

# **Wallowa Falls Hydroelectric Project Noxious Weed Management Plan**

**January 3, 2014**

## **PURPOSE**

Noxious weeds are increasingly becoming a threat to native plants and habitat loss. The Wallowa Falls Hydroelectric Project (Project) is at the gateway of recreational access to the Eagle Cap Wilderness Area, so noxious weed infestations left untreated would promote the spread of noxious weeds into the pristine wilderness. Some of the Project lands are on United States Forest Service (USFS) Wallowa-Whitman National Forest (WWNF) lands. The WWNF's insects and disease (pests) goal for forest management is to control pests to levels that are compatible with resource objectives. To comply with this goal, PacifiCorp will pursue the control of noxious weeds with the Project boundary. This is achieved through implementing the following standards and guidelines (USFS 1990):

Integrated Pest Management: Use Integrated Pest Management (IPM) strategies for early detection, suppression and prevention of Forest pests and to manage pests within the constraints of laws and regulations IPM strategies include manual, mechanical, cultural, biological, chemical, prescribed fire, and regulatory means.

Control of Noxious Weeds: Aggressively pursue control of identified noxious weeds on lands where such activities are not precluded by management area direction.

Monitoring: Develop monitoring and enforcement plans for site-specific projects.

In 2005 all of Region 6 USFS Forest Plans were amended to add a new management direction that included an emphasis on early detection, and effective integrated treatment of invasive plants. The Wallowa-Whitman National Forest Invasive Plants Treatment Project Final Environmental Impact Statement (EIS) and an associated Record of Decision (ROD) provide control methods that are compliant with new standards and to allow for effective treatments on all sites (USFS 2010a and 2010b). Both the EIS and ROD provide specific guidelines on common control methods, project design features, herbicide use buffers, Early Detection, Rapid Response Herbicide Use Decision Process and the Annual Implementation Planning and Monitoring Step (USFS 2010b).

Because a large portion of the Project boundary is on WWNF lands, this noxious weed management plan would need to comply with WWNF guidelines and the Project Design Features described in both the EIS and ROD (USFS 2010a and 2010b). This document provides procedures for implementing a consistent and effective noxious weed management plan and directs to the appropriate USFS document. This plan will apply to all PacifiCorp and WWNF lands that are within the Project boundary and will be implemented by a PacifiCorp employee or a designated qualified contractor. As this management plan is

implemented it may need revisions to improve methods, best management practices, and to adapt to changes in conditions, regulations, or USFS policies and guidelines.

## **PROCEDURES**

### **Noxious Weed Monitoring:**

The Project boundary will have a noxious weed survey to detect and monitor noxious weed infestations and to monitor control methods effectiveness. The inspection may be conducted by a PacifiCorp employee or a designated qualified contractor. A qualified person is defined as an individual with the knowledge, training, and experience in identifying noxious weeds, can accurately describe an infestation and surrounding habitat, and recommend eradication methods that comply with regulations.

The survey will include doing a pedestrian survey using a wide observational swath that will cover all high probability areas and have a representative cross-section of minor topographic features, plant associations, and moderate to low probability areas (USFS 2011). A map of high, medium, and low potential noxious weed areas for the Project was completed as part of relicensing and is available in Attachment A. These areas may be modified as needed to adjust for changes in the Project boundary or in public use of an area (e.g. new trails etc.). Prior to conducting a survey the current Oregon State Department of Agriculture (ODA) and Wallowa County noxious weed lists will be reviewed to insure that the most current weeds and correct classification are included in the survey.

### **Schedule:**

Surveys will be conducted annually between June 1 and July 15. If for three consecutive years no noxious weeds are detected during an annual survey, then surveys can go to biennial (every other year) surveys until a noxious weed infestation is detected. Control methods that can effectively control all Class A and target weeds that should be implemented that same year as detection. The exact timing to implement control methods will be selected for optimal effectiveness for that species of noxious weeds, type of control method, and size of infestation.

### **Records:**

Good record keeping is essential to effectively monitor noxious weed infestations and the success of control methods. Documentation will use the same USFS form used by the WWNF and protocols as described in “Field Guide Invasive Plant Inventory, Monitoring, and Mapping” (USFS 2013). Both of these documents are available in Attachment B. All records of noxious weeds records within the project boundary will be forwarded to the appropriate noxious weed manager at Wallowa Whitman National Forest by December 31 each year and available upon request.

## **Control Methods:**

All noxious weeds that are within the Project boundary, including WWNF lands and PacifiCorp own lands, will be treated. Treatment will be prioritized to the following order:

1. ODA and Wallowa County A designated weeds
2. ODA target weeds
3. ODA and Wallowa County B designated weeds
4. Wallowa County Watch designated weeds

The WWNF has an EIS and an associated ROD that provides detailed control methods that are compliant with new standards and allow for effective treatments (USFS 2010a and 2010b). Both the EIS and ROD provide specific guidelines on common control methods, project design features, herbicide use buffers, Early Detection, Rapid Response Herbicide Use Decision Process and the Annual Implementation Planning and Monitoring Step (USFS 2010b). These specific guidelines are provided in Attachment C and will be used for all control treatment within the Project boundary and USFS lands.

Noxious weed treatments on PacifiCorp lands will be selected for optimal effectiveness for that noxious weeds species, type of control method, and size of infestation. Pesticide applications will be applied by a certified pesticide applicator and will be applied according to federal, state, and county law and ordinances. In additions, pesticides applied on WWNF lands will be comply with WWNF guidelines.

## **PREVENTION**

Prevention guidelines have already been developed as part of the Wallowa-Whitman National Forest Invasive Plants Treatment Project National EIS (USFS 2010a). These guidelines provide weed prevention strategies for all ground disturbing activities that will be implemented on all WWNF lands within the Project boundary and will be considered for PacifiCorp lands within the Project boundary. It also provides guidelines for restoring and revegetation for an area following ground disturbance activities, as well as an example for completing a site implementation plan using the Project Design Features. This document is available in Attachment D.

## **REFERENCES**

United States Forest Service. 1990. Land and Resource Management Plan Wallowa-Whitman National Forest, as amended. United States Forest Service. URL: [http://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5260139.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5260139.pdf). (September 24, 2013).

United States Forest Service. 2010a. Wallowa-Whitman National Forest Invasive Plants Treatment Project Final Environmental Impact Statement. United States Forest

Service. March 2010. URL: <http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5192845> (September 24, 2013).

United States Forest Service. 2010b. Wallowa-Whitman National Forest Invasive Plants Treatment Project Record of Decision. United States Forest Service April 2010. URL: <http://www.fs.usda.gov/detail/wallowa-whitman/landmanagement/planning/?cid=stelprdb5192845> (September 24, 2013).

United States Forest Service. 2011. Wallowa Falls Hydroelectric Project, FERC Project No. 308-005 Comments on Pre-Application Document, Comments on Scoping Document No. 1, and Study Requests. Site accessed on September 24, 2013 URL: <http://www.pacificorp.com/wallowafalls>

United States Forest Service. 2013. Field Guide Invasive Plant Inventory, Monitoring and Mapping Protocol. p. 1-39. URL: [http://www.wilderness.net/toolboxes/documents/invasive/FS\\_Inventory%26Map\\_Guide.pdf](http://www.wilderness.net/toolboxes/documents/invasive/FS_Inventory%26Map_Guide.pdf). Site Accessed September 23, 2013.

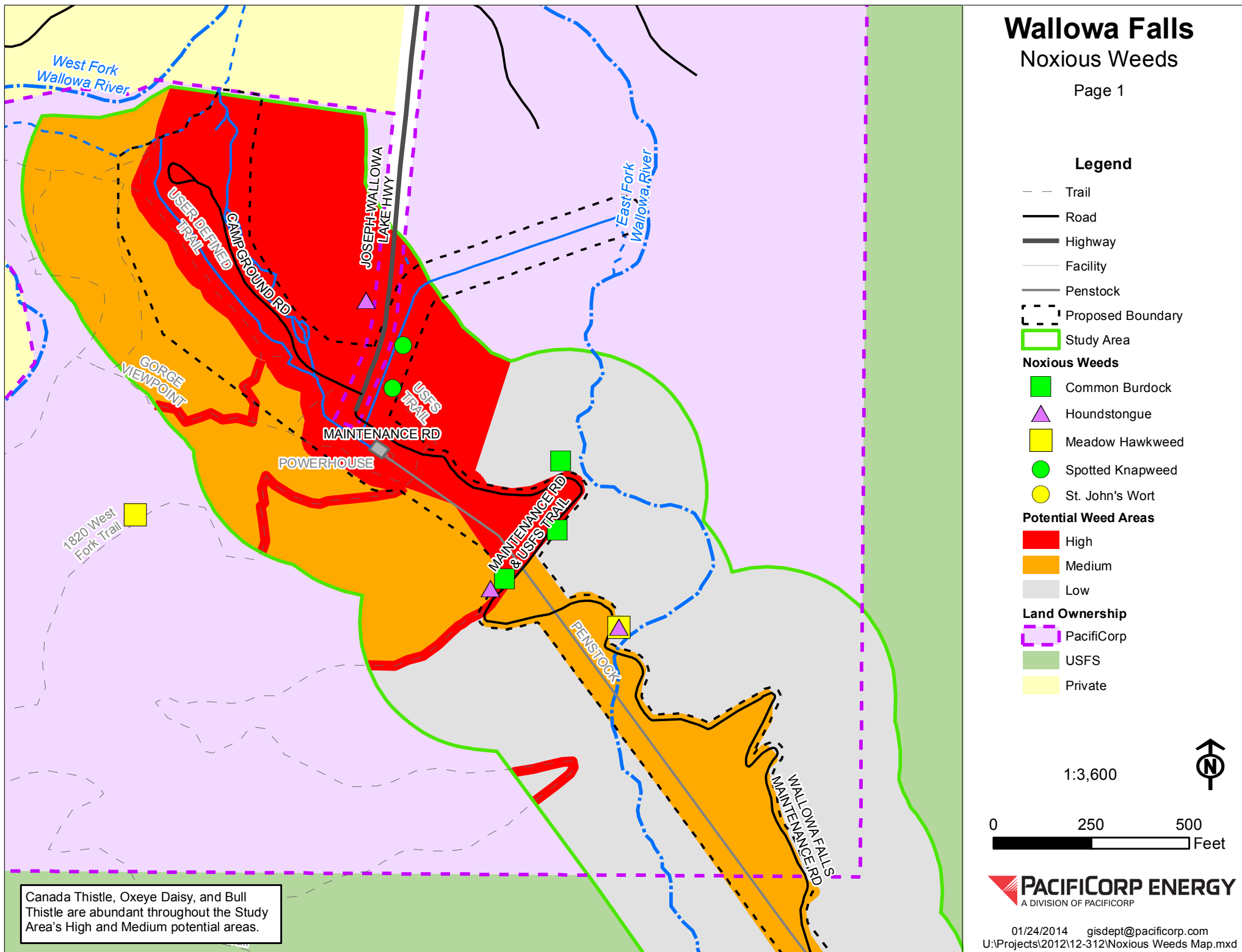
**Attachment A**

**Noxious Weed Potential Map**

# Wallowa Falls

## Noxious Weeds

Page 1



# Wallowa Falls

## Noxious Weeds

Page 2

### Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- Proposed Boundary
- Study Area

### Noxious Weeds

- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort

### Potential Weed Areas

- High
- Medium
- Low

### Land Ownership

- PacifiCorp
- USFS
- Private

1:3,600

0 250 500 Feet



Canada Thistle, Oxeye Daisy, and Bull Thistle are abundant throughout the Study Area's High and Medium potential areas.

**PACIFICORP ENERGY**  
A DIVISION OF PACIFICORP

01/24/2014 gisdept@pacifiCorp.com  
U:\Projects\2012\12-312\Noxious Weeds Map.mxd

# Wallowa Falls

## Noxious Weeds

Page 3

### Legend

- Trail
- Road
- Highway
- Facility
- Penstock
- - - Proposed Boundary
- Study Area

### Noxious Weeds

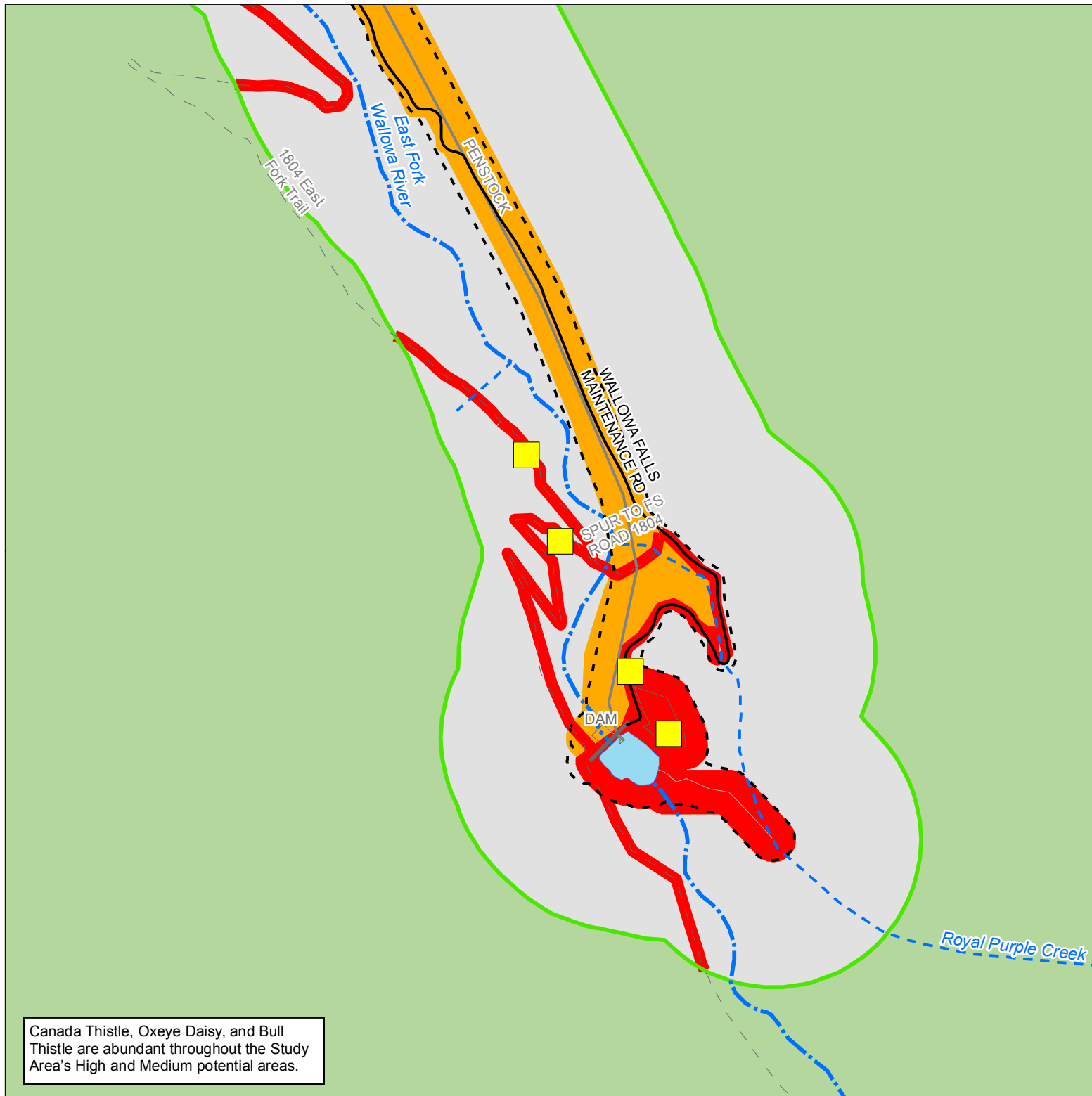
- Common Burdock
- Houndstongue
- Meadow Hawkweed
- Spotted Knapweed
- St. John's Wort

### Potential Weed Areas

- High
- Medium
- Low

### Land Ownership

- PacifiCorp
- USFS
- Private



Canada Thistle, Oxeye Daisy, and Bull Thistle are abundant throughout the Study Area's High and Medium potential areas.

