation to designated important areas such as designated wilderness, wild and scenic rivers, or municipal watersheds

This and other cataloged information is known for each of the 2069 weed sites. Utilizing the site information and following the process described herein, a treatment prescription and relative priority of treatment is established. The final decision on treatment priority will be made locally on each Ranger District. Priorities would change over time based on treatment effectiveness and changes occurring on invasive plant sites.

Armed with the cataloged information and local knowledge about effective treatments, the second step was to prescribe treatment methods for each weed site. This was done by applying the specific weed site information to the Treatment Decision Tree (Figure 8 this section).

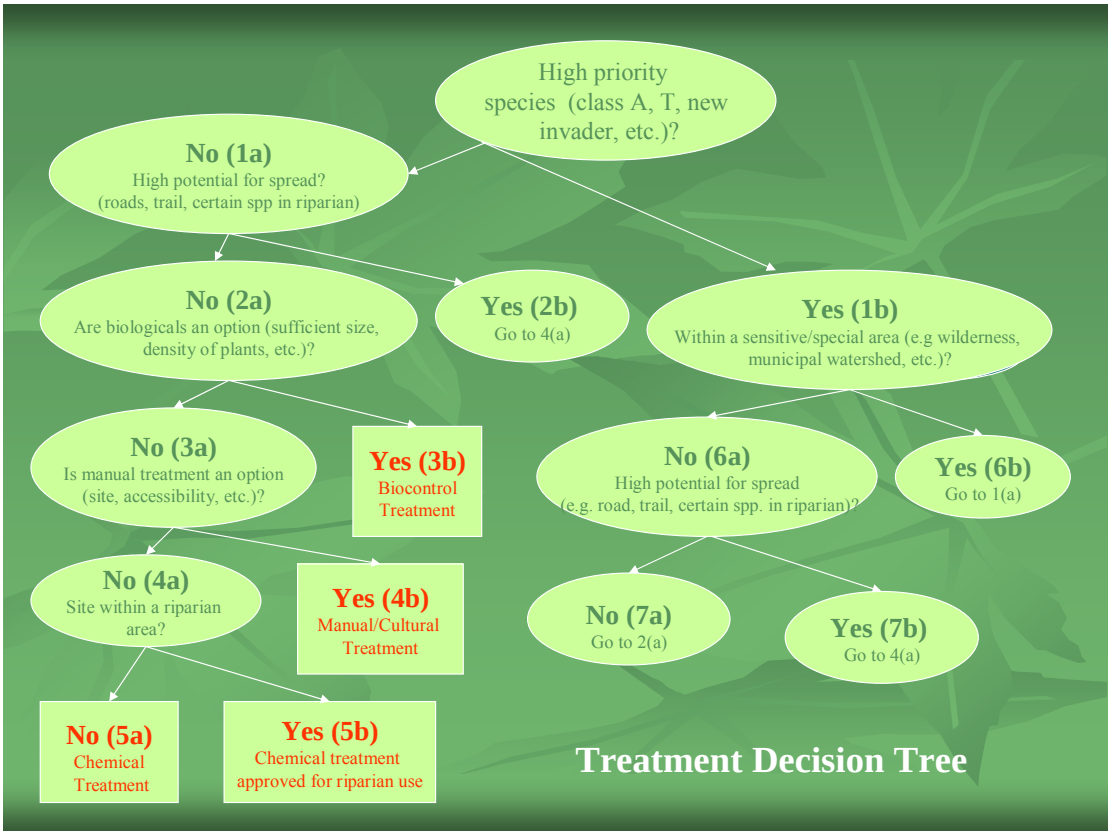

Figure 8 – Treatment Decision Tree

The majority (90 percent) of the treatments assigned allowed the use of herbicides because of the location of the site, the aggressive nature of the plants, and the local knowledge that hand treatments of the past have not been effective. Table 4 shows the results of this process of assigning treatment methods for Alternative B.

Table 4 – Acres of Treatment Methods for Alternative B

Treatment Methods	Alternative B Proposed Action
Upland Areas	**Acres**
Manual, mechanical and/or ground based chemical	14,456
Treatment in Riparian Habitat Conservation Areas 1	
Manual, mechanical ground-based broadcast and/or ground based chemical spot treatment	3,022
Manual, mechanical, and/or chemical ground based spot treatment only (including wicking and wiping), no broadcast allowed	2,538
All areas	
Bio-Control only	3,917
Manual only	41
Aerial only	675
Total Acres Treated	**24,649**

[1]Riparian Habitat Conservation Areas (RHCA) as designated under PACFISH, INFISH

As stated before most infestations will be treated using herbicide application(s). The third step in the process is to prescribe the appropriate chemical and herbicide application method to each site. The Common Control Measures, discussed below, consider the most current science available for the 10 chemicals approved for use by the Forest Plan and The Regional FEIS (USDA 2005) to assign appropriate, effective herbicide treatments for each target invasive species in each infestation site. These measures have been further refined to address conditions on the Umatilla National Forest.

The final step is assuring that all treatments are properly managed to minimize risk and potential adverse effects. Application instructions on herbicide labels would be followed, and treatments would conform to Forest Plan standards adopted from the Regional ROD (USDA 2005b). In addition to this and the Common Control Measures, Project Design Features (PDFs) have been developed to specifically reduce the risk of potential adverse effects of invasive plant treatments. PDFs are listed in Table 6 of this section. Biological control methods are ongoing, once started the control method is maintained by residual populations of bio-agents and acres managed using this type of control would vary across the forest over time.

Through monitoring and updating information after initial treatment, future treatments of each infestation may be required, and may be the same or a different treatment method depending on current status of the weed site. The eventual goal is to reduce dependence on herbicide applications and maintain sites using non-herbicide methods.

Future EDRR sites will be evaluated and assigned a prescription in the same way the presently known sites were addressed. Once discovered, an EDRR site would be inventoried, the information evaluated using the Decision Tree and a treatment method prescribed. EDRR sites would likely have a high priority for treatment if a new species is identified, or if a small infestation in an area that did not contain invasive plants in the past is discovered. The one additional step with EDRR sites is to ensure that the inventory information and prescribed treatment method is consistent with the analyses done in this EIS. If it is, then treatment can proceed. If it is not, then appropriate NEPA analysis must be done to evaluate that site and treatment.

Implementation planning outlines the process that would be used to ensure 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 inventory. Detailed information about the implementation planning process is found in Appendix B of this EIS.

Common Control Measures for Alternatives B, C, and D

Common Control Measures for the Umatilla National Forest are displayed in Table 5. The table includes summary prescriptions that would be used as a starting point for all action alternatives. It is adapted from the Regional FEIS Treatment Restoration Standards to target species known or suspected to occur on Umatilla National Forest system lands. Aerial application of herbicides follow the Regional FEIS Standards 16, 21, and 22 in addition to Project Design Features listed in this section. PDFs are additional protective measures designed to minimize potential impacts from treating invasive plants. The Common Control Measures reflect current information and are subject to change depending on new research and adaptive management. This table was developed for the Regional FEIS and prepared by Linda Mazzu (BLM Botanist) and updated by Vicky Erickson (Invasive Weed Specialist) Julie Laufmann (TEAMS Botanist), Jean Wood (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).

Table 5 - Common Control Measures

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
Spotted knapweed (CEBI2) (*Centaurea biebersteinii*) **Diffuse knapweed** (CEDI) (*Centaurea diffusa*) **Meadow knapweed** (CEDE5) (*Centaurea debeauxii*) *Tap rooted Biennials or Perennials*	Hand pull or dig small populations or when regular volunteers are available. Multiple entries per year are required. Manual Disposal: Remove entire root system from the site, as re-growth can occur. Mowing is possible, but timing is critical. These treatments may take up to ten years due to long term seed viability. If chemicals are used, manual treatments could be used for follow- up. Relative amounts of herbicide to manual treatments would decline over time. Biocontrols available (see Appendix B) Revegetate with desirable species, at high priority sites when possible.	**Upland:** 1 -Clopyralid, or Picloram 2- Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table:** Aquatic labeled Glyphosate (will require the most repeated treatments)	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom or hand broadcast spray in dense cover, where dominant plant community is non-native invasives. Spot spray whenever possible, especially in areas with good native plant cover. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray to target individual plants. Follow PDFs they may require a less impacting choice **Timing**: Preferred treatment is spring before bud stage or early summer so use less herbicide. **Notes:** Yearly revisits will be necessary; the number of which is dependent on the chemical used and the seedbank.
Dalmation Toadflax (LIGEDA) *(Linaria. genistifolia* ssp *dalmatica)* **Butter 'n'**	Hand pull or dig small, easily accessible populations. Ensure all plant parts are completely removed. Multiple entries per year are required. Plants can be left on site, but may reduce germination of desirable species due to	**Upland:** 1. Picloram 2. Chlorsulfuron 3. Imazapic (Use in native grass stands; fall application only)	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom or hand broadcast spray in dense cover, where dominant plant community is non-native. However, this species tends to be scattered, so spot spraying

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
Eggs (LIVU) *(Linaria vulgaris)* *Rhizomatous Perennials*	mulching effect. Success will depend on consistent labor for each growing season until plants are eradicated. Mowing stands in spring or early summer will eliminate plant reproduction, but not the infestation. These treatments may take up to ten years due to long term seed viability. Biocontrols available (See Appendix B) If chemicals are used, manual treatments could be used for follow-up. Relative amounts of herbicide to manual treatments would decline over time. Revegetate with desirable species at high priority sites when possible. Plant communities in good condition may recover without replanting.	**High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table** Aquatic labeled Glyphosate	(backpack or on OHV) is usually more appropriate. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray to target individual plants. Follow PDFs they may require a less impacting choice **Timing**: Apply during active growth in spring before bloom or in late summer or fall during re-growth. **Notes:** Revisits will be necessary; the number of which is dependent on the chemical used and the seedbank. This control could vary by site. Even after three years of consecutive treatments, control may range widely.
Leafy Spurge (EUES) *Euphorbia esula* *Rhizomatous perennial*	Requires combination of techniques for successful control. Multiple entries per year are required. Repeated mowing or hand cutting can control seed production but must be used with herbicides for adequate control of the site. Repeated mowing could reduce competitive ability of desirable species. Biocontrols available (See Appendix B) Some success has been found with using biological control (flea beetle) with fall herbicide treatments.	**Upland:** 1. Picloram 2. Glyphosate or Imazapic **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table** Aquatic labeled Glyphosate	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Spot spray whenever possible. Boom or hand broadcast spray in dense cover, where dominant plant community is non-native and leafy spurge population is large. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Wick application to target individual plants. Follow PDFs they may require a less impacting choice
Russian Knapweed (ACRE3) (*Acroptilon repens)* *Perennial with*	Hand-pulling is very difficult, but can be effective for small infestations during the establishment year only. Pull plants when soil is wet and before seeds have formed. Remove all plant parts from site.	**Upland:** 1. Chlorsulfuron 2. Clopyralid 3. Clopyralid + Triclopyr (Redeem) 4. Glyphosate, Imazapic, or	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom broadcast spray in dense cover, where dominant plant community is non-native. Spot spray whenever possible, especially in areas with good

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
adventitious shoots	Cutting or mowing reduces the current year growth and will eliminate seed production, but will not kill the roots of this species. Cut/mow several times annually (at least 3 times/year) to control existing top growth; re-emerging plants will be smaller in size and lower in vigor. Discing or plowing produces broken root fragments that spread quickly and resprout. Russian knapweed is poisonous to horses. Livestock will graze, but it is usually avoided. In most situations, Russian knapweed cannot be effectively managed by herbicides alone. Lasting control requires an integration of techniques (mechanical, manual, chemical, and possibly biological control), proper land management, and revegetation to out compete the thistle. Biocontrol available, however not effective in region (See appendix B). Competitive plantings are usually necessary.	Metsulfuron **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table** Aquatic labeled Glyphosate	native plant cover. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray or wick application with manual follow-up treatments to **t**arget individual plants. Follow PDFs they may require a less impacting choice **Notes:** Late fall/early winter application is critical for Picloram and Clopyralid
Yellow starthistle (CESO3) *(Centaurea solstitialis)* Annual	Hand-pull small patches or maintenance programs where plants are sporadically located. Remove all above ground material (leaving even a two inch piece of stem can result in recovery if leaves and buds are still attached at base of plant. Pull after bolted but before it produces viable seed. On relatively large populations of < 40 acres, start removing plants at outward edge of population and work toward interior (Bradley Method). Mowing can be useful but timing is critical (before viable seed production, but too early can result in rapid regrowth),	**Upland:** 1 – Clopyralid or Picloram 2 - Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom broadcast spray in dense cover, where dominant plant community is non-native. Spot spray whenever possible, especially in areas with good native plant cover. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray or wick application to target individual plants. Follow PDFs they may require a less impacting choice **Timing:** **Notes:** Yearly revisits will be necessary; the number of which is

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
	Mazzu (2005) discusses biological control. Biological control insects can reduce seed production by 90 to 100 percent. (Wilson et al. 2003, Biology and Biological Control of Yellow Starthistle).Variable success results reported from eastern Oregon releases(Appendix B). Revegetate high priority sites if needed with desirable species if possible.		dependent on the chemical used and the seedbank.
Scotch Thistle (ONAC) *Onopordum acanthium* *Biennial*	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.	**Upland:** 1 – Picloram or Clopyralid 2 – Chlorsulfuron 3 - Metsulfuron **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table** Aquatic labeled Glyphosate	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom broadcast spray in dense cover, where dominant plant community is non-native. Spot spray whenever possible, especially in areas with good native plant cover. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray or wick application to target individual plants. Follow PDFs they may require a less impacting choice **Timing:** Spray in the spring before plants bolt or during the fall on the rosettes.
Canadian thistle (CIAR4) (*Cirsium arvense*) Perennial-rhizomatous	The only manual technique would be hand cutting of flower heads, which only suppresses seed production. Mowing may be effective in rare cases if done monthly (this intensity would damage native species). Covering with plastic tarp may also work for small infestations. Herbicide treatment is most effective. Re-vegetate with desirable species.	**Upland:** • Clopyralid, Picloram, Glyphosate or Chlorsulfuron	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom spray in dense cover, where dominant plant community is non-native invasive. • Backpack spray whenever possible. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray or wick application to target individual plants. Follow PDFs they may require a less impacting choice **Timing:** Apply in spring before to rosettes and prior to flowering. • Or apply in fall to rosettes; season is dependent upon herbicide used. **Notes:** Yearly revisits will be

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
			necessary; the number of which is dependent on the herbicide used and the seed bank.
Musk thistle (CANU4) (*Carduus nutans*) Biennial	Use manual, mechanical or herbicide control or a combination. Any manual method that severs the root below the soil surface will kill these plants. Effective control requires cutting at the onset of blooming. Treatment before plants are fully bolted results in re-growth. Repeated visits at weekly intervals over the 4 to 7 week blooming period provide most effective control. • Mowing should be specifically conducted close to full flower stage (within 2 days). Biological controls may be helpful to suppress populations in combination with other methods (see Appendix B).	**Upland:** 1. Picloram or Clopyralid 2. Metsulfuron methyl 3. Glyphosate 4. Chlorsulfuron **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom spray in dense cover, where dominant plant community is non-native. • Backpack spray whenever possible. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Timing:** Apply in spring before to rosettes and prior to flowering. • Or apply in fall to rosettes; season is dependent upon herbicide used. • **Notes:** Yearly revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. .
Tansy ragwort (SEJA) (*Senecio jacobaea*) Biennial or short-lived perennial	Hand pulling is effective if done in moist soils. This 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 B). Ensure biological controls are present nearby or request their introduction. Re-vegetate with desirable species. Is toxic to horses and cattle and causes severe liver damage.	**Upland:** 1. Clopyralid 2. Chlorsulfuron 3. Picloram 4. Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	• **Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom spray in dense cover, where dominant plant community is non-native. Spot application in patchy areas. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Follow PDFs they may require a less impacting choice **Timing:** During active growth, up through flowering stage. **Notes:** Revisits will be necessary; the number of which is dependent on the herbicide used and the se
Hounds tongue (CYOF) (*Cynoglossum officinale*)	Hand pull or dig for small populations. Entire root system must be removed. Plants could be left on site if no seed pods are present (seed can remain viable for more than one year). These	**Upland:** 1. Metsulfuron methyl 2. Chlorsulfuron 3. Picloram 4. Imazapic	• **Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom spray in dense cover, where dominant plant community is non-native. •

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
Biennial	treatments may take up to five years. Re-vegetate with desirable species.	5. Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Timing:** Apply during active growth, preferably basal rosette stage. • **Notes:** Revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank.
Common burdock (ARMI2) (Arctium minus) Biennial	Hand pulling and mechanical control may prove to be successful since common burdock cannot tolerate cultivation. When cut down or uprooted, any root fragment that is left behind can grow into an entirely new plant and can contribute to spread. An effective control is to cut off emerging flower buds. The plants will have to be monitored throughout the summer as buds can reform after cutting. If herbicides are used, revisits to the site may be necessary in subsequent years to exhaust the seedbank.	**Upland:** 1. Metsulfuron methyl 2. Clopyralid+Triclopyr 3. Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom spray in dense cover, where dominant plant community is non-native. • **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Spot spray or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Timing:** Apply during active growth, **Notes:** Seeds remain viable for 2 and reported up to 10-20 years.
Scotch Broom (CYSC4) (*Cytisus scoparius*) Perennial woody shrub	Hand pull, cutting, weed wrenching or digging small populations or when regular volunteers are available. Hand pulling or weed wrenching is most effective in moist soils. Plants can be left on site if no seed pods are present (seed can remain viable for more than one year). Cutting will require multiple visits in one year. • These treatments may take up to ten years due to long term seed viability. • Biocontrols available (Appendix B), yet only moderate effects noted. Re-vegetate with desirable species.	**Upland:** 1. Triclopyr 2. Picloram 3. Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	• **Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Smaller plants: Backpack spray where hand pulling or weed wrenching is not feasible. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Hand pulling or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Timing** Apply during active growth preferably in the spring to young plants. • **Notes:** Yearly revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. Mowing prior