1:3,600



0 250 500 Feet

**PACIFICORP ENERGY**  
A DIVISION OF PACIFICORP

01/24/2014 gisdept@pacificorp.com  
U:\Projects\2012\12-312\Noxious Weeds Map.mxd



**Attachment B**

**Noxious Weed Form and Field Guide**

**Invasive Plant Inventory, Monitoring, and Mapping**



# Field Guide

## Invasive Plant Inventory, Monitoring and Mapping Protocol



# Field Guide Invasive Plant Inventory, Monitoring and Mapping Protocol

## Table of Contents

<b>GENERAL DESCRIPTION .....</b>	<b>4</b>
AREAS OF USE .....	4
ADVANTAGES AND LIMITATIONS .....	5
EQUIPMENT .....	5
TRAINING .....	5
<b>USING THE PROTOCOL.....</b>	<b>5</b>
<i>Introduction.....</i>	<i>5</i>
<i>Project Name .....</i>	<i>5</i>
<i>Mapping Invasive Plants.....</i>	<i>6</i>
<i>Plant Information.....</i>	<i>7</i>
<i>Figure 1: NRIS Terra Invasive Plant Data Entry Screen.....</i>	<i>8</i>
<i>Aquatic Plants.....</i>	<i>10</i>
<b>MONITORING INVASIVE PLANTS.....</b>	<b>10</b>
<i>Figure 2: NRIS TERRA - Monitoring or Re-measuring a site.....</i>	<i>11</i>
<i>Monitoring/Re-measuring a Single Site.....</i>	<i>11</i>
<i>Figure 3: NRIS TERRA Re-measurement of a single site.....</i>	<i>11</i>
<i>Merging Infestations .....</i>	<i>12</i>
<i>Figure 4: Merging Infestations.....</i>	<i>12</i>
<i>Figure 5: Merging Infestations.....</i>	<i>13</i>
<i>Split Infestations.....</i>	<i>13</i>
<i>Figure 6: Split Infestations .....</i>	<i>13</i>
<i>Figure 7: Split Infestations .....</i>	<i>14</i>
ERADICATED INFESTATIONS .....	14
<b>DATA ENTRY .....</b>	<b>15</b>
<b>INTERNATIONAL MAPPING STANDARDS.....</b>	<b>15</b>
<i>Figure 8: Crosswalk Forest Service to International Data Standards.....</i>	<i>16</i>
<i>Sharing Information.....</i>	<i>16</i>
<b>DOCUMENTING NEW SPECIES, NEW LOCATIONS .....</b>	<b>16</b>
<b>DATA ELEMENTS.....</b>	<b>16</b>
<b>PLANTS WITHOUT A CROSSWALK IN PLANTS.....</b>	<b>27</b>
<b>APPENDIX A .....</b>	<b>31</b>
COLLECTION, PREPARATION, AND PRESERVATION OF HERBARIUM SPECIMENS	31

**APPENDIX B - PLANT PRESS..... 36**

    PUTTING THE PRESS TOGETHER ..... 36

**APPENDIX C – LABELS ..... 37**

## General Description

This protocol is for the inventory monitoring and mapping of invasive plant populations. The Forest Service has adopted the International Data Standards for the Inventory, Mapping and, Monitoring Invasive Plants<sup>1</sup>. This protocol incorporates these standards. The International Data Standards were designed to be compatible with existing inventory protocols such as the Montana Mapping Strategy<sup>2</sup> and the mapping system described in the Guidelines for the Coordinated Management of Noxious Weeds<sup>3</sup>. This method records information about the distribution and relative abundance of invasive plant species. Treatment of invasive species is recorded using a separate protocol called Treatment of Invasive Plants, which can be viewed at .

Invasive plant infestations cross-jurisdictional boundaries and are seldom managed in isolation. A cornerstone of noxious weed or invasive plant management is cooperation and coordination with adjacent land ownerships and jurisdictions. This cooperation requires that information on the location and distribution of invasive species be shared. The protocol standardizes information gathering and mapping procedures, facilitates information sharing between cooperators, aids in the early detection of new invasive plant populations and meets Forest Service reporting requirements. Some of the data elements required by this method may not be essential for Forest Service use, but will facilitate data sharing with other entities.

This protocol is derived from a single species inventory where the single species has been identified as an invasive plant. A single species inventory is most commonly used to describe rare plant population such as sensitive or endangered plants. The single species protocol has been modified to accommodate the ecological characteristics of invasive plants.

The invasive species protocol includes parameters such as location, population size, and habitat information. The protocol focuses on presence, location, extent, and abundance of an invasive species population. Monitoring invasive species populations occurs through repeated observations, noting relative changes in location, extent, and density of the plant population over time. If more detailed information is needed on either the weed or the plant community in which it is found other methodologies such as line intercept, point intercept and rooted nested frequency should be used. These methodologies are described in detail at the following web site.

## Areas of Use

This protocol is applicable to both aquatic and terrestrial invasive plant species and across all vegetation types. This protocol may be applied to any invasive plant species and within all ecosystems. The information gathered using this protocol will be the

---

<sup>1</sup> International Data Standards for Inventory, Monitoring and Mapping Standards of Invasive Plants. 2001.NAWMA

<sup>2</sup> Cooksey, D.; R.Sheley. 1998. Mapping Noxious Weeds in Montana. Montana State University, extension. Bozeman, Montana

<sup>3</sup> Guidelines to Coordinated Management of Noxious Weeds - Development of Weed Management Areas”, formerly The Guidelines for Coordinated Management of Noxious Weeds in the Greater Yellowstone Area. 1999.

source of information for noxious weed (invasive plant) inventories, planning, analysis, monitoring, treatment, reporting and budget allocations. The information gathered will be stored in the Terra module of NRIS (National Resource Information Systems). The protocol can be applied to both Forest Service and other land ownerships. The database will accept information for both public and private lands, inventories taken on National Forest and other land ownerships.

### **Advantages and Limitations**

The invasive plant protocol can be used on a wide variety of plants, in a wide variety of habitats. It is relatively easy methodology and can be used by individuals with a wide range of expertise in plant ecology and plant identification.

### **Equipment**

No specialized equipment is needed for this protocol. GPS (Global Position System) can be helpful in determining locating and relocating sites. A camera and a photo of the general setting and location may be helpful but is also not required. Field data recorders and hand held computers can facilitate data gathering and data entry. Programs for these devices will be available in the fall of 2002.

### **Training**

Examiners must be knowledgeable in invasive plant identification.

## **Using the Protocol**

### **Introduction**

This Invasive Plant Protocol will require the use of both the General and the Invasive Plant Forms. Use the General Form to record information on the location, site, and ecological setting, of the infestation. Directions for completing this form are located in the section of the handbook titled "Rangeland General Form Field Guide", on the Terra Web site and the Forest and Rangeland web site. Capturing detailed information on soils, existing and potential vegetation, aspect, and elevation is recommended. This information will be useful in stratifying areas for treatment or planning and will aid in predicting the spread of weeds to other areas and other habitats. Ecological site information can be used to determine what areas may or may not be subject to future invasions.

### **Project Name**

The General Form offers many avenues to group and sort information, ranger district, forest, allotment, state and counties to name a few. The project name allows the user to group based on an activity. The Weed Management Area (WMA) is a logical project name for invasive species. Choosing the WMA as the project name will quickly allow information about a WMA to be sorted and consolidated for sharing with partners within the WMA.

## Mapping Invasive Plants

The first step is to locate and outline the weed infestation on a map. Maps of weed populations can be created by a number of methods, hand drawing on maps and aerial photos, using GPS (Global Positioning Systems) and through computerized mapping system, Geographic Information System (GIS). Whatever method you use to delineate an infestation in the field, it is highly recommended that maps be converted and stored in an electronic format, GIS.

To ensure consistency the scale for hand drawn weed populations on maps should be 1:24000. 1:24,000 is the scale of United States Geological Service (USGS) 7.5-minute Quadrangle (Quad) maps. The 1:24,000 scale is also the standard for invasive plant mapping as recommended by the International Mapping Standards for Invasive Plants. Aerial photos, ortho quads and other remote sensing can also be useful formats for delineating weed populations. Using photography at 1:24000 scales will aid in the conversion to electronic computerized format.

There is no minimum size for an infestation (polygon). Terra currently accommodates values to  $1/100^{\text{th}}$  (.01) of an acre. The next update of Terra, will allow for increased accuracy, values of  $1/1000^{\text{th}}$  of acre may be recorded. This increase in accuracy will allow very small, single plant infestations to be accurately depicted and located. It will also facilitate monitoring small changes in population size.

To facilitate consistency and information sharing in GIS, all invasive plant infestations will be mapped and stored as polygons. Line and point data (layers) will not be supported. This conforms to the International Data Standards (NAWMA) and agreements with states and other federal agencies on sharing invasive plant information. Infestations that could be displayed as “Points”, such as a single plant or small infestations, will still be mapped as a polygon. You may enter the actual area occupied by the infestation or use the standard conversion factor. The standard conversion is  $1/10^{\text{th}}$  of an acre and its equivalent in hectares<sup>4</sup>. The conversion factor may be useful when converting paper maps or GIS point layers to polygons. It can also be useful when the exact size of an infestation is not known (historical data), an infestation is rapidly growing or  $1/10^{\text{th}}$  acre is accurate enough. Infestations that could be mapped as “lines” such as, infestations along roads and streams, will also be converted to long thin polygons, with the area corresponding the actual area in the polygon or the standard  $1/10^{\text{th}}$  acre conversion factor.

Assign a unique identity, (*Site\_ID*) to each polygon or map unit. The *Site\_ID* can be any combination of letters and number up to 30 characters in length. It is strongly encouraged and highly recommended that the combination of Region, Forest and District numbers form the first six digits of the *Site\_ID*. Each weed will be mapped separately so that each *Site\_ID*, polygon, will contain a single species. The result will be polygons of different species can and will be overlapping. While this convention may seem cumbersome it

---

<sup>4</sup> International Data Standards for the Inventory, Monitoring and Mapping of Invasive Plants. 2001. NAWMA.

will greatly facilitates tracking the growth and changes in weed infestations over time and across the landscape.

The location of an infestation (polygon) must be entered in one of the location data fields (see General Form), even if the infestation is spatially located in GIS. The data based location information will assist in the transfer of information between cooperating agencies and allows the easy compilation of data. The location will correspond to the center of the infestation (polygon) or the population perimeter. The next release of Terra scheduled for fall of 2002, will allow users to enter this information automatically from GIS.

There will be two standard, default GIS map displays for invasive plants in NRIS. The first will be a map of the current infestations for all species. This map will be result of displaying the most recent information for each infestation (*Site\_ID*). Not all sites may be visited each year, in this case the most recent information may be several years old. The query will search for the last update and then display that information. The second map will show the historical changes for each weed species. In this case every re-measurement including the most recent will be displayed. This map will readily show the change in a weed population over time. Each of these maps will be archived at the end of each year (January).

## **Plant Information**

Complete definitions and explanations for all data fields can be found on page 16 in the following section called *Data Fields*. Record the invasive plant species using the species code from the NRCS, PLANTS. If appropriate enter the code for the subspecies or variety. The common name, complete genus, species, subspecies, variety and accompanying authority will be displayed automatically. Only one invasive plant species may be entered on each form or for each polygon. If you cannot identify the plant to species you can enter the code for the genus or family. Other generic codes for grasses and forbs are also available. In some instances there may be no PLANT code for the species you have identified. Enter NO-XWALK in the plant code field and then select the Unidentified/New Plant tab. Instructions for the Unidentified/New Plant screen can be found on page 27 of this guide. Use the NO-XWALK only for plants you can identify and no PLANTS code exists, this code is not for plants you cannot identify.

If more than one invasive plant is found at a given site a new form/record, a new polygon with a unique *Site\_ID* must be drawn. This convention was agreed upon because of the difficulty of monitoring several species within a GIS polygon.



**Figure 1: NRIS Terra Invasive Plant Data Entry Screen**

The extent or size of the infestation is recorded in the *Infested\_Area* field. This field is a critical component of this methodology and will be used to monitor changes in infestation size, report acres of invasive plants in national and regional reports and share information on invasive plants with cooperators, Weed Management Areas, counties, states, federal agencies and other entities.

The *Infested\_Area* is defined as the: “Area of land containing a single weed species. An infested area of land is defined by drawing a line around the actual perimeter of the infestation as defined by the canopy cover of the plants, excluding areas not infested. Areas containing only occasional weed plants per acre do not equal one acre infested. Generally, the smallest area of infestation mapped will be 1/10th (.10) of an acre or 0.04 hectares.”

Some infestations are very large or discontinuous and it is difficult or not useful to map these larger infestations based on the canopy cover of the plants. The increase in accuracy gained by plotting individual plants may not compensate for the increase in cost or manpower. The general location on the landscape and an estimate of land area may be sufficient to meet inventory and treatment requirements. For these larger infestations draw a line around the outer perimeter of the area occupied by the plant population, this is the *Gross\_Area*. *Gross\_Area* is intended to show general location and population information and is defined as:

“ Like *Infested\_Area* it is the area of land occupied by a weed species. Unlike *Infested\_Area*, the area is defined by drawing a line around the general perimeter of the infestation

not the canopy cover of the plants. The gross area may contain significant parcels of land that are not occupied by weeds.”

If a value for *Gross\_Area* is entered a value for *Infested\_Area* must also still be entered. The *Infested\_Area* field will be used to sum and correlate data. When the question is asked “How many acres of spotted knapweed are there on the Mark Twain National Forest?”, that number will come from summing all the *Infested\_Area* fields for records (*Site\_IDs*) where spotted knapweed is found. The value for *Infested\_Area* is derived from estimating the actual land area or the percentage of land occupied by weed plants and then multiplying this estimate by the *Gross\_Area*.

For example: A large spotted knapweed infestation is located in the West Fork drainage. By driving around the area and looking at aerial photos the weed population is an approximate *Gross\_Area* of 600 acres. There are significant portion of the area that are not infested. It is estimated that approximately 40% of the area is actually occupied, or an estimated 240 acres infested ( $600 \times .40 = 240$ ). The value entered in *Gross\_Area* is 600 and value entered in *Infested\_Area* is 240. In this case there was no added value or utility in mapping the smaller infestations within the gross area. Treatment options would be the same for all the individual infestation or the gross area. Only the values recorded in infested area will be used for upward reporting.

Measure or estimate the canopy cover for each species recorded. The estimate of canopy cover is made on and refers to the *Infested\_Area*, the portion of the site, which is actually occupied by the weed species. Canopy cover can be estimated using any of the following three types of cover classes: Daubenmire, 10-point Classes or the Greater Yellowstone Guidelines. The numeric midpoint of these cover classes will be the number actually shared with cooperating entities. Canopy cover can also be recorded as the actual percent canopy cover observed or measured. On sites with a *Gross\_Area*, canopy cover is estimated on the *infested* and not the *Gross\_Area*. In the example above, the average canopy cover was estimated to be 20% on the 240 acres actually infested.

Canopy cover can change rapidly in a population of invasive plants. A few scattered plants will grow to several acres and a dense canopy in a short time, one to two years. Often surveys taken at the beginning of the season will be not accurately reflect the nature of the infestation at the end of the season. Nor will the canopy cover be uniform throughout the infestation. For this reason it is impractical and often inappropriate to spend much time measuring canopy cover, therefore canopy cover will almost always be an estimate. Only significant differences in canopy cover should be mapped as separate polygons. As a general rule, until differences are equal to one or more cover classes listed in should infestation be mapped as separate polygons.

The protocol allows further description of the infestaion such as the phenology of the weed at the time the site was visited, the lifeform of the weed and the distribution pattern of the weeds across the landscape. The protocol also offers space to hold information on mangement of the plants *Treatment\_Priority* and *Plant\_Status*.

The distance to water may be recorded for each species. This information is often valuable for environmental analysis or planning treatments. It allows the categorization of treatment options

and potential effects around water. For example, infestations that are greater than 100' horizontally or vertically from water have a low probability of herbicides or effects from other treatments entering water.

## Aquatic Plants

This methodology can be used both on terrestrial and aquatic invasive plants. Aquatic species tend to multiply and move rapidly creating challenges to mapping. In lakes and ponds it may be appropriate to apply the concepts of *Infested\_Area* and *Gross\_Area*. The *Infested\_Area* would be the area that is currently occupied by the weed species. Since aquatic species multiply rapidly and often are moved with readily with currents it is likely that other areas will be quickly infested. In this instance the *Gross\_Area* could be the entire pond or a bay in larger lakes. In streams, rivers and irrigation canals aquatic species are easily transported with the currents. To facilitate and display the areas that are infested the methodology requires that the Hydrologic Unit Code (HUC) also be included for aquatic species. The HUC code is located on the General Form.

## MONITORING INVASIVE PLANTS

An essential element of invasive plant management is observing changes in weed populations over time, monitoring. This method monitors weeds at the population and infestation level through characteristics such as expansion or contraction of a given infestation. Each observation will require the completion of a new form and creation of a new record in the database. The site or polygon identifier (*Site\_ID*) will allow changes in the infestation to be traced and connected from one observation to another. Individual observation can be identified and differentiated by the date. In Terra monitoring, subsequent visits to a site, will be referred to as a re-measurement. All the site and setting information, from the General Form, and the weed information, from the Invasive Plant Form, can be automatically transferred to the new record. You can then modify the information based on the current site visit, see Figure 2.

Weed infestations can change dramatically over time. Weed populations can expand exponentially, spreading along roads and trails. Conversely, infestations can be reduced through treatment. Separate infestations can grow together to form a single, large infestation. An infestation can split forming two separate populations where one previously existed. Changes in size and shape of an infestation can be traced over time through subsequent site visits, differentiated by the *Date*. The *Site\_ID* will remain with a particular infestation (polygon) unless it splits or is combined with other polygons. The Re-Measurement Wizard and the Associated Sites utility in Terra will help you track these changes through time and record display the history of any given site.

**Re-measurement Wizard**

Please select a scenario that best describes the type of infestation:

☐ **Single Area Infestation**  
The new infestation (Site A in "Time Period 2") is recorded as a re-measurement of the parent site (Site A in "Time Period 1"). The new infestation (child site) carries the same Site ID as the parent site, but with a later sample date.

☒ **Merging Infestation**  
The new infestation (Site A in "Time Period 2") is recorded as a re-measurement of both infestation sites A and B (parent sites) shown in "Time Period 1". The new infestation (child site) carries the Site ID number from one of the "parent sites".

☐ **Split Infestation**  
The new infestations (Site A and Site B in "Time Period 2") are recorded as re-measurements of the parent site (Site A in "Time Period 1"). One of the new infestations (child sites) carries the Site ID number from the parent site; any others are given new (unique) Site ID numbers. Child sites with new Site ID numbers must be created independently (e.g. using the Range Wizard in the Range General form) before they can be linked to the parent site in the Remeasurement Wizard.

Click on Next/Finish to continue

Cancel <Previous Next> Finish

Figure 2: NRIS TERRA - Monitoring or Re-measuring a site

## Monitoring/Re-measuring a Single Site

An individual infestation can expand, contract or even move across the landscape. All observations are tied together by the *Site\_ID* and differentiated from each other by the date of the observation. For each observation make any needed adjustments to the information contained in the General Form, site and setting or to the invasive plant community on the Invasive Plant

**Invasive Plant**

Site ID: 001CIAR4 Start Date: 03/28/2002 Examiner Last Name: ABRAHMS First Name: BILLY

Data Elements \* Distance to Water Associated Species Associated Sites Unidentified/New Plants Comment

**Remeasurements** Remeasurement Wizard

Remeasurements with Parents

- 001CIAR4 (03/28/2002-S-T EU)
- 001CIAR4 (06/05/1999-S-T EU)

Single Area Merge Split Original

**Related Sites**

Site ID	Project	Start Date

**Single Area Infestation Remeasurement**

In the example shown below, the new infestation (Site A in "Time Period 2") is recorded as a re-measurement of the parent site (Site A in "Time Period 1"). The new infestation (child site) carries the same Site ID as the parent site, but with a later sample date.

Example:

Time Period 1 Time Period 2

Site A Site A

Figure 3: NRIS TERRA Re-measurement of a single site

Form. It is important to enter all observations even if there is no change in the invasive plant community. An observation of no change is an important observation. There is no limit to the number of re-measurements. Terra will display all the recorded observations to a site (Figure 3).

## Merging Infestations

Weed populations can grow and expand overtime, merging into a single infestation. Two geographically separate populations can also merge. It is important to monitor and be able to recreate the weed expansion over the landscape. The Re-measurement Split Infestation Wizard, Figures 4 & 5 will assist in tracking these changes. The two “parent” sites with their *Site\_IDs* will merge into a single site with one *Site\_ID*. This new site is called the “child” and will retain the *Site\_ID* from one of the “parents”. All the previous sites and their relationships will be maintained. While there is no limit to the number of merges, the number of merged sites can be minimized by carefully drawing infestation boundaries. If sites are relatively close and will soon grow together, consider mapping these adjacent sites as a single site, using the *Gross\_Area* concept. Encouraging the grouping of small infestations when it is likely that they will merge overtime will minimize the dilemma described in this section.

**Re-measurement Wizard**

**Merging Infestations**

Time Period 1: Site A, Site B

Time Period 2: Site A

The new infestation (Site A in "Time Period 2") is recorded as a re-measurement of both infestation sites A and B (parent sites) shown in "Time Period 1". The new infestation (child site) carries the Site ID number from one of the "parent sites".

Please select the parent Site IDs for this current Invasive Plant.

Site ID	Project	Start Date
001CMA4	B-TEUI	06/05/1999

Click on Finish to continue

Cancel <Previous Finish

Figure 4: Merging Infestations



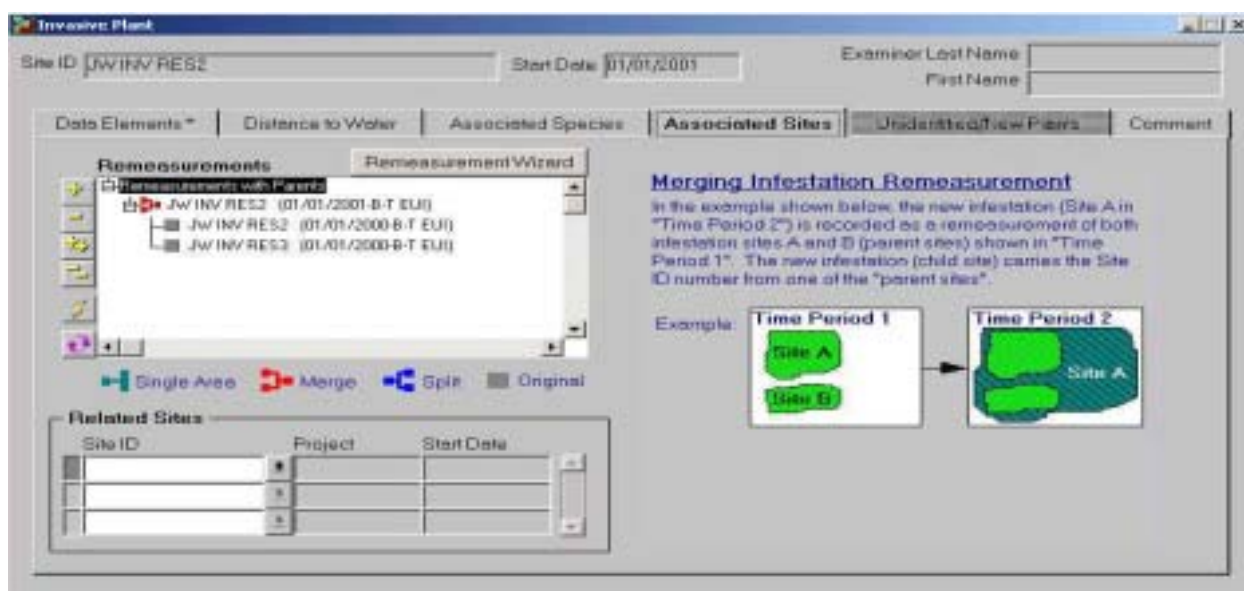


Figure 5: Merging Infestations

## Split Infestations

Infestations cannot only merge but may also split and becoming two infestations over time. There are a number of factors that could lead to this split such as treating only part of an infestation. There is value in monitoring the changes in canopy cover of the weed between the treated and untreated areas. Many of the principles in polygon and *Site\_ID* management discussed in the previous section are applicable here to splitting infestations. In this case a “parent” infestation will result in two “children”. Only one of the infestations can carry the “parent” *Site\_ID*. Use the Split Infestation Wizard, Figures 6 and 7, to assist in the naming of the sites. Naming *Site\_ID* schemes that will also show this linkage; adding an A and B to the “parent” *Site\_ID* where A represents the “parent” and B represents the new polygon or “child” may be useful.