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
			to fruiting and follow up with spot spray to individual plants will reduce herbicide use.
St John's wort (HYPE) *(Hypericum perforatum)* perennial	Hand removal of small populations or isolated stems is possible, but repeated treatments will be necessary as lateral roots give rise to new plants. Pulled or dug plants must be removed from the area and burned. • These treatments may take up to ten years due to long term seed viability. Biocontrols available (Appendix B). Biological controls will most likely not be effective in damp, cool climates. Re-vegetate with desirable species.	**Upland:** 1. Metsulfuron methyl 2. Picloram 3. Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Backpack spray whenever possible. Boom spray larger areas of dense cover, where dominant plant community is non-native. Apply metsulfuron methyl when plants are fully emerged and in active growth. • Apply picloram in early growth stages before bloom. • Yearly revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Hand pulling or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Timing** Apply during active growth preferably in the spring to young plants. **Notes:** Yearly revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank.
Yellow Hawkweed (HICA10) (*Hieracium pratense*) **Tall Hawkweed** (HIPI2) (*Hieracium aurantiacum*) Perennial	Manual treatments are difficult since hawkweeds have stolons and will re-sprout from any fragments. Therefore, pulling must be done during moist soil conditions to get as much of the root as possible. Remove seed heads if control is attempted later in the season to reduce seed spread. Mowing of plants can cause plants to respond by sending up shorter stems and quickly flowering again.	**Upland:** 1. Picloram or Clopyralid **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Backpack spray whenever possible. • Boom spray larger areas of dense cover, where dominant plant community is non-native.Yearly revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Hand pulling or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Notes:** No indication of a long-lived seed bank, yet yearly visits may be warranted to ensure no resprouting. Herbicides have

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
			been shown to be more effective when combined with fertilizer for grass species.
Sulphur cinquefoil (PORE5) (*Potentilla recta*) Perennial	Hand-pulling is effective on small infestations provided the entire root is removed. Mechanical control by disking shown to be effective if reseeded. Mowing is not effective Make postemergent herbicide application to actively growing plants and in the rosette to flower stage of growth. Seeds remain viable in the seedbank for 1 to 5 years	**Upland:** 1- Picloram 2- Metsulfuron methyl **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table:**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Backpack spray whenever possible. • Boom spray larger areas of dense cover, where dominant plant community is non-native. • Yearly revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Hand pulling or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Timing:** Apply to actively growing plants or during the rosette to flower stage of growth. **Notes:** Repeated applications are needed to for the first couple of years ensure re-establishment does not occur.
Whitetop (CADR (*Cardaria draba)* *Perennia*l	Diligent hand pulling or digging can control small infestations, but plants must be completely removed within 10 days after emergence throughout growing season for two to four years Mowing followed a month later by herbicide may be effective. Mowing must be done during full flowering. In general, manual and mechanical methods are not recommended. Re-vegetate with desirable species.	**Upland:** Metsulfuron methyl, or Chlorsulfuron , or Sulfometuron methyl, or Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Backpack spray whenever possible. • Boom spray in dense cover, where dominant plant community is non-native. • **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Hand pulling or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Notes:** Multiple applications are probably necessary for control. Handing pulling will stimulate plant growth if all plant parts are not removed.

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
Everlasting peavine (LALA4) (*Lathyrus latifoliis*) Perennial vine	Hand pulling is most effective if the entire plant is pulled. Care must be taken not to pull desirable vegetation which is often intermingled. If herbicides are used, manual treatments could be used for follow-up. Relative amounts of herbicide to manual treatments would decline over time	**Upland:** Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Backpack spray whenever possible. • **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Hand pulling or wick application to target individual plants. Follow PDFs they may require a less impacting choice **Timing:** Yearly revisits will be necessary.
Medusahead (TACA8) (*Taeniatherum caputmedusae*) Annual grass	Repeated cutting/mowing with herbicide treatment is effective. • Manual removal can be effective with small populations. A combination of prescribed fire (in June), herbicide application, and reseeding with native grasses is considered highly effective. Repeated treatments may be needed Active restoration (seeding of a competitive desirable species) is important.	**Upland:** 1 Imazapic 2 Sulfometuron methyl + Chlorsulfuron 3 Sulfometuron methyl 4 Sethoxydim 5 Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Backpack spray whenever possible. • Boom spray in dense cover, where dominant plant community is non-native. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Hand pulling or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Timing:** Treatment should be done before seed formation or during the fall through early winter. **Notes:** Off-site drift of 100' or more reported with aerial application.
Reed canarygrass (PHAR3) (*Phalaris arundiacea*)	Use a combination of herbicides and manual, mechanical, cultural or prescribed fire treatments. Manual treatments or mowing are only practical for small stands when multiple entries per year can be made. The entire population must be removed 2 to 3 times per year for at least five years. • Disking or plowing can be effective especially after herbicide treatment. Prescribed burning several weeks after herbicide treatment or in the late fall could also be effective. • Covering populations with black plastic may be effective if shoots are not allowed to grow beyond	**Upland:** Sulfometuron methyl or Glyphosate **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Backpack spray whenever possible. • Boom spray in dense cover, where dominant plant community is non-native. Unlikely area will be in an upland site **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Hand pulling or wick application to target individual plants. Follow PDFs they may require a less impacting choice. **Timing:** Apply in early spring when just sprouting before other wetland species have emerged

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
	tarps. This technique could take over two years to be effective.		**Notes:** Yearly revisits will be necessary; the number of which is dependent on the herbicide used and the seed bank..
Wild carrot (DACA6) (*Daucus carota*) Perennial	Hand-pulling or mowing close to the ground in the first year of growth (7-10 inches high) in mid-to-late summer before seed set can be effective on small patches. It is particularly troublesome when it occurs on railroad and highway rights-of-way with heavy soils where incorrectly timed mowing scatters viable seed for re-establishment. This perennial herb persists in recovering grasslands and prairies, but has been shown to decline on its own.	**Upland:** Metsulfuron methyl or Chlorsulfuron **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table:** Aquatic labeled Glyphosate (not found as effective in the literature	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Spot spray whenever possible. **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Follow PDFs they may require a less impacting choice. **Timing:** Wide range of application times from spring treatments of over-wintered plants or seedlings to established plants in the fall. Yearly revisits will be necessary; the number of which is dependent on the chemical used and the seedbank **Notes:** Abundance in sandy soil generally declines on its own as natives become reestablished. It is more persistent in soils with a good clay content, and active management may be necessary in such areas
Rush skeletonweed (CHJU) (*Chondrilla juncea*)	No manual techniques recommended. A 1-cm section of the extensive and deep tap and lateral root system can resprout aerial parts if damaged Frequent mowing of plants infested with gall mites may decrease the rate of spread. • Biocontrols available (See Appendix B) Herbicides can be effective, especially with repeat follow-up Re-vegetate with desirable species.	**Upland:** 1. Clopyralid (late fall or early spring only) or Picloram 2. Metsulfuron methyl **High risk of aquatic delivery /High Water Table/Porous Soils over a shallow water table**	**Drier upland sites (Road, Quarries & Upland Forest/Rangeland):** Boom spray in dense cover, where dominant plant community is non-native. Backpack spray whenever possible. • **Sensitive Sites or Special Management Areas where more selective treatment is desired:** Apply to rosette in late fall or up to early bolting stage in spring. • Application may be difficult due to lack of leaf surface. • Plants less than 5 years old respond best. • Aggressive repeated treatments will be necessary. • The number will be dependent on the herbicide used and the seed bank. Follow PDFs they may require a less impacting choice. **Timing:** late fall or early spring only

Target Species - Common Name and Growth Habit	General Prescription	Documented Effective Herbicides[1,2]	When/How to treat with Herbicides
			Notes: The pappus on each seed allows the seed to be carried up to 20 miles by wind currents. A healthy plant can produce 1500 flower heads with the capability of producing 20000 viable seeds. Where sexual reproduction is prevented, the plant can regrow from root fragments. Some seeds may remain viable up to 5 years in the seed bank.

1Herbicides listed in numerical order represent a preferential order; no numerical listing indicates no preference for control, no chemical listed indicates no information available. If future research indicates that one of our listed chemicals is effective on an invasive species that it is not listed for now, then they could be used. If a new chemical label gets approved that is effective, it can be used after review of the risk assessment and any additional design features incorporated by supplementing this EIS analysis.
2Currently, the available herbicides for use in or near surface water is glyphosate, triclopyr and imazapyr.

Aerial application
STD 16: Cannot use: Chlorsulfuron, metsulfuron methyl, sulfometuron methyl or triclopyr
STD 21: 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
STD 22: Prohibit aerial application of herbicides within legally designated municipal watersheds

Project Design Features

The following Project Design Features (PDFs) minimizes the potential impacts of invasive plant treatments. These PDFs are specific, Forest level measures designed to minimize project effects and provide sideboards for early detection/rapid response in accordance with R6 2005 ROD Standards 19 and 20. 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 sensitive species, species of local interest (SOLI) and their habitats, potential for herbicide delivery to water, and the social environment. Implementation of the PDFs would be mandatory to ensure that treatments would have effects within the scope of those disclosed in Chapter 3. The analysis assumes buffers approximate horizontal (map) distances.

Project Design Features are summarized in the following table.