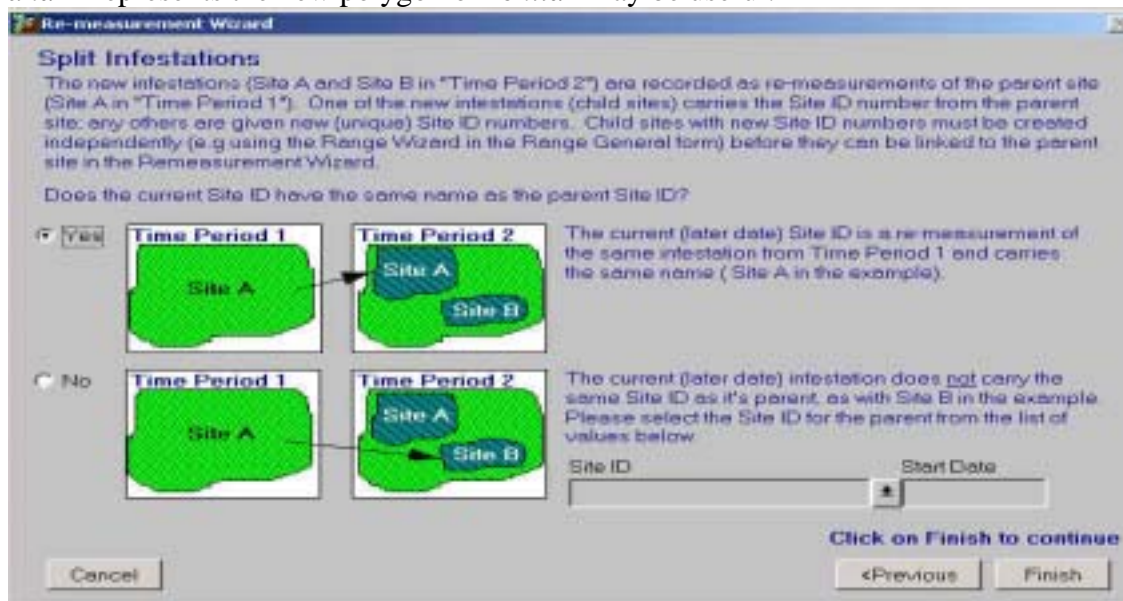
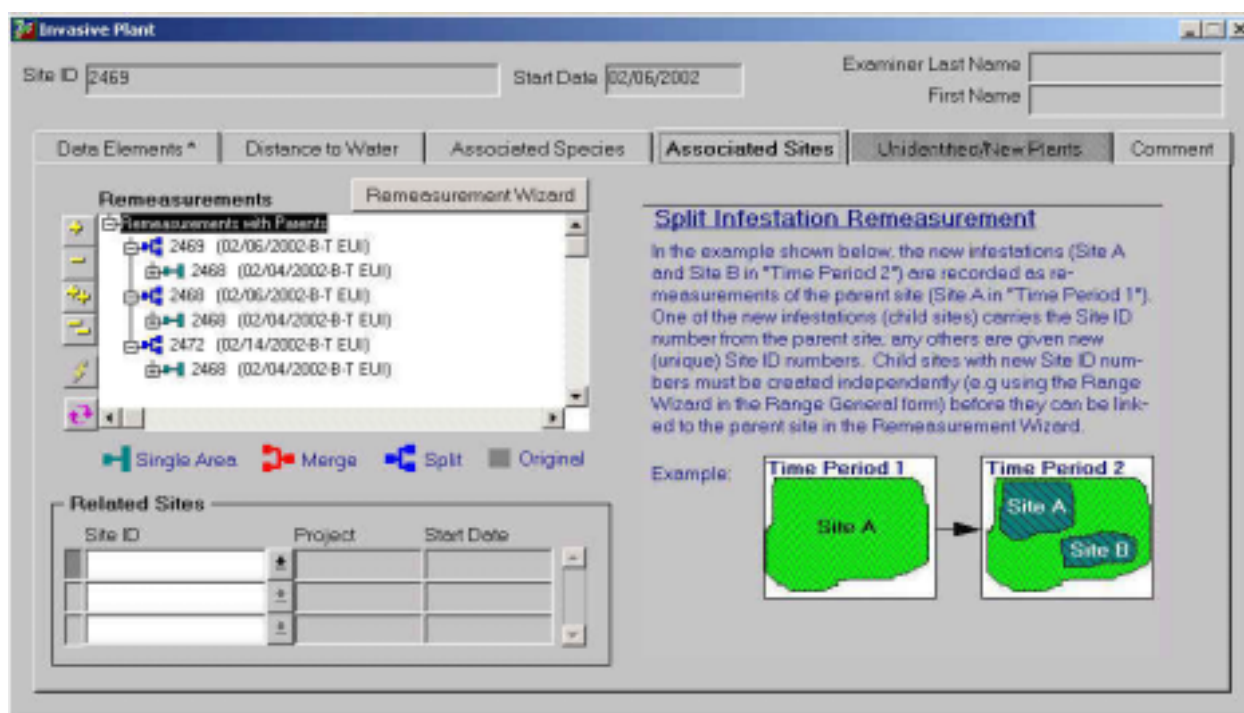


Figure 6: Split Infestations



**Figure 7: Split Infestations**

NRIS will take a snapshot of the GIS coverage at the end of the calendar year. This is not a limitation; the user may store additional GIS overages. This will allow the tracking of historical infestations through GIS as well as through data files. The NRIS default map will be an all species map using the most recent information. The map will likely be a mixture of polygon and inventory information from several years. Some polygons may have been created or re-measured during the most recent field season and some from sites that may not have been visited in several years. The second is a group of map for each species showing changes over time.

## **Eradicated Infestations**

All visual evidence of an infestation may disappear after treatment such as biological control or application of herbicides. Through above ground the weed may have disappeared there may be roots, stems and other plant parts that may recover and sprout. Seeds are stored in the soil profile for many years and may remain viable for 15 years or longer. For these reasons it is important to monitoring sites for many years, even after all evidence of weed has disappeared. A monitoring regime may start with annual monitoring for the first 3-5 years, decreasing the frequency of monitoring to every other year for the next 5-10 years and further decreasing the frequency to every 3 years for the next ten years, until the seed source has been exhausted. For sites that are continually vulnerable to reinfestations such as, roads, trails, recreational facilities and administrative sites, annual monitoring is encouraged.

Changes in an infestation following treatment can be monitored through reduction in canopy cover. Infestations with no visual evidence of weeds may have a canopy cover of zero (0). The map unit or polygon should remain until the seed source has been

exhausted. When an infestation has truly been eradicated reduce the acres infested to 0. This will show the infestation has been eliminated but keeps the polygon active allows monitoring of the site.

## DATA ENTRY

Detailed information on data entry can be found on the Terra web site.

## INTERNATIONAL MAPPING STANDARDS<sup>5</sup>

The International Inventory Monitoring and Mapping standards were developed by a broad group of scientists, land managers, state and local weed managers. These standards have now been adopted by most federal agencies. Most western states and provinces of Canada have also adopted these standards. Negotiations are now underway to gain acceptance in the eastern portion of the United States. The standards have been devised to facilitate the transfer of information on invasive plant species across ownerships, jurisdictions and property boundaries. These standards include not only the information on what will be collected but how it will be collected and the form or codes that will be used to record the information.

The Forest Service has accepted the standards and incorporated these standards into this protocol. In some cases the Forest Service may be collected or store information in a different form than the International Standard. In those cases the data will be converted to the accepted form before data is shared or transferred. An example is the *Date*. The Forest Service, NRIS uses the format DD/MM/YYYY while the International Standards use the format YYYY/MM/DD. This protocol relies on plant codes from the NRCS PLANTS database. To generate a report and data files, select a geographic area based on any of the location of area fields on the General Form such as: region, forest district, state, county, allotment or project. You must also select what form you would like the data in such as: a spreadsheet or ORACLE. Following is a list of the required data fields for the International Standards and the corresponding fields in the Forest Service Invasive Species Protocol.

International Standards	Forest Service Data Field
Collection Date	Date (General Form)
Country	No equivalent field, all data will be marked as located in the United States
State	State (General Form)
County	County (General Form)
National Ownership	Ownership (General Form)
Location: Use one of the following methods: Legal, metes and bounds, UTM, Lat/Long	Location (General Form): Use one of the following methods: Legal, metes and bounds, UTM, Lat/Long
HUC Code	Watershed HUC Number (General Form)
Source of Data	No equivalent field, all data will be marked as the

<sup>5</sup> International Standards for the Inventory, Monitoring and Mapping of Invasive Plants. 2001 NAWMA



International Standards	Forest Service Data Field
	Forest Service with the Region and Forest as the source of the data
Plant Name Genus Species	Plant Name: PLANTS code will be converted to Genus and Species name (Invasive Plant Form)
Infested Area	Infested Area (Invasive Plant Form)
Infested Area Unit of Measure	Unit of Measure (Invasive Plant Form)
Gross Area	Gross Area (Invasive Plant Form)
Gross Area Unit Of Measure	Unit of Measure (Invasive Plant Form)
Canopy cover (as a percent)	Canopy Cover (as percent or mid point of the canopy class) (Invasive Plant Form)

**Figure 8: Crosswalk Forest Service to International Data Standards**

## Sharing Information

A key component of invasive species management is working and coordinating with others. It is vital that information on the location and extent of invasive plant populations be easily shared. The acceptance of the International Standards will facilitate this task. A standard report/application is available that will automatically gather all this information and readily transfer the information to cooperators like states, counties, Weed Management Areas and regional data bases. The report will ensure that all the required data elements are included and in the accepted format.

## DOCUMENTING NEW SPECIES, NEW LOCATIONS

Distribution of invasive species over broad landscapes is held by regional and national data sets such as PLANTS or Invaders. In order for these data sets to be credible, the information they contain must be from verified plant records. Each new record for a county, a state or the country must be recorded and verified. The Forest Service can and should contribute to this information base by documenting new occurrences in counties and states with a voucher specimen. A voucher is a properly mounted and labeled specimen that has been submitted to a herbarium and verified by a qualified botanist or taxonomist. Consult your forest or regional botanist or see Appendix A for the proper procedure to collect, mount and submit a voucher specimen. These specimens can be submitted to a local, state herbarium or to the Forest Service herbarium collection at the University of Wyoming in Laramie.

## DATA ELEMENTS

The invasive plant protocol requires the use of two forms, the General Form and the Invasive Plant Form discussed here. Fields 1-3 of this form/ protocol are a duplication of Fields 1-3 on the General Form. These fields are used to ensure that there is a link between the two forms. The information entered on these fields should be identical on both forms.

**Site ID [Varchar 2(30)] Required**

Enter the 30-digit code that uniquely identifies the site. This field is the identifier for the polygon and links the General Field Form with the Invasive Plant Inventory and Monitoring Form.

Although no convention for this field is mandated, it is **highly, highly, highly** recommended that the region, forest and district form the beginning of the *Site\_ID* number. Using this convention will allow the easy sorting of information and uniquely identify infestations. During data entry into Terra this field will automatically be migrated to the Invasive Form from the General Form. In completing the paper field form enter the *Site\_ID* number on both the General and Invasive forms.

Code	Description
0103101111	Region, Forest, District, Site
0310051234	Region, Forest, District, Site

**Start Date [Date (12)] Required**

Record the calendar month, day, and year the site was visited. This is the day that the information was collected in the field, **not** the date the data was entered into the computer. The format is MMDDYYYY. This field will also migrate automatically from the General Form to the Invasive Form.

Code	Description
01/23/1984	January 23, 1984
12/07/1997	December 7, 1997

**Examiner's Last, First Name and Middle Initial [Varchar 2(40)] Required**

Record the examiner's last, and first name is required. The middle initial is optional. The combination of Site ID, Start Date and Examiner's Last, First Name and Middle Initial will ensure that if the General Form can be associated with the correct Invasive Plant Form.

Last Name	First Name	Middle Initial
MacDonald	John	Q
Montoya	Juanita	

**Plant Code [Varchar 2(8)] Required**

For vascular plant species, use the (most codes are less than 8 chars long) alpha-numeric code from the NRCS PLANTS data base. Identify plants to species and subspecies, if possible. If plants can only be identified to the genus or family enter the genus/family code from PLANTS. If a code for a species does not exist enter NO-XWALK and refer to the section on Plants Without a Crosswalk in Plants on page 27 of this field guide. The NO-XWALK should not be used for unidentified plants.

Code	Description
LIDAD	Linaria dalmatica (L.) P. Mill. ssp. dalmatica Dalmatian toadflax
CEBI2	Centaurea biebersteinii DC Spotted Knapweed

**Common Name [Varchar2(60)] Optional**

These are the weed names most commonly used in conversation. They are often descriptive e.g., yellow star thistle. This field will autopopulate from PLANTS when the PlantCode is entered, or enter the common name on the field form.

Code	Description
Yellow Star thistle	Centaurea solistitis
Dalmatian toadflax	Linaria dalmatica (L.) P. Mill. ssp. dalmatica

**Genus [Varchar 2(20)] Optional**

This refers to the latin, scientific name for the Genera. This field will auto populate from PLANTS when the Plant Code is entered, or enter the genus name on the field form.

Code	Description
Centaurea	Knapweed
Polygonum	Japanese knotweed

**Species [Varchar 2(30)] Optional**

This refers to the scientific name for the species. This field will auto populate from PLANTS when the Plant Code is entered, or enter the species name on the field form.

Code	Description
<u>Soltitalis</u>	The species name for yellow star thistle
<u>cuspidatum</u>	The species name for Japanese knotweed

**Subspecies [Varchar 2(30)] Optional**

This field is reserved for finer plant identification, to subspecies. This refers to the scientific name for the subspecies/variety. This field will auto populate from PLANTS when a Plant Code when includes a subspecies is entered.

Code	Description
LIDAD	Linaria dalmatica (L.) P. Mill. ssp. dalmatica Dalmatian toadflax
SOARU	Sonchus arvensis (L.) ssp. uliginosus (Bieb) Nyman

**Variety [Varchar 2(30)] *Optional***

This field is reserved for more precise identification of species to the variety. This refers to the scientific name for the variety. This field will auto populate from PLANTS when the Plant Code which includes the variety is entered.

Code	Description
LIDAD	Linaria dalmatica (L.) P. Mill. ssp. dalmatica Dalmatian toadflax
SOARU	Sonchus arvensis (L.) ssp. uliginosus (Bieb) Nyman

**Authority [Varchar 2(100)] *Optional***

Enter the abbreviation for the name of the authority. The authority refers to first individual to classify and name the plant. This field will auto populate from PLANTS when the Plant Code which includes the genus, species, subspecies and variety is entered.

Code	Description
L.	Linnaeus
Nutt.	Nuttall

**Phenology [Varchar 2(2)] *Optional***

The stage of plant development for the invasive plant such as: buds, flowers, or fruit. Record the phenology at the time of sampling.

Graminoids/Grass like plants	
Code	Class
G1	Leaves partially developed; no heads
G2	Inflorescence inside the sheath (in the boot)
G3	Inflorescence partially or fully exerted from sheath
G4	Seeds maturing or mature
G5	Senescent; dormancy
RG	Regrowth

Forbs & Shrubs	
Code	Description
F1	Pre-flowering (includes vegetative, beginning growth stages and rosettes)
F2	Flowering
F3	Fruiting
F4	Senescent; dormancy

**Life Form [Varchar 2(3)] Optional**

The characteristic form or appearance of a species, at maturity (e.g., tree, shrub, or herb). Use the following codes to describe the life form of the plant.

<b>Lifeform Code</b>	<b>Definition</b>
AL	Algae - A general name for the single-celled plant plankton, seaweeds, and their freshwater allies.
FB	Herbaceous forb/herb - Vascular plant without significant woody tissue above or at the ground. Forbs and herbs may be annual, biennial, or perennial but always lack significant thickening by secondary woody growth and have perennating buds borne at or below the ground surface..
FU	Fungus -A non-flowering plant of the kingdom Fungi, all lacking chlorophyll.
GR	Herbaceous graminoid - Grass or grass-like plant, including grasses (Poaceae), sedges (Cyperaceae), rushes (Juncaceae), arrow-grasses (Juncaginaceae), and quillworts (Isoetes)
LC	Lichen - Organism generally recognized as a single plant that consists of a fungus and an alga or cyanobacterium living in symbiotic association. Often attached to solid objects such as rocks or living or dead wood rather than soil.
LI	Woody Liana - Climbing plant found in tropical forests with long, woody rope-like stems of anomalous anatomical structure.
NP	Nonvascular Plant - Nonvascular, terrestrial green plant, including mosses, hornworts, and liverworts. Always herbaceous, often attached to solid objects such as rocks or living or dead wood rather than soil.
SH	Woody Shrub - Perennial, multi-stemmed woody plant that is usually less than 4 to 5 meters or 13 to 16 feet in height. Shrubs typically have several stems arising from or near the ground, but may be taller than 5 meters or single-stemmed under certain environmental conditions.
SS	Woody Subshrub/Half-shrub - Low-growing shrub usually under 0.5 m or 1.5 feet tall (never exceeding 1 meter or 3 feet tall) at maturity.
TR	Woody Tree - Perennial, woody plant with a single stem (trunk), normally greater than 4 to 5 meters or 13 to 16 feet in height; under certain environmental conditions, some tree species may develop a multi-stemmed or short growth form (less than 4 meters or 13 feet in height).
UN	Unknown - Growth form is unknown.
VI	Herbaceous Vine - Twining/climbing plant with relatively long stems, can be woody or herbaceous. FGDC classification considers woody vines to be shrubs and herbaceous vines to be herbs.

**Distribution [Varchar 2(2)] Optional**

The spatial distribution of individual plants within a population and across the landscape. Record the distribution using the codes listed below.

Code	Class
CI	Clumpy
SP	Scattered patchy
SE	Scattered even
LI	Linear

**Infested Area [Numeric(9,2)] Required**

This is the area of land containing a single weed species. An infested area of land is defined by drawing a line around the actual perimeter of the infestation as defined by the canopy cover of the plants, excluding areas not infested. Areas containing only occasional weed plants per acre do not equal one acre infested. Generally, the smallest area of infestation mapped will be 1/10th (.10) of an acre or 0.04 hectares. This field will be expanded to accept 1/1000 of an acre in the next version of Terra. This field has been referred to as *Occupied\_Area* or *Net\_Area* in the past.

Code	Description
12.5	12 and a half acres of land are infested with purple loosestrife
.05	5/100 of a hectare or approximately 500 square meter (patch 5 meters by 10 meters) are infested with garlic mustard

**Infested Area Unit of Measure [Varchar 2(12)] Required**

The convention for measuring infested area is either in acres or hectares. Enter either hectares or acres in this field.

Code	Description
Acres	Acres infested
Hectares	Hectares infested

**Gross Area [Numeric(8,0)] Optional**

This field is intended to show general location and population information. Like *Infested Area* it is the area of land occupied by a weed species. Unlike *Infested Area*, the area is defined by drawing a line around the general perimeter of the infestation not the canopy cover of the plants. The gross area may contain significant parcels of land that are *not* occupied by weeds.

Gross area is used in describing large infestations. When a value is entered for gross area, the assumption is that the area within the perimeter of the weed population (area perimeter) is an estimate or the product of calculating the area within a described perimeter. It is *not* a measured value. Values in this field are rounded up to the nearest acre. If a value for *Gross\_Area* is entered a value for *Infested\_Area* must still be entered. The value for *Infested Area* is derived from estimating the actual or percentage of land occupied by weed plants.

**Gross Area Unit of Measure [Varchar 2(12)] Required** if a value for *Gross\_Area* is entered

The convention for measuring *Gross\_Area* is either in acres or hectares. Enter either hectares or acres in this field.

Code	Description
Acres	Acres Gross area
Hectares	Hectares Gross area

### **Computing Infested Area**

This field(s) are only provided on the field form to assist in the computation of infested area.

### **Plant Status Set [Varchar 2(30)] *Optional*.**

This field describes the name of the set of the status codes which are developed locally.

Name of the Set	Description
Upper Crow Creek	Set of status values for the Crow Creek Weed Management Area
No Knapweed WMA	Set of status codes for The No Knapweed Weed Management Area
Bear Creek District	Set of status codes for the Beaver Creek Ranger District from the Beaver Creek Weed Control Environmental Impact Statement
California	Set of status codes from the California Noxious Weed List

### **Plant Status Code [Varchar 2(5)] *Required*** when a value for *Plant\_Status\_Set* is entered.

This field is intended to hold information on the status of plants, such as those species that are listed as noxious by counties, states or are on the federal list. There are no national standards for this field as states and counties use varying systems for designating plants as noxious. In those areas where noxious weed lists do not exist or are incomplete this field can be used to identify species of concern. The field is not limited to officially designated status, it could contain status systems generated by a WMA, a forest, a district or through an environmental analysis. This field is reserved for local use, with locally generated codes and definitions. Coding conventions for this field can be entered into the data base by the local NRIS data base steward. Codes can be from one to five characters in length and can be either numbers, characters or a combination of both. This field can be automated with the help of a local data steward. Within a given set each weed species will be associated with a code. There is no limit to the number of *Plant\_Status\_Sets* for a region, forest or district. Following is an example of possible codes from a state weed law.

Code	Description
A	Noxious – Mandatory Control
B	Noxious Control and Contain
C	Noxious No control required

**Treatment Priority [Varchar 2(8)] Optional.**

This field is intended to hold information on management of invasive plants. In some cases it could refer to the state priorities such as category A, B or C weeds. It could also be used to identify priorities from Weed Management Area, a county and environmental analysis, EA, EIS or from an annual plan of work. This field is reserved for local use and therefore there are no national standards. Codes and definitions will be developed locally, with the agreed to coding conventions entered into the database by the local NRIS data base steward. Codes can be from one to eight characters in length and can be either numbers, characters or a combination of both. Following is an example of sample codes.

Priority	Description
PR1	Priority One, potential Invaders
PR2	Priority II, new Invaders
PR3	Priority III, established Infestations

***Canopy Cover*** is a required data element for invasive plant protocol. You can describe canopy cover by either entering the actual percent (*Cover\_Percent*) or by entering a *Canopy\_Cover\_Class* and *Cover\_Class\_Code*.

**Canopy Cover Set [Varchar2(6)] Optional**

The name of the cover class set you are using to describe canopy cover. Only three classes, Daubemire (6 Point), Ten Point Cover Class or the Greater Yellowstone Area are available.

Canopy Cover Set	Description
NRMCOV	Ten Point Cover Class
DAUBEN	Daubemire Cover Classes
GYA	Greater Yellowstone Area Cover Classes

**Cover Class Code [Varchar 2(1)] Required** if using *Canopy\_Cover\_Class*

The percent of a fixed area occupied by the plant species, life form, or ground cover type. Percent cover is obtained by projecting the outline of the foliage or surface feature to a horizontal plane and determining what percent of the fixed area it covers. This field is used for measured or estimated percent cover. Some measurement of canopy cover is required but this information can be entered in this field or by cover classes.

**Ten Point Cover Classes**

Class Code	CoverClass	Mid Point
T	0-1.0%	0.5%
0	1.1-5.0%	3.0%
1	5.1-15.0%	10.0%



2	15.1-25.0%	20.0%
3	25.1-35.0%	30.0%
4	35.1-45.0%	40.0%
5	45.1-55.0%	50.0%
6	55.1-65.0%	60.0%
7	65.1-75.0%	70.0%
8	75.1-85.0%	80.0%
9	85.1-95.0%	90.0%
A	91.1-99.0%	97.0%
X	99.1-100%	99.5%

### Daubenmire Classes

Class Code	Cover Class	Mid Point
T	0 - 1.0%	0.5%
1	1.1 - 5.0%	3.0%
2	5.1 - 25.0%	15.0%
3	25.1 - 50.0%	37.5%
4	50.1 - 75.0%	62.5%
5	75.1 - 95.0%	85.0%
6	95.1 – 100%	97.5%

### Greater Yellowstone Area Cover Classes<sup>6</sup>

Guidelines for Coordinated Management of Noxious Weeds

Cover Code Class	Cover	Mid Point
T – Trace	0-1%	0.5%
L – Low	1.1 – 5.0%	2.5%
M – Moderate	5.1 – 25%	15%
H- High	25.1 – 100%	63%

### **Canopy Cover Percent [Numeric (5,10) *Optional*]**

Canopy cover is the percent of the ground, covered by foliage of a particular weed species. Percent cover is obtained by projecting the outline of the foliage or surface feature to a horizontal plane and then determining what percent of the fixed areas covered. This field is used to measure or estimate percent cover. In some cases canopy cover could exceed 100% when multiple layers of weed plants are present such as plants in the rosette and mature stages. Some

<sup>6</sup> Guidelines to Coordinated Management of Noxious Weeds - Development of Weed Management Areas”, formerly The Guidelines for Coordinated Management of Noxious Weeds in the Greater Yellowstone Area. 1999.

measurement of canopy cover is required but this information can be entered in this field or by using a combination of *Canopy\_Cover\_Set* and *Cover\_Class\_Code*.

Code	Description
18	Canopy cover was estimated at 18%
32	Canopy cover was measured using line interspet as 32%

**Horizontal Distance to Water** [Numeric (8,2)]. *Optional*.

Enter the measured or estimated distance to water. The distance is measured as a direct line from the edge of the infestation to the nearest surface water. This is often described “as the crow flies”. It is often useful to separate sites by the distance to water. This information is helpful in grouping or classifying weed sites into management or treatment zones. These may be areas where it is likely or possible that surface runoff will result in herbicides entering the water systems. Conversely this field could be used to group sites where it is highly unlikely or improbable that herbicides could enter the water. Groupings based on distance to water can be useful for environmental analysis and discussions of potential effects within NEPA.

Code	Description
145	The distance to Deep Creek from the infestation was measured at 145 feet.
32	The distance from the spotted knapweed infestation was estimated to be 32 meters

**Horizontal Distance to Water Unit of Measure** [Varchar 2(34)] *Required* if a value for *Horizontal\_Distance\_to\_Water* is entered a value for *Unit\_of\_Measure* must also be entered. Enter the appropriate unit of measure. The unit of measure is limited to the following options.

Code	Description
Feet	The distance was estimated in feet
Meters	The distance was measured in meters

**Vertical Distance to Water** [Numeric (8,2)]. *Optional*.

Enter the measured or estimated vertical horizontal distance to water. Distance is measured in a direct line from the site of the infestation to the nearest subsurface water. This is useful information in grouping or classifying weed sites into management or treatment zones. It would identify areas where it is likely or possible that water movement through the soil profile could result in herbicides entering groundwater or other subsurface water systems. Conversely it could be used for grouping sites where it is highly unlikely or improbable that herbicides could enter groundwater systems.

Code	Description
25	The distance was water table was estimated as 25 feet.

130	A well was located in the immediate vicinity of the infestation. Water was found at 130 meters.
-----	---

**Vertical Distance Unit of Measure** [Varchar 2(34)] ***Required*** if a value for Vertical Distance to Water is entered.

Enter the appropriate unit of measure: feet, yards or meters.

Code	Description
Feet	The distance was estimated in feet
Meters	The distance was measured in meters

### Associated Species

The remaining data fields all refer to associated species, you may enter up to three (3) plant species. An Associated Species is defined as any plant species that occurs, is associated with or commonly found growing with the invasive plant species.

**Associated Species Code** [Varchar2(8)] ***Optional***.

For vascular plant species, use the alpha-numeric code from the NRCS PLANTS data base. Identify plants to species and subspecies, if possible. For genus identification, enter the appropriate genus code, and enter subspecies code.

Code	Description
ARTRV2	<u>Artemesia tridentata</u> var. <u>vaseyana</u>

**Associated Genus** [Varchar 2(20)] ***Optional***

This refers to the latin, scientific name for the Genera. This field will auto populate from PLANTS when the Plant Code is entered, or you may enter the genus name on the field form.

Code	Description
<u>Artemesia</u>	Sagebrush

**Associated Species**. [Varchar 2(30)] ***Optional***

This refers to the scientific name for the species. This field will auto populate from PLANTS when the Plant Code is entered, or enter the species name on the field form.

Code	Description
<u>tridentata</u>	Species name for big sagebrush

**Associated Subspecies** [Varchar 2(30)] ***Optional***

This field is reserved for finer delineations of species, the scientific name for the subspecies. This field will auto populate from PLANTS when the Plant Code is entered, or enter the subspecies name on the field form.

Code	Description
<u>vaseyana</u>	Subspecies name for mountain big sagebrush

**Associated Variety** [Varchar 2(30)] *Optional*

This field is reserved for finer delinations of species variety, the scientific name for the variety. This field will auto populate from PLANTS when the Plant Code is entered, or enter the variety name on the field form.

Code	Description
<u>vaseyana</u>	Subspecies name for mountain big sagebrush

**Comment Field** [Varchar 2(2000)] *Optional*

This field is available to the user to enter any relevant information on the weed infestation. There is also a comment field associated with the General Form. Use the comment field on the General Form to describe the site and setting for the weed infestation. Use this comment field to describe the weed infestation

**Map**

This box is available to draw a map showing directions to the site, map of the general location or display the location of the infestation on the landscape. This sketch map can be scanned and stored in under the “photo information” on the General Form.