Table 6 - Project Design Features

PDF Reference	Design Features	Purpose of PDF	Source of PDF
A - Pre-Project Planning			
A1	Prior to treatment, confirm species/habitats of local interest, watershed and aquatic resources of concern (e.g. hydric soils, streams, lakes, roadside treatment areas with higher potential to deliver herbicide to water, municipal watersheds, domestic water sources), places where people gather, and range allotment conditions. Apply appropriate PDFs described below and any from the Regional EIS/Forest Plan. For EDRR sites follow the decision tree (see figure 1) to determine the type and method of treatment and apply applicable PDFs.	Ensure project is implemented appropriately.	This approach follows several previous NEPA documents. Pre-project planning also discussed in the previous section.
B - Coordination with Other Landowners/Agencies			
B1	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 species reproductive characteristics, and current use of area	To ensure that neighbors are fully informed about nearby herbicide use and to increase the effectiveness of treatments on multiple ownerships.	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

PDF Reference	Design Features	Purpose of PDF	Source of PDF
C - To Prevent the Spread of Invasive Plants During Treatment Activities			
C1	Ensure vehicles and equipment (including personal protective clothing) do not transport invasive plant materials.	To prevent the spread of invasive plants during treatment activities	Common measure.
D - Wilderness Areas [1]			
D1	For EDRR in wilderness, invasive plants could be treated using non-mechanical hand methods or herbicides. Herbicide treatments may use application methods such as wicking, stem injection, spray bottle, hand pressurized pumps, battery or solar powered pumps and propellant based systems such as those that use pressurized carbon dioxide	To reduce the effects of invasive plant treatments on the untrammeled quality of wilderness character	
E - Non-herbicide Treatment Methods			
E1	Limit the numbers of workers on any one site at any one time while treating areas within 150 feet of creeks.	To minimize trampling protect riparian and aquatic habitats, and prevent potential invasive plant spread via waterway dispersal	The distance of 150 feet was selected because it incorporates the Aquatic Influence Zone for fish bearing streams.
E2	Fueling of gas-powered equipment with tanks larger than 5 gallons would	To protect riparian and aquatic habitats.	The distance of 150 feet was selected because it incorporates

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

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	not occur inside the RHCA unless there is no other alternative.		the Aquatic Influence Zone for fish bearing streams.
F - Herbicide Applications			
F1	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. Herbicide application methods include wicking, wiping, injection, spot, and broadcast, as permitted by the product label and these Project Design Features. The use of triclopyr is limited to spot and hand/selective methods. Herbicide carriers (solvents) are limited to water and/or specifically labeled vegetable oil.	To limit potential adverse effects on people and the environment.	Standard 16, 2005 R6 ROD; Pesticide Use Handbook 2109.14

PDF Reference	Design Features	Purpose of PDF	Source of PDF
F2	Herbicide use would comply with standards in the PNW Regional Invasive Plant Program – Preventing and Managing Invasive Plants FEIS (2005), including standards on herbicide selection, restrictions on broadcast use, tank mixing, licensed applicators, and use of adjuvants, surfactants and other additives.	To limit potential adverse effects on people and the environment.	2005 R6 ROD Treatment Standards (see Chapter 1).
F3	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. See J4a	To protect aquatic organisms.	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.
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 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. In no case will imazapyr use exceed 0.70 lbs. a.i. /ac.	To eliminate possible herbicide or surfactant exposures of concern to human health, wildlife, and/or fish.	Based on SERA Risk Assessment for imazapyr there would be no exposure concerns

PDF Reference	Design Features	Purpose of PDF	Source of PDF
F5	Herbicide applications would occur when wind velocity is between two and eight miles per hour to reduce the chance of drift. During application, weather conditions would be monitored periodically by trained personnel.	To ensure proper application of herbicide and reduce drift.	These restrictions are typical so that herbicide use is avoided during inversions or windy conditions.
F6	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.	To ensure proper application of herbicide and reduce drift.	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 non-target vegetation 100 feet or further from broadcast sites (see Chapter 3 for details).
F7	Use of sulfonylurea herbicides (Chlorsulfuron, Sulfometuron methyl and Metsulfuron methyl), will require soils to be mapped 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.	To avoid potential for herbicide drift.	Label advisory

PDF Reference	Design Features	Purpose of PDF	Source of PDF
F8 Additional Herbicide Design Features Specific to Aerial Applications Also see Appendix F for Aerial Spray Guidelines	Application of herbicide aerially will not be used for treatment of EDRR sites	To prevent non-target effects	Not required for newly discovered small infestation
		To prevent non-target effects	
	Chlorsulfuron, metsulfuron methyl, sulfometuron methyl and triclopyr will not be applied aerially.	To minimize any impacts to humans	Regional FEIS ROD, 2005
		To protect water supplied	Regional FEIS ROD, 2005
	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).	To ensure impacts to non-target species is within tolerance.	
		To ensure all aircraft SS for fleet and contract operators follow all FS safety, training, supervision for natural resource protection activities. To ensure pesticide-use management and coordination follows NF direction and policies.	Regional FEIS ROD, 2005
		Reduce likelihood that herbicides would enter surface water in levels of concern.	Regional FEIS Appendix 1.
	Prohibit aerial application of herbicides within Congressional designated municipal watersheds. See B2 for other developed water sources.	To protect SOLIs and reduce non-target effects. To comply with ROD Standards 19 & 20	FSM 5700, FSM 2150, FSM 5709.16, FSM 2109.14059
	Inventory and Monitor – Effectiveness Monitoring required for “a representative sample” in project involving aerial application of herbicide	To prevent non-target effects	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.
	All aviation activities shall be in accordance with FSM 5700 (Aviation Management), FSH 5709.16 (Flight Operations Handbook)FSM 2150 (Pesticide	To ensure proper public notification	Forest Service Manual 2670

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	Use Management and Coordination), FSH 2109.14, 50 (Quality Control Monitoring and Post-Treatment Evaluation),	To ensure grazing animals are not exposed to aerial herbicide applications	and applicable federally listed recovery plans
		To ensure proper public notification	
	Herbicide buffers have been established for perennial and wet intermittent streams, dry streams and lakes and wetlands. These buffers are shown in the tables below.	To ensure non-target effects	Common measure
	Buffer distances for federally listed SOLIs will follow Recovery Plan recommendations. No aerial application would occur within 300' of non-federally listed SOLIs. Spray cards to monitor drift can be used in conjunction with monitoring and adaptive management to adjust buffers if needed.		
	Aerial spraying of invasive species will not occur in areas with 30% or more live tree canopy cover. For live tree		

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	canopy cover between 10-29% 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 non-target tree species present. 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 Press releases will be submitted to local newspapers indicating potential windows of treatment for specific areas. Signing and on		

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	site layout will be performed one to two weeks prior to actual aerial treatment. 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. Enforceable temporary area, trail, and road closures will be used to ensure public safety during aerial spray operations. 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.		

PDF Reference	Design Features	Purpose of PDF	Source of PDF
G Herbicide Transportation and Handling Safety/Spill Prevention and Containment An *Herbicide Transportation and Handling Safety/Spill Response Plan* would be the responsibility of the herbicide applicator. At a minimum the plan would: Address spill prevention and containment. Estimate and limit the daily quantity of herbicides to be transported to treatment sites. Require that impervious material be placed beneath mixing areas in such a manner as to contain small spills associated with mixing/refilling. Require a spill cleanup kit be readily available for herbicide transportation, storage and application (minimum FOSS Spill Tote Universal or equivalent). Outline reporting procedures, including reporting spills to the appropriate regulatory agency. Ensure applicators are trained in safe handling and transportation procedures and spill cleanup. Require that equipment used in herbicide storage, transportation and handling are maintained in a leak proof condition. Address transportation routes so that traffic, domestic water sources, and blind curves are avoided to the extent possible. Specify conditions under which guide vehicles would be required. Specify mixing and loading locations away from water bodies so that accidental spills do not contaminate surface waters. Require that spray tanks be mixed or washed further than 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 H14).		To reduce likelihood of spills and contain any spills.	FSH 2109.14,
H - Soils, Water and Aquatic Ecosystems			
H1	Herbicide use buffers have been established for perennial and wet intermittent steams; dry	To reduce likelihood that herbicides would enter surface waters in concentrations of concern.	* Treatments within RHCAs are allowed if they meet Riparian Management

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	streams; and lakes and wetlands. These buffers are depicted in tables 7, 8, and 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.		Objectives (RMOs) including avoiding 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 R6 2005 ROD Standards 19 and 20.
H2	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 non-aquatic triclopyr (Garlon 4), non aquatic glyphosate, and sethoxidim.	To ensure high risk herbicides are not delivered to streams in concentrations that exceed levels of concern.	SERA Risk Assessments, R6 2005 FEIS Fisheries Biological Assessment
H3	In riparian and aquatic settings, vehicles (including all terrain vehicles) used to access invasive plant sites, 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.	To protect riparian and aquatic habitats.	Common protection measure
H4	Avoid use of clopyralid on high-porosity soils	To avoid leaching/ground water contamination.	Label advisory.