**PLANTS WITHOUT A CROSSWALK IN PLANTS**

Terra uses codes from the PLANTS database to enter plant information. Terra will only allow a *Plant\_Code* to be entered it will not allow the user to enter a name in the *Genus*, *Species*, *Common\_Name* or any of the plant fields. Because of this constraint a plant code from PLANTS must exist for a plant name to be entered. Sometimes a plant will be identified, where a code in PLANTS does not yet exist. This can be the result of new taxonomy, new nomenclature and in the case of invasives new species to North America. It may take up to two years for a new species to be added to PLANTS. This group of fields allow you to record and data base this information in the interim period until PLANTS establishes a code. This field will also be used by regional botanists to alert PLANTS, that a new code is needed. To use these fields enter NO-XWALK in the *Plant\_Code* field and then select the Unidentified/New Plants tab. Do not use these fields for plants that you cannot identify. There are a number of codes that allow you to enter identified plants such as codes for genera, family and life form.

**NO-XWALK Plant Code 2(8)] Required**

This field will autopopulate from the Data Elements screen when NO-XWALK has been entered in the *Plant\_Code* field.

Code	Description
NO-XWALK	Centaurea horibilis (Funk.)
NO-XWALK	Euphorbia godzillipus Swg.

**NO-XWALK Common Name [Varchar2(60)] Optional**

These are the weed names most commonly used in conversation. They are often descriptive e.g., yellow star thistle.

Code	Description
Evenworse Star thistle	Centaurea horibilis (Funk.)
Godzilla's spurge	Euphorbia godzillipus Swg.

**NO-XWALK Genus [Varchar 2(20)] Required**

This refer to the scientific name for the Genera.

Code	Description
Centaurea	Knapweed
Euphorbia	Spurge

**NO-XWALK Species [Varchar 2(30)] Required**

This refer to the scientific name for the species

Code	Description
horibilis	The species name for evenworse thistle
godzillipus	The species name for Godzilla's spurge

**NO-XWALK Subspecies [Varchar 2(30)] Optional**

This field is reserved for finer delinations of species such as subspecies and refers to the scientific name for the subspecies.

Subspecies	Description
Elongatum	Large evenworse thistle
Japonicus	Godzilla Godzilla's spurge

**NO-XWALK Variety [Varchar 2(30)] Optional**

This field is reserved for finer delinations of species, the variety name.

Code	Description

**NO-XWALK Authority [Varchar 2(100)] Optional**

Enter the abbreviation for the name of the authority. The authority refers to first individual to classify the plant into this name.

Code	Description
Funk.	J.W. Funkadelic
Swg.	S.W. Guild

**Collection Number [Varchar 2(20)] Optional**

Enter the collection number from the specimen label. This field can be up to 20 characters in length and any combination of numbers and letters.

Collection Number	Description
FS19663783	The collection number
1267902G	The collection number

**Voucher Number [Varchar 2(6)] Optional**

Enter the voucher number from the voucher label. This field can be up to six (6) characters in length and any combination of numbers and letters. The *Voucher\_Number* is usually assigned by the herbarium that verifies the identification.

Collection Number	Description
FS19663783	The collection number
1267902G	The collection number

**Remarks [Varchar 2(240)] *Optional***

This is a comment field. Enter any relevant information up to 240 characters in length.

## APPENDIX A

### COLLECTION, PREPARATION, AND PRESERVATION OF HERBARIUM SPECIMENS

Introduction: Herbarium specimens are permanent records of plant species or populations. Such specimens are becoming increasingly valuable documentation of native flora, rare plants (TES), rare populations, exotic and invasive species. Herbarium specimens document the existence of species and also provide valuable information on geographic distribution of species across the landscape, region and continent. Computers allow the graphic display of a species occurrence, allowing predictive modeling on likely habitat for other populations and expansion of existing populations. For invasive species predicting and tracking expansion into new states and new areas is vitally important. This information is now being housed in such databases as the PLANTS, National Heritage Rare Plant program, Invaders plus state and national floras. For plant data to be included in these large data sets or published floras the existence of the plant must be substantiated. The traditional and current avenue is through peer reviewed publication and herbarium specimens. A herbarium specimen verifies the sighting of new species at a county, state, district, forest, or region. Specimens are also important in documenting ecological and inventory studies for scientific research, publication and environmental impact statements.

The value of a specimen depends upon the care taken by the collector in selecting and preparing the specimen, and providing data to accompany it. Following are directions for collecting, mounting and submitting herbarium specimens with appropriate label data.

1. Specimens should be representative of the plant population, not simply that that fit nicely in the plant press. Plants should be collected in flower and/or fruit stage. Plants that are smaller than a herbarium page (11" x 16") should be collected in their entirety. For very large plants, such as shrubs and trees, branches with leaves, stems, flowers, fruits should be collected. Underground parts of herbaceous plants are often diagnostic and should be collected where feasible (using a strong trowel, brick hammer, screwdriver, etc.).
2. Avoid collecting specimens from very small populations, less than twenty or so individuals. Collection from small isolated populations may not be represent the species adequately and/or may damage these populations. Documentation of small populations of rare plants may have to rely on photographs or non-vouchered report. In contrast, small populations of invasive or undesirable plants, control of the population is desirable.
3. Site records should be made in the field at the time of collection. Describe the site in sufficient detail to gain an understanding of the plant setting. When multiple specimens are collected at a given site, link the appropriate site information to each specimen.
  - a. Use a bound, waterproof notebook or prepared field sheets for records.
  - b. Notes should be taken in pencil or indelible ink; ballpoint and fiber pens will run with rain or even moisture from the specimen.
  - c. Record the collection number and date.
  - d. Some form of location information is essential; country, state, county, legal description or longitude/latitude, GPS.



- e. Recording direction from a locatable landmark may provide useful information.
  - f. Record information on the ecological setting of the plant. Include such information as: habitat type, associated species, elevation, aspect, soils and any other relevant information.
  - g. Record plant features that may be lost or reduced during the drying and collection process such as: petal color, glaucescence, height and dbh. Some flowers may turn from blue to brown when dried; if no record of flower color has been made, identification may be hampered.
4. Plants should be pressed as soon as possible. If a field press is not available, the material can be placed in a tagged plastic bag. Pressing can be delayed if bagged samples are not exposed to heat or sunlight by keeping bags cold, but not allowing them to freeze (ice chest with ice; refrigerator).
  5. Old newspapers are commonly used for pressing plants, but plain newsprint or other porous paper can also be used. Specimens should be prepared for pressing by removing all soil from roots and judicious pruning of superfluous leaves. Care should be taken not to destroy plant parts necessary for identification. Plants that are longer than a folded half sheet of newspaper should be bent accordion-style (V-, N-, or W-shaped, etc.). Arrange the material as naturally as possible and avoid excessive overlapping of parts. Leaves should be arranged to expose both sides in for a dried, mounted specimen. Spread out inflorescences and flowers to show as many details as possible. Extra flowers and/or fruits should be included where possible, so they can be dissected for verification of the specimen. Parts too bulky for pressing, (e.g. cones or large dried fruits) should be labeled and kept in paper bags. Number the newspaper prominently with the collection number, corresponding to the number in the collection notebook.
  6. After the plant is positioned on the folded newspaper, place the newspaper between two felt blotters or driers and then between corrugated cardboard. The blotters should be exchanged every day until the specimen is dry. If an artificial heat source is used for drying blotters are not necessary. A portable plant dryer frame can be constructed from an electrical cord with 4 or 5 sockets and 150 watt light bulbs, hot plate, or kerosene or gas lanterns). For instructions on building a press see Appendix A.
  7. The dried specimens should be kept stored in the numbered newspapers until identified and mounted.
  8. A label is prepared for each specimen, following identification. The label should be printed on high quality rag paper, 25-100% rag content, to assure labels will not deteriorate with age. The label should be 4 x 2.5 in. or larger. The label contains the following information: scientific name with authority, location, habitat, associated species, notes on plant features, date of collection, and the collector's name with collection number. A sample and blank herbarium labels are located on Appendix B. The sample is printer ready and can be reproduced on any printer.
  9. If the specimen is to be mounted, it should be attached to a sheet of 100% rag herbarium paper (11.5 x 16.5 in.?). Mounting paper may be obtained from biological supply house

(as with the corrugates, blotters, and other supplies; see addresses below). The label is attached to the lower right-hand corner of the sheet. The specimen may be attached with linen straps, thread, or glue (such as Elmers or Nicobond B), or a combination of these methods. If glue is used, it is spread in a thin layer over a sheet of glass or Plexiglass (14 x 20 in. or larger) with a paintbrush. The specimen, face up, is placed firmly, but without smearing, on the glue, lifted with forceps, and carefully dropped in the desired position on the mounting paper. A piece of wax paper (12 x 18 in.) is then placed over it and moderately weighted until the glue is completely dry. Twigs and other heavy parts of the specimen should be taped or sewed to the sheet for added reinforcement or glued if feasible.

10. The mounted specimen should be stored in standard genus covers in insect- or dust-proof herbarium cabinets, which are housed in a dry place. The sheets should be protected from insect attack by including a small container of paradichlorobenzene (PDB) in the case or by occasional fumigation (with chemicals by specially trained individuals or by placing the plants in a deep-freezer for several days). The climate throughout much of the west may be sufficiently dry that fumigation is not necessary.

At least one specimen from a site should be sent to a recognized herbarium. It is from these herbaria that plant distribution records are compiled. Most State land grant universities maintain a herbarium or specimens can also be sent to the Rocky Mountain Herbarium, which houses the Forest Service plant collection, at the University of Wyoming in Laramie. The Forest Service contracts with the University of Wyoming for maintenance of the Forest Service collection and to provide assistance with plant identification. To send specimens to the herbarium or for assistance in identification contact:

Ronald L. Hartman, Curator  
Or  
B. Ernie Nelson, Herbarium Manager

Rocky Mountain Herbarium  
P. O. Box 3165 University Station  
University of Wyoming  
Laramie, WY 82071-3165  
(307-766-2236)

#### **Additional Sources on Field and Herbarium Techniques:**

1. Benson, L. 1979. Plant Classification. Heath and Co., pp. 423-444.
2. Jones, S. B., Jr., and A. E. Luchsinger. 1979. Plant Systematics, McGraw-Hill Book Co., pp. 138-156.
3. Lawrence, G. 1951. Taxonomy of Vascular Plants. Macmillan Co., pp. 234-262.
4. Savile, D. B. O. 1962. Collection and Care of Botanical Specimens. Publ. 1113, Research Branch, Canada Department of Agriculture.
5. Smith, C. E., Jr. 1971. Preparing Herbarium Specimens of Vascular Plants. Agric. Information Bull. 348, USDA, Superintendent of Documents, U. S. Govt. Printing Office, Washington, D. C. 20402 (stock no. 001-000-01159-6).

**Collection and Herbarium Supplies:**

1. Herbarium Supply Company, 955 West Catching Inlet, Coos Bay, OR 97420; John and Sandy Ayers (503/269-2350)
2. St. Louis Paper and Box Company, P. O. Box 8260, St. Louis, MO 63156; 314/531-7900; 800/444-0891)
3. Carolina Biological Supply Company, Powell Laboratories Division, Gladstone, OR 97027 (503/656-1641; 800/547-1733)



## APPENDIX B - PLANT PRESS

### Constructing a Field Plant Press

1. A press typically consists of 2 hardwood frames
2. Cut 9 strips of wood as follows:
  - a. 4 wood strips, 18" long, 1/4" to 3/4" wide
  - b. 5 wood strips, 12" long, 1/4" to 3/4" wide
3. The 5 short strips are spaced equally at right angles to the 4 long strips. The strips are nailed, riveted or stapled together at the intersection of the strips. The completed frame should measure 12 x 18 inches.
4. A press can also be made from two (2) 12-x 18-inch pieces of 3/8" or 1/2" plywood. A plywood press is not as durable as one constructed from wood strips.

Plant presses can be purchased from herbarium supply houses or hobby stores. Presses are available in a variety of sizes. Make sure when ordering a press make sure the frame measures 12" x 18", the required size for herbarium specimens.

### Putting the Press Together

Cardboard Spacers – Corrugated cardboard sheets are used to space specimens, provide stability and aid in drying. Regular, used, cardboard boxes can be cut to the required 12 x 18 inches. Cardboard spacers should be placed next to the press frame and scattered through the blotters and specimens. A good rule of thumb is cardboard spacer for every two to five specimens.

Blotters or Driers – Blotters are used to absorb or wick moisture from pressed, drying specimens. Blotters can be made from light weight builder's deadening felt, from heavy blotting paper or can be acquired from any herbarium supply store. The driers should measure 12 x 18 inches. When specimens are air dried, a blotter should be placed between each specimen. For very succulent plants or in wetter environments blotters may have to be changed daily until specimens are dry. For occasional pressing, one may substitute several thicknesses of newspaper for the driers, but care should be taken to change these frequently to avoid mildew and inadequate drying.

Specimen sheets - The sheets are used to hold and dry the specimens. Newspaper is the most common material, but blank newsprint or other thin absorbent paper can also be used. Sheets should be 24" x 36" folded lengthwise in half or folded 1/3 from the right 1/3 from the left to join at the middle. The finished folded paper should measure 12 x 18.

The order of materials in a press:

P r e s s  
Cardboard  
**Blotter**  
Newsprint  
**Blotter**  
Cardboard  
P r e s s

## APPENDIX C – LABELS

The following pages are blank printer ready labels. It is best to print label on a high quality rag paper and cut to 3 x 4 inches. The first set of lined labels is intended for field use or hand lettering. The second set of labels, without lines is intended for entering information on screen and then printing out a completed label.



**U.S.D.A Forest Service**

Collection Date: 06/23/1998 Number: 125

Collector: Harvey Crankshaw

Scientific Name: *Artemesia ludoviciana* Nuttall

Subsp. *mexicana* (Willdenow) Keck.

Family:

State: CO County: Elevation: 4,500'

Location:

Habitat: Grassland site,

Flower Color: Height:

Comments:

---

---



**U.S.D.A Forest Service**

Collection Date: \_\_\_\_\_ Number: \_\_\_\_\_

Collector: \_\_\_\_\_

Genus: \_\_\_\_\_ Species: \_\_\_\_\_

Subsp./Var.: \_\_\_\_\_ Authority: \_\_\_\_\_

Family: \_\_\_\_\_

State: \_\_\_\_\_ County: \_\_\_\_\_ Elevation: \_\_\_\_\_

Location: \_\_\_\_\_

Habitat: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Flower Color: \_\_\_\_\_ Height: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**U.S.D.A Forest Service**

Collection Date: \_\_\_\_\_ Number: \_\_\_\_\_

Collector: \_\_\_\_\_

Genus: \_\_\_\_\_ Species: \_\_\_\_\_

Subsp./Var.: \_\_\_\_\_ Authority: \_\_\_\_\_

Family: \_\_\_\_\_

State: \_\_\_\_\_ County: \_\_\_\_\_ Elevation: \_\_\_\_\_

Location: \_\_\_\_\_

Habitat: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Flower Color: \_\_\_\_\_ Height: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**U.S.D.A Forest Service**

Collection Date:                      Number:

Collector:

Scientific Name:

Family:

State:                      County:                      Elevation:

Location:

Habitat:

Flower Color:                      Height:

Comments:



**U.S.D.A Forest Service**

Collection Date:                      Number:

Collector:

Scientific Name:

Family:

State:                      County:                      Elevation:

Location:

Habitat:

Flower Color:                      Height:

Comments:

---



NOXIOUS WEED PLANT OCCURRENCE RECORD  
WALLOWA-WHITMAN NATIONAL FOREST

Noxious Weed:

Listed:

Category:

SCIENTIFIC NAME: \_\_\_\_\_ COMMON NAME: \_\_\_\_\_

PROJECT: \_\_\_\_\_ DISCOVERY DATE: \_\_\_\_\_

LOCATION

RANGER DISTRICT: \_\_\_\_\_ COUNTY: \_\_\_\_\_

QUAD(S):

LEGAL SUBDIVISION:

GPS-datum/lat&long (decimal,degree)

LOCATION (directions, landmarks, etc): Land

Owner:

DATES OF FIELDWORK: BY:

INFESTATION

SIZE OF SITE: \_\_\_\_\_ NUMBER OF PLANTS: \_\_\_\_\_

DESCRIPTION (phenology, age class, density, etc.):

VOUCHER (collector and number, where stored):

SUITABILITY FOR MONITORING:

HABITAT

ELEVATION: \_\_\_\_\_ ASPECT: \_\_\_\_\_ SLOPE: \_\_\_\_\_

Riparian: \_\_\_\_\_ Upland: \_\_\_\_\_ Site Composition: \_\_\_\_\_

DESCRIPTION (microhabitat, timber type, plant associates, soil type, etc.):

NATURE OF DISTURBANCE (if any):

MONITORING STATUS:

ERADICATION

METHODS USED (if any):

RECOMMENDATIONS (for further control efforts):

REPORTER: \_\_\_\_\_ JOB TITLE: \_\_\_\_\_ DATE: \_\_\_\_\_

Photos: \_\_\_\_\_

## **Attachment C**

**Record of Decision Wallowa Whitman National Forest Invasive Plants Treatment  
Project Appendix 1 Common Control Methods, Project Design Features, Herbicide  
Use Buffers, Early Detection, Rapid Response Herbicide Use Decision Process and the  
Annual Implementation Planning and Monitoring Step.**

# Appendix 1. Record of Decision Wallowa-Whitman National Forest Invasive Plants Treatment Project

The information for this appendix has been taken from the FEIS for this project and repeated here for emphasis. Table numbers, figure numbers and other indication to areas of information have been retained for ease of cross referencing.

## Common Control Measures

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

The Common Control Measures summary table is a distillation of detailed work shown in Appendix B prepared by Linda Mazzu (R6 2005 FEIS), and updated by Vicky Erickson (Invasive Weed Specialist), Julie Laufmann (TEAMS Botanist), Gene Yates (Forest Botanist), with incorporated comments from Mark Porter (Wallowa Resources, Enterprise, OR) Dan 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](http://www.natureserve.org)).

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

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
<b>Bugloss</b> (ANOF) <i>Anchusa officinalis</i>  <i>Perennial</i>	5813 ac 1 site	Herbicide in combination with manual and mechanical. Manual/mechanical alone will not eradicate. Use surfactants for herbicide use to penetrate the hairy leaves on the plant  1. Metsulfuron methyl 2. Picloram 3. Clopyralid 4. Chlorsulfuron + Metsulfuron	Cannot aerially spray sulfonylurea herbicides (as per Standard 16), picloram and clopyralid have mobility and soils restrictions  Large site that will not be treated aerially due to lack of acceptable, effective herbicide
<b>Canada Thistle</b> (CIAR) <i>Cirsium arvense</i>	3395 ac 154 sites	Herbicide treatment is most effective. The only manual technique would be hand cutting of flower heads, which only suppresses seed production. Manual Disposal: bag and remove flower heads from site. Mowing may be effective in rare cases if done monthly (this intensity would damage native species). Covering with a plastic tarp may also work for small infestations, but smothers all plants covered.  Yearly revisits would be necessary; the number of which is dependent on the chemical used and the seedbank. Revegetate with desirable species in accordance with the Restoration Plan.	Cannot aerially spray sulfonylurea herbicides (as per Standard 16). Picloram and clopyralid have mobility and soils restrictions. Many sites have well drained or shallow soils where alternative herbicides or methods may be necessary (see Appendix D).

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
		1. Clopyralid 2. Picloram 3. Chlorsulfuron 4. Aquatic labeled Glyphosate (best in fall)  Biocontrols proposed for some sites.	
<b>Clary Sage (SASC2) and Mediterranean sage (SAAE)</b> <i>Salvia aethiopis</i>  <i>Biennial</i>	22 acres 1 site	Manual or mechanical removal of individual plants can be effective. Mowing several times during the growing season will prevent seed production, but the rosettes are low enough to the ground to escape most damage. Biocontrol available and somewhat effective. 1. Metsulfuron methyl 2. Chlorsulfuron 3. Picloram 4. Glyphosate	Cannot aerially spray sulfonylureas, (as per Standard 16). No known shallow or well drained soil sites.
<b>Common Crupina</b>	284 ac 1 site	Manual/Mechanical - handpulling is effective on small infestations prior to seed set (WA DNR) 1. Clopyralid (0.13 lb ae/A) Sequential fall and spring applications provide >95 % control <sup>1</sup> 2. Triclopyr (.25 lb ae/A) Sequential fall and spring applications provide >95 % control <sup>1</sup> 3. Spring application of picloram	Biological – none <sup>1</sup>
<b>Dalmatian Toadflax (LIDA)</b> <i>Linaria dalmatica</i> <b>And other Linaria sp.</b>	783 ac 141 sites	Hand-pull or dig if populations are small Manual Disposal: Plants can be left on site, but may reduce germination of desirable species due to mulching effect. If plants have flower heads with seeds (immature as well), bag and remove them from site. - Cutting stems in spring or early summer would eliminate plant reproduction, but not the infestation. - These treatments may take up to ten years due to long term seed viability. - Revegetate with desirable species in accordance with the Restoration Plan. Plant communities in good condition may recover without replanting. Biocontrols available. 1. Metsulfuron methyl (forested sites) 2. Imazapic (in native grasses) 3. Aquatic labeled Glyphosate 4. Picloram	Biocontrols proposed for some sites. Aquatic Glyphosate may be only option for sites near streams (some riparian sites exist).  Picloram may be restricted in well drained, clayey and/or shallow soils at some sites.
<b>Dodder</b> <i>Cuscuta sp.</i>	10 acres 2 sites	Mechanical control by roughing out host sagebrush	
<b>Field bindweed (COAR)</b> <i>Convolvulus arvensis</i>	3 acres 1 sites	Manual/mechanical –is not effective 1. Picloram apply early bud to full bloom for best control <sup>2</sup> 2. Glyphosate, full bloom – early seed <sup>2</sup> 3. Metsulfuron actively growing plants in bloom stage <sup>2</sup>	Biocontrol available <sup>1</sup>
<b>Himalayan blackberry (RUDI)</b> <i>Rubus discolor</i>	15 acres 3 sites	Manual or mechanical removal is effective only in combination with herbicides and is best used as a first step to reduce above ground biomass before root crown removal. Fall herbicide treatments alone or on regrowth following cane removal is effective.  Glyphosate, Picloram, Imazapyr or Triclopyr	

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
<b>Hounds tongue</b> (CYOF) ( <i>Cynoglossum officinale</i> )  <i>Biennial</i>	980 ac 64 sites	Herbicide in combination with manual treatments. Re-vegetate with desirable species.  1. Metsulfuron methyl 2. Chlorsulfuron 3. Picloram 4. Imazapic or Glyphosate	Some known sites are in riparian areas. Several areas of well drained soils where herbicide selection may be restricted (see Appendix D).  Six known sites are proposed for manual only.
<b>Japanese knotweed</b> (POCU6)  <i>Polygonum cuspidatum</i>  <i>Perennial</i>	78 acres 2 sites	Mechanical treatment is ineffective alone. Cutting in combination with herbicide is most effective since the manual/mechanical treatments will encourage the plant to send up new shoots. The more shoots per linear foot of root, the more likely you will be able to physically pull them out, exhaust their reserves or kill them with herbicide. Manual treatments alone are not effective. Stem injection is labor intensive and less effective than a canopy foliar spray  Glyphosate, Triclopyr, or Imazapyr	Not in treatment database.
<b>Leafy Spurge</b> (EUES) <i>Euphorbia esula</i>  <i>Rhizomatous perennial</i>	102 ac 12 sites	Herbicide treatments are most effective. Manual and mechanical methods must be used in combination with herbicides for successful control. Repeat treatments are usually required. 1. Picloram 2. Glyphosate or Imazapic Biocontrols available	All but one known site is riparian. Several well drained, excessively well drained, and shallow water table sites. Use of picloram may be limited in some areas.
<b>Medusahead</b> (TACA8) ( <i>Taeniatherum caputmedusae</i> )  <i>Annual grass</i>	921 ac 22 sites	Repeated cutting/mowing with herbicide treatment is effective. Manual removal can be effective with small populations. A combination of herbicide application and reseeding with native or desirable non-native grasses is considered highly effective. Follow-up seeding of a competitive desirable non-native perennial grass may be necessary prior to returning the site to native perennial grasses. Herbicide treatment should be done before seed formation or during the fall through early winter. Repeated treatments may be needed.  1. Imazapic 2. Sulfometuron methyl +Chlorsulfuron 3. Sulfometuron methyl 4. Sethoxydim 5. Glyphosate	No known riparian sites. Several sites are well drained.
<b>Musk thistle</b> (CANU4) ( <i>Carduus nutans</i> )  <i>Biennial</i>  <b>Bull Thistle</b> (CIVU) <i>Cirsium vulgare</i>	27 acres 6 sites	Use manual, mechanical or herbicide control or a combination. Biological controls may be helpful to suppress populations in combination with other methods (see Appendix E).  1. Picloram or Clopyralid 2. Metsulfuron methyl 3. Glyphosate 4. Chlorsulfuron	Biocontrols proposed for some sites. No known riparian sites proposed for herbicide use. No sites are known to be well drained or shallow to ground water.

Target Species - Common Name	Acres and Number of Sites	Range of Effective Treatment Options	Site Specific Considerations
<b>Pepper weed</b> (LELA2) ( <i>Lepidium latifolium</i> )  Perennial	1 acre 1 site	1. Chlorsulfuron, 2. Metsulfuron, 3. Glyphosate 4. Imazapic 5. Triclopyr may only kill top plant and capable of resprouting use after mowing to increase efficacy	Not a riparian site or known to be well drained or shallow to ground water.
<b>Poison Hemlock</b>	7 acres 3 sites	Manual/Mechanical: Handpulling when soils are wet can be effective on small infestations. Mowing at flowering stage can provide some control. <sup>3</sup> Biocontrol available.  1. Glyphosate 0.75 ae/acre at pre-bolt stage; 2. Metsulfuron 0.6 oz ai/acre to actively growing plants <sup>2</sup> ;	Biological: None <sup>3</sup>
<b>Puncture vine</b> (TRTE) ( <i>Tribulus terrestris</i> )  Annual	12 acres 1 site	Manual and Mechanical control effective if collected prior to seed set. Biocontrol available  1. Chlorsulfuron 2. Sulfometuron methyl 3. Metsulfuron methyl 4. Glyphosate or Picloram	Not on known shallow or well drained soils.
<b>Purple loosestrife</b> (LYSA2) ( <i>Lythrum salicaria</i> )  Perennial	3 acres 3 sites	Biocontrols available. Otherwise, combination of herbicide and manual/mechanical treatments.  Glyphosate	
<b>Rush Skeletonweed</b> (CHJU) ( <i>Chondrilla juncea</i> )  Perennial	390 ac 36 sites	Since any mechanical damage to plants stimulates new growth resulting in satellite plants, such methods are not recommended. Rush skeletonweed is a deep rooted, rhizomatous perennial considered tolerant to herbicides. Therefore, an aggressive follow up program with repeated applications will be necessary. Difficult to apply because of small leaves. Biocontrols proposed for two sites.  1. Clopyralid 2. Picloram	No known riparian sites. No known shallow or well drained soil sites
<b>Russian Knapweed</b> (ACRE3) ( <i>Acroptilon repens</i> )  Perennial with adventitious shoots	26 acres 4 sites	Lasting control requires an integration of techniques: mechanical, manual, herbicide and competitive plantings.  1. Chlorsulfuron 2. Clopyralid 3. Clopyralid + Triclopyr (Redeem) 4. Glyphosate, Imazapic, or Metsulfuron Methyl	No known riparian sites.
<b>Russian thistle</b> (SATR12 or SAIB) ( <i>Salsola tragus</i> )  Annual	10 acres 1 site	Manual or mechanical removal of plant prior to seed set can be effective in small populations. Repeat visits to areas previously infested likely required.  Spot or hand broadcast with backpack sprayer whenever possible. Boom spray larger areas of	No known riparian sites. No known shallow or well drained soil sites.



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

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

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

### Chemical Methods

Chemical methods are the use of herbicide formulations approved under the R-6 2005 ROD with the following active ingredients: chlorsulfuron, clopyralid, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sethoxydim, sulfometuron methyl, and triclopyr.

Ground-based or aerial application of herbicides will be used based on accessibility, topography, size of the treatment area, and the expected efficiency and effectiveness of the method selected. The following methods of application may be used depending on the site, applicable PDFs and buffers:

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

**Wicking** – This hand method involves wiping a sponge or cloth that is saturated with chemical over the plant. This is used in sensitive areas, such as near water, to avoid getting any chemical on the soil or in contact with non-target vegetation.