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	(coarser than loamy sand).		
H5	Avoid use of chlorsulfuron on soils with high clay content (finer than loam).	To avoid excessive herbicide runoff.	Label advisory.
H6	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.	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.	SERA Risk Assessment. Based on quantitative estimate of risk from worst-case scenario and uncertainty
H7	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.	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.	SERA Risk Assessments. Based on quantitative estimate of risk from worst-case scenario and uncertainty.
H8	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.	To reduce exposure to herbicides by providing some untreated areas for some organisms to use.	SERA Risk Assessments. Based on quantitative estimate of risk from worst-case scenario and uncertainty regarding effects to reptiles and amphibians.

PDF Reference	Design Features	Purpose of PDF	Source of PDF
H9	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.	To reduce exposure to herbicides by providing some untreated areas for some organisms to use.	SERA Risk Assessments. Based on quantitative estimate of risk from worst-case scenario, uncertainty in effects to some organisms, and label advisories.
H10	Foaming would only be used on invasive plants that are further than 150 feet from streams and other water bodies.	To limit the amount of foam that may be delivered to streams and other water bodies.	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.
H11	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.	Safe drinking water. Also to reduce the potential chance of herbicide delivery to watering systems used for grazing animals.	Label advisories and state drinking water regulations.
H12	When chemicals need to be carried over water by boat, raft or other watercraft, herbicides will be carried in water tight, floatable containers of 1	Lower risk of herbicide being delivered to streams in concentrations that exceed levels of concern.	

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	gallon or less.		
H13	Aerial applications would use typical application rates	Limit herbicide concentrations so that adverse effects are within the scope of analysis	Analyses based on SERA risk assessment worksheets
H14	Treatments above bankfull, within the aquatic influence zone (riparian area), would not exceed 10 acres along any 1.6 mile of a stream	Limits the extent of treatment within the aquatic influence zone so that adverse effects are within the scope of analysis	Analyses based on SERA risk assessment worksheets. Ten acres is based on GLEAM model factors.
I - Vascular and Non-Vascular Plant and Fungi Species of Local Interest (SOLI)			
I1	A USDA Forest Service botanist would use monitoring results/adaptive management to refine buffers in order to adequately protect SOLI (see section on Adaptive Management below)	To prevent any repeated effects to SOLI populations, thereby mitigating any long-term effects. To demonstrate compliance with ROD Standards 19 & 20	Broadcast buffer sizes are based on Marrs, 1989 based on 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 Implementation Planning Section).

PDF Reference	Design Features	Purpose of PDF	Source of PDF
I2	Botanical surveys may be necessary to identify plant SOLI if suitable habitat is within 300 to1000 feet (see section I5) of planned aerial treatments, 100 feet of planned broadcast treatments, 10 feet of planned spot treatments and/or 5 feet of planned hand herbicide treatments.	To ensure SOLI are protected and survey are conducted when appropriate	Forest Service Manual 2670 and applicable federally listed recovery plans
I3	Botanical SOLI within 100 feet of planned ground based broadcast applications would be covered by protective barrier, or broadcast application would be avoided in these areas (spot or hand herbicide treatment, or non-herbicide methods may be used without covering SOLI plants)	To ensure SOLI are protected and survey are conducted when appropriate	Forest Service Manual 2670 and applicable federally listed recovery plans

PDF Reference	Design Features	Purpose of PDF	Source of PDF
I4	When SOLI 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. Avoid the use of picloram and imazapyr in this situation, and use aquatic triclopyr with caution as typical application rates can result in concentrations greater than estimated or measured "no observable effect concentration" to aquatic plants (R6 2005 FEIS, Table 4-47).	To ensure SOLI are protected and survey are conducted when appropriate	Forest Service Manual 2670 and applicable federally listed recovery plans
I5	Picloram will not be used within 50 feet of the threatened plant species *Silene spaldingii.*	To ensure protection of emerging seedlings and potential non-target plant root uptake due to herbicide soil persistence.	US FWS Conservation Strategy (2004).
I6	Aerial herbicide applications will follow Recovery Plan recommendations for listed species (FWS). Presently, one federally listed species (Silene spauldingii) is documented on the forest with recovery plan recommendations suggesting no aerial herbicide within 1000 feet of occurrence. No aerial herbicide applications would occur within 300' of a non-federally listed SOLI, and spray cards to monitor drift can be used in conjunction with	To ensure SOLI are protected and survey are conducted when appropriate	Forest Service Manual 2670 and applicable federally listed recovery plans. Aerial drift buffers were derived from various scientific publications (See aerial application methods)

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	monitoring and adaptive management to adjust buffers if needed.		
I7	[2]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.		
I8	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.		
I9	Effectiveness monitoring would occur before, during and after treatment to determine whether invasive plants are being		

[2] Forest level monitoring would occur according to the Umatilla National Forest Plan, as amended by the R6 2005 ROD. Project specific monitoring would occur in all action alternatives as explained in I6, I7, and I8.

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	effectively controlled and to ensure non-target vegetation, especially native vascular and non-vascular species of local interest, is adequately protected.		

PDF Reference	Design Features	Purpose of PDF	Source of PDF
I10	The impacts of herbicide use on plant 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 non-vascular plant SOLIs would be monitored. Non-target 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: •Decrease in the size of the SOLI plant population •Leaf discoloration or chlorophyll change •Mortality Monitoring would continue until three post-treatment visits (at one or more sites near each botanical SOLI) confirm a lack of adverse effects.		

PDF Reference	Design Features	Purpose of PDF	Source of PDF
I11	In the vicinity of *S. spaldingi* and all other SOLI, restoration and cultural treatments, including seeding and/or use of fertilizer, will be under the direct supervision of the 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.	To ensure soil chemistry/biology is not negatively impacted, which can potentially alter the subsequent establishment of resident seedbank species	Professional judgement
J - Wildlife Species of Local Interest			
J1	**Bald Eagle**		
J1-a	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.	To minimize disturbance to nesting bald eagles and protect eggs and nestlings	Bald Eagle Management Guidelines for OR-WA (Anonymous); U.S. Fish and Wildlife Service 2003, p. 9
J1-b	Noise-producing activity above ambient levels would not occur between October 31 and March 31 during early morning or late	To minimize disturbance and reduce energy demands during stressful winter season	Bald Eagle Management Guidelines for OR-WA (Anonymous); t Programmatic BO (U.S. Fish and Wildlife

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	afternoon near known winter roosts and concentrated foraging areas. Disturbance to daytime winter foraging areas would be avoided.		Service 2003, p. 9)
J2	**Gray Wolf**		
J2-a	Treatments within 1 mile of active wolf dens would be timed to occur outside the season of occupancy (April 1 through June 30)	To minimize disturbance and reduce energy demands on denning wolves.	Federal Register, Vol, 68, No, 62 4(d)
J2-b	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)	To minimize disturbance/impacts to wolves at rendezvous sights.	Buffer is based on expected range of disturbance
J2-c	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.		
J3	**Peregrine Falcon**		
J3-a	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	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.	Pagel, J. (2006) Peregrine falcon nest site data, 1983-2006.

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	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		

PDF Reference	Design Features	Purpose of PDF	Source of PDF
J3-b	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.	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.	Pagel, J. (2006) Peregrine falcon nest site data, 1983-2006.

PDF Reference	Design Features	Purpose of PDF	Source of PDF
J3-c	Protection of nest sites would be provided until at least two weeks after all young have fledged.	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.	Pagel, J. (2006) Peregrine falcon nest site data, 1983-2006.
J3-d	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.	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.	Pagel, J. (2006) Peregrine falcon nest site data, 1983-2006.
J3-e	Non-mechanized 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. Non-mechanized invasive plant activities such as back pack spray, burning, hand-pulling, lopping, and/or re-vegetation planting may be allowed within the secondary nest zone during the seasonal restriction period.	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.	Pagel, J. (2006) Peregrine falcon nest site data, 1983-2006.

PDF Reference	Design Features	Purpose of PDF	Source of PDF
J3-f	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 non-disturbing. (5) Other exceptions on a case-by-case basis as determined by the Deciding Official.	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.	Pagel, J. (2006) Peregrine falcon nest site data, 1983-2006.
J3-g	Picloram and clopyralid would not be used within 1.5 miles of peregrine nest more than once per year.	To reduce exposure to hexachlorobenze, which has been found in peregrine falcon eggs.	Pagel, J. (2006) Peregrine falcon nest site data, 1983-2006.
J4	**Columbia Spotted Frog and Leopard Frog**		
J4-a	Avoid broadcast spraying of herbicides, and avoid spot spraying of glyphosate with POEA surfactant, sulfometuron methyl, and NPE-based surfactants, in occupied or	To minimize exposure of frogs to herbicides or surfactants that pose risk to frogs.	Appendix P of the R6 2005 FEIS; SERA 2003, 2004; Bakke 2003

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	suitable (within 100 feet) spotted or leopard frog habitat. Coordinate treatment methods, timing, and location with local Biologist.		
J5	**Painted Turtle**		
J5-a	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.	To minimize disturbance, trampling, and herbicide exposure to painted turtles.	David Anderson, WA Dept. of Fish and Wildlife, personal communication, 2005.
K	**Public Notification**		
K1	High use areas, including administrative sites, developed campgrounds, visitor centers, and trailheads would be posted in advance of herbicide application or closed. Areas of potential conflict would be marked on the ground or otherwise posted. Postings would indicate the date of treatments, the herbicide used, and when the areas are expected to be clear of herbicide residue. See also F for aerial, L for special products, and M for cultural plants.	To ensure that no inadvertent public contact with herbicide occurs.	These are common measures to reduce conflicts.
K2	The public would be notified about upcoming herbicide treatments via the	To ensure that no inadvertent public contact with herbicide occurs.	R6 2005 ROD Standard 23 (see table 1).

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	local newspaper or individual notification, fliers, and posting signs. Forest Service and other websites may also be used for public notification.		
L	**Special Forest Products**		
L1	Triclopyr would not be applied to foliage in areas of known special forest products or other wild food collection areas.	To eliminate any scenario where people might be exposed to harmful doses of triclopyr.	Appendix Q of the R6 2005 FEIS
L2	Special forest product gathering areas may be closed for a period of time to ensure that no inadvertent public contact with herbicide occurs.	To eliminate any scenario where people might be exposed to herbicide.	R6 2005 ROD Standard 23
L3	Popular berry and mushroom picking areas would be posted, marked on the ground or otherwise posted.	To eliminate any scenario where people might be exposed to herbicide	R6 2005 ROD Standard 23
L4	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, in multi-lingual formats if necessary. See section K.	To ensure that no inadvertent public contact with herbicide occurs.	R6 2005 ROD Standard 23
M	**American Indian Tribal and Treaty Rights**		
M1	American Indian tribes would be notified annually (see section K) as treatments are scheduled so that tribal members may provide input and/or be notified prior to gathering cultural plants.	To ensure that no inadvertent public contact with herbicide occurs and that cultural plants are fully protected.	Government to government agreements between American Indian tribes and the Umatilla National Forest.

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	Individual cultural plants identified by tribes would be buffered as above for botanical species of local interest; see section I2, I3, and I4).		
M2	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.	To avoid conflicts impacts to cultural resources.	Common practice.
N	**Range Resources**		
N1	Use available administrative mechanisms to incorporate invasive plant prevention practices into rangeland management. Examples of admin. mech. include, but are not limited to, revising permits and grazing allotment plans, providing annualoperating instructions, and adaptive management. Plan and implmt practices in coop. with grazing permit holder.	To ensure proactive adaptive measures are taken to eliminate future spread of invasive plants.	Regional FEIS Standard #6
N2	Permittees will be notified of annual treatment actions	To ensure permittee has knowledge of activities occurring within the allotment	Common Practice

PDF Reference	Design Features	Purpose of PDF	Source of PDF
	at the annual permittee operating plan meeting, and/or notified within 2 weeks of planned treatments of infestations > 1 acre in size. See section K.		
N3	Follow most current EPA herbicide label for grazing restrictions.	To ensure grazing animals are not exposed to chemicals	EPA labeling requirements

Herbicide Use Buffers

Herbicide treatments would become more restrictive as they occur 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. Table 7,

Table 8 and Table 9 specify buffers according to treatment methods, herbicides used, risk, and type of aquatic zone.

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	300	100	Water's edge	Water's edge
Aquatic Triclopyr-TEA	None Allowed	None Allowed	15	Water's edge
Aquatic Imazapyr*	300	100	Water's edge	Water's edge
Low Risk to Aquatic Organisms				
Imazapic	300	100	15	Bankfull
Clopyralid	300	100	15	Bankfull
Metsulfuron Methyl	None Allowed	100	15	Bankfull
Moderate Risk to Aquatic Organisms				
Imazapyr	300	100	50	Bankfull
Sulfometuron Methyl	None Allowed	100	50	5
Chlorsulfuron	None Allowed	100	50	Bankfull
High Risk to Aquatic Organisms				
Triclopyr-BEE	None Allowed	None Allowed	150	150
Picloram	300	100	50	50
Sethoxydim	300	100	50	50
Glyphosate	300	100	50	50

Table 8 - Herbicide Use Buffers in feet – Dry Intermittent Streams - Proposed Action (Alternative B)

Herbicide	Dry Intermittent Stream			
	Aerial	Broadcast	Spot	Hand/ Select
Aquatic Labeled Herbicides				
Aquatic Glyphosate	100	50	0	0
Aquatic Triclopyr-TEA	None Allowed	None Allowed	0	0
Aquatic Imazapyr*	100	50	0	0
Low Risk to Aquatic Organisms				
Imazapic	100	50	0	0
Clopyralid	100	50	0	0
Metsulfuron Methyl	None Allowed	50	0	0
Moderate Risk to Aquatic Organisms				
Imazapyr	100	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	100	100	50	50
Glyphosate	100	100	50	50

Table 9 - Herbicide Use Buffers in Feet–Wetlands-Proposed Action (Alternative B)

Herbicide	Wetlands			
	Aerial	Broadcast	Spot	Hand/ Select
Aquatic Labeled Herbicides				
Aquatic Glyphosate	300	100**	Water's edge	Water's edge
Aquatic Triclopyr-TEA	None Allowed	None Allowed	15	Water's edge
Aquatic Imazapyr*	300	100**	Water's edge	Water's edge
Low Aquatic Hazard Rating				
Imazapic	300	100	15	high water mark
Clopyralid	300	100	15	high water mark
Metsulfuron Methyl	300	100	15	high water mark
Moderate Aquatic Hazard Rating				
Imazapyr	300	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	300	100	50	50
Glyphosate	300	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.

Figure 9 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

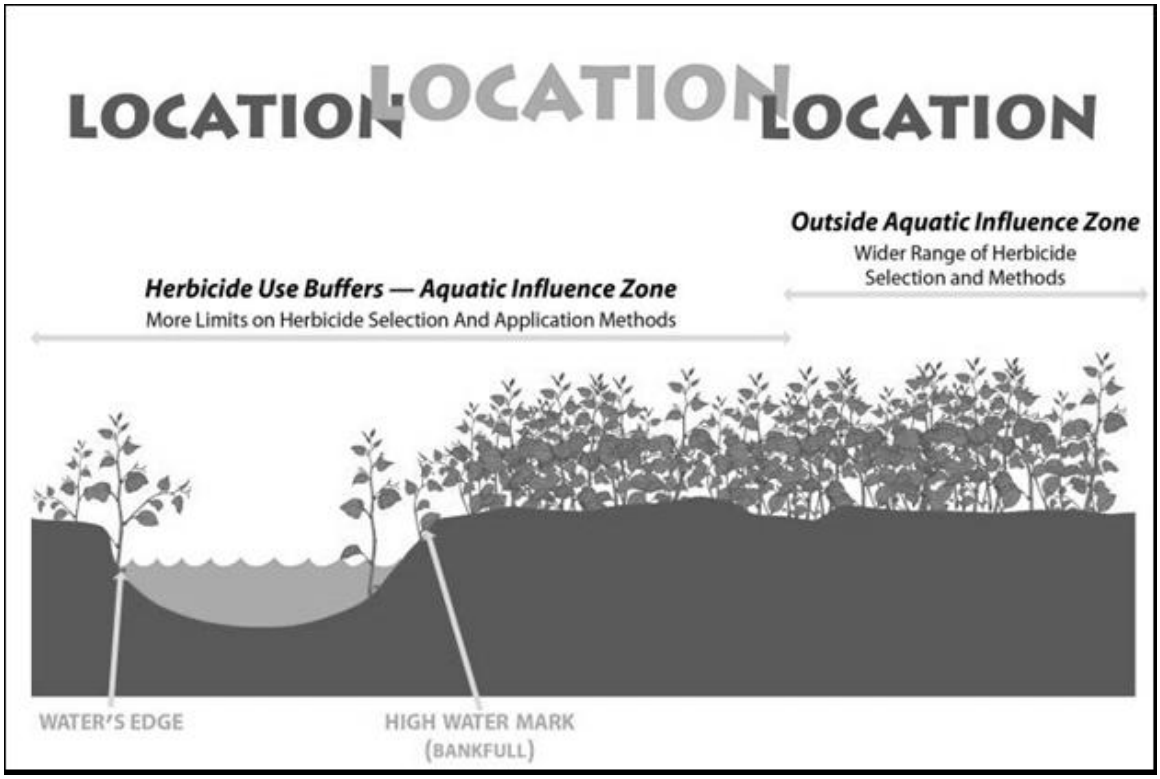

Figure 9 - Illustration of how herbicide selection and application methods in the established buffer widths are more limited in Aquatic Influence Zones

Restoration

Passive site restoration is a component common to all action alternatives. This method of restoration may include mulching, seeding, planting native species, or may simply allow desirable vegetation to naturally replace target invasive species that have been removed. When needed to facilitate recovery, native seed would be used to recover the site to increase competition and provide erosion protection.

Restoration would not include soil surface disturbing activities such as tilling, plowing or mechanical seed drilling. Projects utilizing such restoration methods would require individual site environmental analysis. Other restorative activities such as road or trail closures allow treated sites to recover without concern of the outside introduction of invasive species seed by vehicle, human or stock travel through the site. Such closures will not be considered under this project. They are managed under the Travel Management and Recreation Management programs, and have separate environmental analyses.

2.2.4 Alternative C - No Broadcast Spraying in Riparian Areas

There is concern that detrimental effects could occur from broadcast spraying herbicide chemical in riparian areas. This alternative would not allow broadcast applications of herbicides in riparian areas. However, spot spraying, or hand applications like wiping or wicking of herbicides would be allowed.

The ID Team reviewed comments and concerns received from the public during the scoping process. From those concerns, issues about the proposed project were identified. Among those, the following issues would be addressed by this alternative:

Human Health:

- There is concern by members of the public that exposure to herbicides may have serious human health consequences (reduced potential for effects to water supplies compared to Alternative B)

Treatment Effectiveness:

There is a concern that the spread of invasive species will increase if all available treatment methods are not utilized (broadcast spraying in riparian areas eliminated)

Non-target Species:

- There is a concern that herbicide exposure, particularly when applied using aerial or broadcast spraying, may harm terrestrial wildlife species (more targeted application and reduced potential of drift compared to Alternative B)
- There is a concern that herbicide exposure, particularly when applied using aerial or broadcast spraying, may harm non-target plants (more targeted application to riparian species than under Alternative B)

Soil, Water Quality, Aquatic Biota:

- There is a concern that there may be potential adverse effects of herbicide treatment on soils (reduced application of herbicides and less drift potential compared to Alternative B)
- There is a concern that there may be potential adverse effects of herbicide treatment on riparian areas adversely impacting water quality and aquatic ecosystems (reduced application of herbicides and less drift potential compared to Alternative B)

Treatment applications would be the same as for Alternative B except for the use of herbicides in riparian areas. Herbicide treatment applications would only include 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 non-organic matter. With this level of control specificity, potential contact with water or aquatic organisms from chemical drift is virtually eliminated.

Table 10 – Acres of Treatment Methods for Alternaive C

Treatment Methods	Alternative C – No Broadcast Application of Herbicide
Upland Areas	**Acres**
Manual, mechanical and/or ground based chemical	14,456
Treatment in Riparian Habitat Conservation Areas 1	
Manual, mechanical ground-based broadcast and/or ground based chemical spot treatment	0
Manual, mechanical, and/or chemical ground based spot treatment only (including wicking and wiping), no broadcast allowed	5,560
All areas	
Bio-Control only	3,917
Manual only	41
Aerial only	675
Total Acres Treated	**24,649**

Invasive plants have been inventoried on 5,560 acres within riparian/wetlands lands. Potentially, under Alternative B, all riparian areas could be treated by broadcast spraying, unless restricted by project design features. Broadcast spraying was proposed either because large, concentrations of invasives would make weed control difficult using other methods, or because it was the most cost effective method. Under Alternative C some acres, otherwise proposed for broadcast spraying may:

- Contain spread of the weeds with herbicides or manual/mechanical methods, but with no attempt to control the infestation site
- Control the infested area with spot treatment, other hand application of herbicides or manual/mechanical methods

For each treatment site, the decision to treat or not, and if so, how to treat would be determined on a site by site basis.

With the exception of the limitations imposed on broadcast spraying in riparian areas, the features of this alternative are the same as Alternative B.

2.2.5 Alternative D - No Aerial Application

There is concern that aerial application of herbicides could cause detrimental effects to areas targeted and to adjacent areas where chemical drift could impact non-target environments. Alternative D would eliminate this concern by eliminating the option to aerially apply herbicides.

The ID Team reviewed comments and concerns received from the public during the scoping process. From those concerns, issues about the proposed project were identified. Among those, the following issues would be addressed by this alternative:

Human Health:

- There is concern by members of the public that exposure to herbicides may have serious human health consequences (reduced potential for effects to water supplies compared to Alternative B)

Treatment Effectiveness:

- There is a concern that the spread of invasive species will increase if all available treatment methods are not utilized (aerial application method eliminated)

Non-Target Species:

- There is a concern that herbicide exposure, particularly when applied through aerial or broadcast spraying, may harm terrestrial wildlife species (aerial application eliminated)
- There is a concern that herbicide exposure, particularly when applied through aerial or broadcast spraying, may harm non-target plants (aerial application eliminated)

Soil, Water Quality, Aquatic Biota:

- There is a concern that there may be potential adverse effects of herbicide treatment on soils (less drift potential than under the Alternative B)
- There is a concern that there may be potential adverse effects of herbicide treatment on riparian areas adversely impacting water quality and aquatic ecosystems (less drift potential than under the Alternative B)

Alternative B proposes to treat approximately 675 acres using aerial application of herbicides. Aerial application is the most cost effective way to apply herbicides on large areas of continuous infestations, or on remote or inaccessible infestations. By eliminating the aerial application option, either:

- Some containment could occur using ground-based chemical, manual or mechanical methods or
- Control would be pursued with ground-based broadcast spraying methods

For each treatment site, the decision to treat or not, and if so, how to treat, would be determined on a site by site basis.

With the exception of the limitations imposed on broadcast spraying in riparian areas, the features of this alternative are the same as Alternative B.

Table 11 – Acres of Treatment Methods for Alternative D

Treatment Methods	Alternative D – No Aerial Application of Herbicide
Upland Areas	**Acres**
Manual, mechanical and/or ground based chemical	15,131
Treatment in Riparian Habitat Conservation Areas 1	
Manual, mechanical ground-based broadcast and/or ground based chemical spot treatment	3,022
Manual, mechanical, and/or chemical ground based spot treatment only (including wicking and wiping), no broadcast allowed	2,538
All areas	
Bio-Control only	3,917
Manual only	41
Aerial only	0
Total Acres Treated	24,649

2.3 Alternatives Not Considered in Detail

2.3.1 High Potential for Spread Areas of 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, and/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 1995 Environmental Assessment for the Management of Noxious Weeds (USDA 1995) and the Regional Invasive Plant EIS (USDA 2005) considered alternatives to manage weeds without using herbicides. The 1995 EA considered such an alternative in detail. That alternative was rejected because the likelihood of controlling weeds without herbicides was low (USDA 1995, page 44). The selected alternative allows herbicide use, but only after other methodologies has proven 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 1995 Guidelines Applied Forest-wide

The current program established by an environmental assessment (EA) completed in 1995(as amended), allows herbicide treatment on 1,774 acres only if non-chemical 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 Regional FEIS (USDA 2005). In fact, dicamba, approved for use in the 1995 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 non-herbicide treatments be used on new sites first. Herbicide application would only occur if non-herbicide treatments proved ineffective.

The present inventory of invasive plants suggests 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 circumstances of herbicide use. Because only two herbicides would be used and because the present program would not meet 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. Therefore an alternative was considered that would not allow herbicide applications in any of these special areas or riparian areas.

Without herbicide treatments, riparian areas and special areas 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 would allow invasives to persist throughout the forest. This is contrary to the project Purpose and Need of containing, controlling or eradicating invasive plants across the Forest. 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 in the Regional ROD (USDA 2005a) prevents use of effective herbicides coming on the market and future herbicides 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

During scoping members of the public identified several issues of concern regarding this proposed project. (A detailed discussion of public involvement and issues can be found in Chapter 1.7, 1.8, and 1.9 of this EIS). Significant issues were grouped into these four categories;

- Human health
- Treatment effectiveness
- Non-target species
- Soils, water quality and aquatic biota

The significant issues were the basis for developing alternatives to the Proposed Action (Alternative B). Table 12 summarizes some of the major activities of each alternative. Herbicide treatment acres in Table 10 are based on gross acreage infestations and represent worst case scenarios. Actual herbicide treatment acres would be evaluated at treatment time and would likely be much less than reported here. Table 13 compares the No-action (Alternative A) and Alternatives B, C, and D on each of the significant issues.

It is important to understand the significant issue statements as they appear in the table. They are representative statements of concern members of the public expressed during scoping. For instance, the statement, "the exposure to herbicides may have serious human health consequences" (first significant issue listed in Table 13 below) reflects a concern or belief stated by a member of the public. It does not necessarily agree with conclusions the interdisciplinary team has drawn after analyzing the effects of the proposed alternatives.

Table 12 – Comparitive Summary of Alternatives

Activity	Alt A	Alt B	Alt C	Alt D
Acres identified for treatment	**3154**	**24,649**	**24,649**	**24,649**
Acres identified for aerial spraying of herbicides	0	675	675	0
Estimated % of treatment sites proposed for treatment	40	100	100	100
Acres of proposed herbicide treatments	1774	20,691	20691	20691
Number of herbicides available for use	2	10	10	10
Estimated % of herbicide treatment using broadcast methods on known infestations in RHCA's (with adherence to all project PDFs)proposed for treatment	9%	100%	54%	100%
Estimated % of herbicide treatment using broadcast methods on known infestations proposed for treatment	2%	10%	23%	10%
Biocontrol releases	Yes	Yes	Yes	Yes
EDRR including chemical methods	No	Yes	Yes	Yes
% of Total Forest Landbase Treated with Herbicides	Apprx: 0.12%,	Apprx: 1.5%,	Apprx: 1.5%,	Apprx: 1.5%,
% of Total Forest landbase treated annually1	<0.008%	0.3%	0.3%	0.3%
Treatment effectiveness	Low	Highest	High	High
Total cost initial treatment, all acres	$641,695	$3,887,460	$3,963,010	$3,942, 840
Cost per effectively treated acre	$814	$197	$201	$200
Jobs potentially supported to contain or control acres proposed for treatment (total that would occur over life of project)	105	326	335	332
Income potentially supported, to contain or control acres proposed for treatment, $1,000s (total that would occur over life of project)	$2,673	$8,338	$8,550	$8,493
Projected time to achieve P & N	P & N would not be met	19 years	19 years	19 years
Estimated annual cost of target treatment program	$133,700	$539,030	$549,790	$546,95 0
Estimated undiscounted costs to achieve P & N at target annual treatment level ($1,000)	unlimited	$6,824	$6,960	$6,924

Table 13 – Alternative Comparison Relative to Significant Issues

Significant Issue	Unit of Measurement	(No Action) Alternative A	(Proposed Action) Alternative B	Alternative C	Alternative D
***1 – Human Health**					
	Worker and public exposure to herbicides	No significant impact (1995 FONSI).	Forest Plan standards and project design features eliminate plausible harmful exposure scenarios	Same as Alternative B	Same as Alternative B
	Contamination of drinking water	No significant impact (1995 FONSI).	Forest Plan standards and project design features eliminate plausible harmful exposure scenarios	Same as Alternative B	Same as Alternative B
2 – Treatment Effectiveness					
2a-the spread of invasive species will increase if all available treatment methods are not utilized	Estimated rate of invasive species spread	High because: Current treatments are estimated at 25%effective. Invasive species are predicted to spread 8-12% annually. Only two herbicides can be used as last resort. Only 13 % of presently identified acres can be treated	Lower than Alternative A because: Proposed trtmnts are estimated at 80% effective. Invasive species are predicted to spread 8-12% annually. EDRR and increased treatment effectiveness will reduce spread potential. Ten herbicides available for use. 100% of presently identified acres can be treated	Same as Alternative B	Same as Alternative B
	Acres treated by method	41 acres manually; 1339 acres biocontrol; 1,774 acres treated chemically only after other methods shown to be ineffective	41 acres of manual; 3917 acres of biocontrol; 20,691 acres of any method, but most would be herbicide treatment	Same as Alt B except no broadcast herbicide treatment in riparian areas, though spot or hand herbicide treatment allowed in riparian areas	Same as Alt B except no aerial application of herbicides but areas may still be treated with herbicides or up to 675 acres less than Alt B

Significant Issue	Unit of Measurement	(No Action) Alternative A	(Proposed Action) Alternative B	Alternative C	Alternative D
2b-herbicides should be used only as a last resort when other methods fail	Estimated rate of invasive species spread	Estimated 25% effective on treated acres & infestation continues to grow because emphasis on non-herbicide treatments; residual infestation spread rate 8-12%	Estimated 80% effective on treated acres & infestation; post-treatment rate of spread estimated at 4-6%. residual infestation spread rate 8-12% in untreated acres	Same as Alternative B	Same as Alternative B
	Acres of non-herbicide treatment	41 acres manual/mechanical; 1339 acres Biocontrol; Emphasis on 1774 acres for non-herbicide treatement	41 acres of manual/mechanical; 3917 acres of biocontrol; Emphasis on 20,693 for herbicide treatment	Same as Alt B however invasive plants more persistent in riparian areas	Same as Alt B however rate of decrease may be less because some areas proposed for aerial treatment may not be treated
2c-not using herbicides will result in the continued spread of invasive plants	Estimated rate of spread	Acreage increase continue as in the past	Acres of invasive species reduced by less than half during project life	Same as Alternative B	Same as Alternative B
	Acres of invasive species	Exponential acreage increase continue as in the past	Acres of invasive species reduced by half or less during project life	Same as Alternative B	Same as Alternative B
3 – Non-Target Species					
*3a-herbicide exposure, particularly when applied through aerial or broadcast spraying, may harm terrestrial wildlife and non-target plants	Acres of potential herbicide application using broadcast methods (ground and aerial spraying)	Ground based method: 1,252 acres no aerial	Ground based method 17,478 acres aerial 675 acres	Ground based method 14, 456 acres aerial 675 acres	Ground based method 18,153 acres no aerial 675 acres proposed for aerial would be treated with ground based methods
4 – Soil, Water Quality, Aquatic Biota					
4a-there may be potential adverse effects of herbicide treatment on soils	Acres of herbicide treatment by broadcast and	1,774	20,691	Same as Alternative B	Same as Alternative B

Significant Issue	Unit of Measurement	(No Action) Alternative A	(Proposed Action) Alternative B	Alternative C	Alternative D
	spot methods				
4b-there may be potential adverse effects of herbicide treatment on riparian areas adversely impacting water quality and aquatic ecosystems	Acres of herbicide treatment in riparian by broadcast & spot methods	broadcast = 0 acres spot only = 522	broadcast = 3022 spot only = 2,538	broadcast = 0 spot only = 5560	Same as Alternative B
	Character of herbicide use inside riparian areas	1995 FONSI	Buffers protect riparian from herbicides (see Tables 7,8 & 9); Herbicides used in riparian restricted (see PDFs H2, H3, Treatment method and extent restricted (see PDFs H 9, H10, H15)	Same as Alt B and no broadcast application method in riparian areas	Same as Alternative B

* Indicates issue will tier to the Regional EIS

2.5 Monitoring

Invasive plant treatment and restoration activities are likely to be complex, involve multiple land ownerships and will take years to implement, due to the nature of invasive plant problems. It is possible that a site will be treated multiple times over the years. Tracking these efforts and subsequent progress will be crucial to determining success. The Umatilla National Forest Plan has a monitoring plan, and monitoring results are reported by the Forest annually. In addition, the R-6 2005 ROD established an invasive plant treatment framework for project and program monitoring (see Appendix 1-7 to 11 of the R-6 2005 ROD). The Forest staff will follow Forest Plan and R-6 monitoring requirements, and contribute data to the framework.

The monitoring framework begins with the Umatilla National Forest invasive plant inventory that followed the NRIS/Terra protocol. It suggests beginning a monitoring regime once treatment of a site has started, which includes annual monitoring for the first 3-5 years, decreasing in frequency to every other year for the next 5-10 years and further decreasing monitoring frequency to every 3 years for the next ten years. With the current inventory in place, two types of monitoring would be included in the framework for all action alternatives. They are:

Implementation/Compliance Monitoring – This type of monitoring basically answers the question, "Did we do what we said we would do?" For example, did we use only the chemicals analyzed and approved in the places and under the constraints we set forth? Did we adhere to the buffers established? Answers to these and other questions would ultimately answer the initial question.

Effectiveness Monitoring – This type of monitoring would answer the following questions:

- Have the number of new invasive plant infestations increased or decreased on the Forest?
- What changes in distribution, amount, and proportion of invasive plant infestations have resulted due to treatment activities on the Forest?
- Has the infestation size for a targeted invasive plant species been reduced regionally or at the project level?
- Which treatment methods, separated or in combination, are most successful for specific invasive species?
- Which treatment methods have not been successful for the specific invasive species?
- Do follow-up treatments demonstrate a reduction of herbicide use or the selected method on treated sites?

Effectiveness monitoring would be required; 1) where aerial herbicide applications occur and 2) where broadcast application of herbicide occurs in riparian areas, ditches or water corridors connected to habitat for listed fish; or proximity to federally listed plants.

Monitoring of a representative, statistically reliable, sample of invasive plant treatments would be required. This process will help lead the Region toward efficient and reliable data collection and allow statistical analysis of the data gathered (Regional Standards and Forest Plan).

Project Design Features serve to minimize or eliminate the risk of significant effects so that even though precise treatment locations may not be known, the effects of treatment are known. Uncertainty is addressed through effectiveness monitoring and adaptive management. That is, monitoring data would help managers evaluate when, where, how, etc. follow-up treatment would be appropriate.

For example, monitoring required in the PDFs would track direct effects and adjust buffers and treatment options to protect against any future effects. Such adjustments or treatment changes could be made as long as they were consistent with the findings of this EIS analysis. For instance, monitoring may have shown that spot spraying of a small roadside weed infestation proved ineffective. The treatment was changed to broadcast spraying to better control the weeds that were missed by spot spraying.

PDFs in Table 6 with a monitoring dimension include:

- PDF – F8 = Inventory and Monitor – Effectiveness Monitoring required for "a representative sample" in project involving aerial application of herbicide
- PDF – F8 = All aviation activities shall be in accordance with FSH 2109.14, 50 (Quality Control Monitoring and Post-Treatment Evaluation)
- PDF – I1 = A USDA Forest Service botanist would use monitoring results/adaptive management to refine buffers in order to adequately protect SOLI
- PDF – I8 = Implementation monitoring would occur during implementation to ensure Project Design Features are applied 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
- PDF – I9 = Effectiveness monitoring would occur before, during and after treatment to determine whether invasive plants are being effectively controlled and to ensure non-target vegetation, especially native vascular and non-vascular species of local interest, is adequately protected
- PDF – I10 = Impacts of herbicide use on plant SOLI are uncertain, especially regarding lichen and bryophytes. Monitoring would continue until three post-treatment visits (at one or more sites near each botanical SOLI) confirm a lack of adverse effects

The implementation planning and monitoring would ensure that effective treatments are completed according to PDFs, and undesired effects are minimized. Further analysis would be required if the effective treatment for a new infestation was determined to be outside of existing PDFs (for instance, if the herbicides available for use near streams were not effective for a new infestation).