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

Approximately 9,000 inventoried acres are subject to be treated with spot or selective methods.

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

**Boom broadcast** – Application of herbicide 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.

Approximately 16,600 inventoried acres are subject to be treated by ground-based broadcast applications. Most of this acreage is expected to be treated using hand broadcast application.

**Aerial applications** – Broadcast application of herbicide using aircraft, such as a helicopter. Aerial application of the herbicides would occur in the HCNRA and La Grande District covering 875 acres (see Figure 9). Appendix B includes maps detailing aerial application sites.

Herbicide application will be done in accordance with USDA Forest Service policies, regulations, Forest Plan Standards, product label requirements, PDFs, and Herbicide Use Buffers. Project Design Features are listed in the following section of this appendix.

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

Table 4 displays 10 herbicides approved for use. The range of application rates for each chemical was derived from the SERA Risk Assessments, which are the basis for the herbicides analyzed in the R6 2005 FEIS. Most of the time application rates will not exceed the typical rate; however, the actual effective rate may vary depending on application method, target species, and PDFs (site-specific measures of protection). Broadcast applications will not exceed typical label rates shown in Table 4. Non-broadcast methods such as spot spraying, wicking, wiping or stem injection may be applied at rates greater than typical, but that is expected to happen infrequently and only where necessary to be effective.

**Table 4. High, Typical, and Low Application Rates for Herbicides**

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

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

### *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 effective for only relatively small, accessible sites, and often need to be repeated several times, depending on the species, throughout the growing season. Manual treatments can be effective for annual and tap-rooted weeds, but are not effective against perennial weeds with deep underground stems, roots or rhizomes that cannot be entirely removed.

Manual treatments are typically used to treat selected plants, small infestations, and sensitive areas to avoid potential toxic 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 solarization techniques such as using black plastic to cover invasive plants to shade out and kill pieces of roots (i.e. rhizomes). These techniques may be used where minimizing herbicide use is desirable such as areas with an abundance of sensitive wildlife or plant species.

### *Mechanical Control Methods*

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

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

### *Biological Methods*

Animal and Plant Health Inspection Service (APHIS) and State approved insects or plant pathogens that are proven natural control agents of specific weed species will be released to selectively suppress, inhibit, or control herbaceous and woody target species. Biological controls will be used on remote sites where the target species occupies extensive portions of the landscape, and other methods of control are

prohibitive based on cost and location. In some situations, a suite of biological control agents may be 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 5 to 20 years are needed to bring about an economic control level.

Biological control activities include collection of beetles/insects, development of colonies for collection, transporting, and transplanting parasitic beetles/insects, and supplemental stocking of populations.

The treated areas will 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.

### *Cultural Treatment Methods/Restoration*

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

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

Typical circumstances for applying cultural/restoration treatments include:

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

Project Design Features (Group P) address restoration for areas that are highly disturbed within the dry grassland habitat in Hells Canyon National Recreation Area, and for areas where potential re-infestation by new or nearby invasive plants threatens the introduction of, or existing, native vegetation as well as soils. Treatment Restoration Standards from the R6 2005 FEIS and guidelines and techniques outlined in *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al. 2003) are addressed.

### **Project Design Features**

The following Project Design Features (PDFs) reduce the potential adverse impacts of invasive plants treatment and provide sideboards for EDRR. The PDFs have been developed to respond to the site-specific resource conditions within the treatment areas, including (but not limited to) the current invasive plant inventory, the presence of special interest species and their habitats, potential for herbicide delivery

to water, and the social environment. Implementation of the PDFs is mandatory. The purpose and source of each PDF is provided in the list below.

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

#### *A-Pre-Project Planning*

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

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

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

#### *B-Coordination with Other Landowners and Agencies*

**B-1:** Work with owners and managers of neighboring lands to respond to invasive plants that straddle multiple ownerships. Coordinate treatments within appropriate distances based on invasive plant species reproductive characteristics, and current use of area.

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

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

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

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

#### *D-Wilderness Areas<sup>2</sup>*

**D-1:** For EDRR in wilderness and Research Natural Areas (RNAs), 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.

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

---

<sup>2</sup> Invasive plant eradication within Wilderness meets the “no impact” intent of the Wilderness Act and associated land use policies

### *E-Non-herbicide Treatment Methods*

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

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

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

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

### *F-Herbicide Application*

**F-1:** Herbicides will be used in accordance with label instructions, except where more restrictive measures are required as described below. Herbicide applications will treat only the minimum area necessary to meet site objectives. Herbicide formulations will be limited to those containing one or more of the following 10 active ingredients: chlorsulfuron, clopyralid, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sethoxydim, sulfometuron methyl, and triclopyr. Additional chemical formulations may be added only when a formal risk assessment shows them to be less hazardous than existing chemicals that would otherwise be used on the same site. Furthermore, an analysis supplemental to this EIS will be completed to show predicted effects of adding the formulation considered. Herbicide application methods include wicking, wiping, injection, spot, and broadcast, as permitted by the product label and these Project Design Features. The use of triclopyr is limited to spot and hand/selective methods. R-6 2005 ROD Standard 18 permits only the use of adjuvants reviewed in Forest Service risk assessment documents.

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

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

- Purpose: To limit potential adverse effects on people and the environment
- Source: W-W LRMP as amended by the R6 2005 ROD Treatment Standards (see Chapter 1)

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

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



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

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

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

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

**F-6:** To minimize herbicide application drift during broadcast operations, use low nozzle pressure; apply as a coarse spray, and use nozzles designed for herbicide application that do not produce a fine droplet spray, e.g., nozzle diameter to produce a median droplet diameter of 500-800 microns.

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

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

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

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

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

- Purpose: To reduce potential adverse effects to non-target species

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

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

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

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

**F-8d:** Prohibit aerial application of herbicides within congressionally designated municipal watersheds. See B2 for other developed water sources.

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

**F-8e:** Effectiveness monitoring is required for “a representative sample” of treatments involving aerial application of herbicide.

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

**F-8f:** 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.

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

**F-8g:** Buffer distances for federally listed SOLIs will follow Recovery Plan recommendations. No aerial application will occur within 300 feet 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.

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

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

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

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

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

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

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

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

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

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

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

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

- Purpose: To prevent effects to non-target species

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

- Purpose: To protect resources in the worst case scenario

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

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

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

**Design Features for G:** An Herbicide Transportation and Handling Safety/Spill Response Plan will be the responsibility of the herbicide applicator. At a minimum the plan will:

- Address spill prevention and containment.
- Estimate and limit the daily quantity of herbicides to be transported to treatment sites.
- Require that impervious material be placed beneath mixing areas in such a manner as to contain small spills associated with mixing/refilling.
- Require a spill cleanup kit be readily available for herbicide transportation, storage and application (minimum FOSS Spill Tote Universal or equivalent).
- Outline reporting procedures, including reporting spills to the appropriate regulatory agency.
- Ensure applicators are trained in safe handling and transportation procedures and spill cleanup.
- Require that equipment used in herbicide storage, transportation and handling are maintained in a leak proof condition.
- Select transportation routes to minimize exposure to traffic, domestic water sources, and adjacent water sources
- Specify conditions under which guide vehicles would be required.
- Specify mixing and loading locations away from water bodies so that accidental spills do not contaminate surface waters.

- Require that spray tanks be mixed or washed further than 150 feet of surface water.
- Ensure safe disposal of herbicide containers.
- Identify sites that may only be reached by water travel and limit the amount of herbicide that may be transported by watercraft (see H12).
- Purpose: To reduce likelihood of spills and contain any spills.
- Source: FSH 2109.14

#### *H- Soils, Water and Aquatic Ecosystems*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**H-9:** Wetlands – Wetlands will 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 will be treated in any 30-day period.

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

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

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

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

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

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

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

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

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

### *I - Vascular and Non-Vascular Plant and Fungi Species of Local Interest (SOLI)*

**I-1:** Botanical surveys may be necessary prior to treatment applications to identify vascular and non-vascular SOLI occurrence in or near areas proposed for invasive plant treatments. Lists of target SOLI to include in each treatment area will be developed by qualified botanical personnel based on the range and distribution of SOLI species and the presence of suitable SOLI habitat. If surveys are deemed necessary, they will be conducted within the proposed treatment area and immediately adjacent to the treatment area as follows: 300 to 1000 feet of planned aerial treatments (see I-7), 100 feet of planned broadcast treatments, and 10 feet of planned spot treatments and/or 5 feet of planned hand herbicide treatments.

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

**I-2:** If circumstances will not permit surveys prior to treatment then all suitable SOLI habitat identified to occur within and around the treatment area will be managed as if the habitat were occupied by SOLI species. In absence of botanical surveys: no aerial herbicide treatment will occur within 300 to 1000 feet of SOLI habitat (see section I-6), and no ground based broadcast, spot, or hand treatments will occur within 100 feet of SOLI habitat.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Purpose: To prevent any repeated effects to SOLI populations, thereby mitigating any long term effects
- Source: Broadcast buffer sizes are based on Marrs, 1989 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 will be addressed through monitoring (See I-9)

**I-9:** The impacts of herbicide use on plant Species of Local Interest (SOLI) are uncertain, especially regarding lichen and bryophytes. The potential for variances in aerial drift due to uncontrolled weather conditions during treatment may also be uncertain. To manage this uncertainty, representative samples of herbicide treatment sites adjacent to vascular and non-vascular plant SOLIs will 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 will be evaluated before treatment, immediately after treatment, and two to three months later as appropriate. Treatment buffers will be expanded if damage is

found as indicated by: (1) Decrease in the size of the SOLI plant population, or (2) Leaf discoloration or chlorophyll change

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

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

**I-11:** Implementation monitoring will 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 will be used to correct deficiencies. Herbicide use will be reported as required by the Forest Service Health Pesticide Use Handbook (FSH 2109.14)

**I-12:** Effectiveness monitoring will 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 are adequately protected.

- Source: PNW 2005 ROD and FEIS Appendix M: Inventory and Monitoring Plan Framework

## *J - Wildlife Species of Local Interest*

### **J-1: Bald Eagle**

**J-1a:** Treatment of areas within 0.25 mile, or 0.50 mile line-of-sight, of bald eagle nests will 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) will be determined each year prior to treatments.

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

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

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

### **J-2: Grey Wolf**

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

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

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



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

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

### **J-3 Peregrine Falcon**

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

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

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

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

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

**J-3b:** Seasonal restrictions will be waived if the site is unoccupied or if nesting efforts fail and monitoring indicates no further nesting behavior. Seasonal restrictions will be extended if monitoring indicates late season nesting, asynchronous hatching leading to late fledging, or recycle behavior which indicates that late nesting and fledging will occur. 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 will 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 will be determined and mapped for each known nest site.

(3) Tertiary: a three-mile radius from the nest site including all zones. The tertiary nest zones are not mapped; they apply to a circular area based on the three-mile radius.

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

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

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

**J-3d:** Invasive plant activities within the secondary nest zone requiring the use of machinery will be seasonally restricted. This may include activities such as mulching, chainsaws, vehicles (with or without boom spray equipment) or other mechanically based invasive plant treatment.

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

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

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

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

1. (1) Biologists performing monitoring in association with the eyrie and coordinated with the District Biologist.
2. (2) Law enforcement specialists performing associated duties with notice to the District Ranger.
3. (3) Access for fire, search/rescue, and medical emergencies under appropriate authority (Forest Service line officer or designee).
4. (4) Trail access, when determined by a biologist to be non-disturbing.
5. (5) Other exceptions on a case-by-case basis as determined by the Deciding Official
  - Purpose: To reduce disturbance to nesting falcons and protect eggs and nestlings. Agitated parents can damage the eggs with thin shells resulting in failed reproduction for that nest.
  - Source: Pagel J. 2006. Peregrine falcon nest site data, 1983-2006

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

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

#### **J-4 Painted Turtle**

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

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

#### **J-5 Greater Sage Grouse (If discovered and documented on the W-WNF)**

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

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

**J-5b:** Human activities within 0.3 mile of leks will be prohibited from the period of one hour before sunrise until four hours after sunrise and one hour before sunset until one hour after sunset from February 15 – May 15.

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

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

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

### *K-Public Notification*

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

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

### *L-Special Forest Products*

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

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

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

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

### *M- American Indian Tribal and Treaty Rights*

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

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

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

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

### *N-Rangeland Resources*

**N-1:** Use available administrative mechanisms to incorporate invasive plant prevention practices into rangeland management. Examples of administrative mechanisms include, but are not limited to, revising permits and grazing allotment plans, providing annual operating instructions, and adaptive management. Plan and implement practices in cooperation with grazing permit holder.

- Purpose: To ensure proactive adaptive measures are taken to eliminate future spread of invasive plants
- Source: R6 2005 FEIS Standard 6

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

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

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

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

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

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

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

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

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

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

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

*P-Restoration*

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

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

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

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

•

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

- Purpose: To ensure those sites are successfully restored with desirable vegetation

- Source: Treatment Restoration Standard 3, 12 (RFEIS), and *Guidelines for Revegetation for Invasive Weed Sites on National Forests and Grasslands in the Pacific Northwest* (Erickson et al. 2003)

## Herbicide Use Buffers

Herbicide treatments are more restrictive nearer water bodies. PDFs and herbicide use buffers within the aquatic influence zone were developed based on label restrictions; SERA risk assessments, and various studies of drift and runoff to streams, such as Berg 2004. The scientific basis for establishing no treatment buffer widths is based on research on the inherent risk of chemical contamination due to herbicide application (Moore 1975, Norris, Lorz and Gregory 1991, Bissin, Ice, Perrin and Bilby 1992). Research has demonstrated that the risk of aquatic organism exposure to chemical herbicides is dependent on three key factors: chemical behavior, the rate and methods of application, and site characteristics.

Tables 7, 8 and 9 prescribe buffer widths according to treatment methods, herbicides used, risk, and type of aquatic environment. Table 10 addresses buffer widths used for aerial application. Buffers identify distances from various water bodies where treatment activities are not allowed.

Ephemeral streams exist in the project area. Label direction and PDFs will be followed for treatments along ephemeral streams. These areas flow rarely during very high water events when herbicide use is not likely occur.

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

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

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

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

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

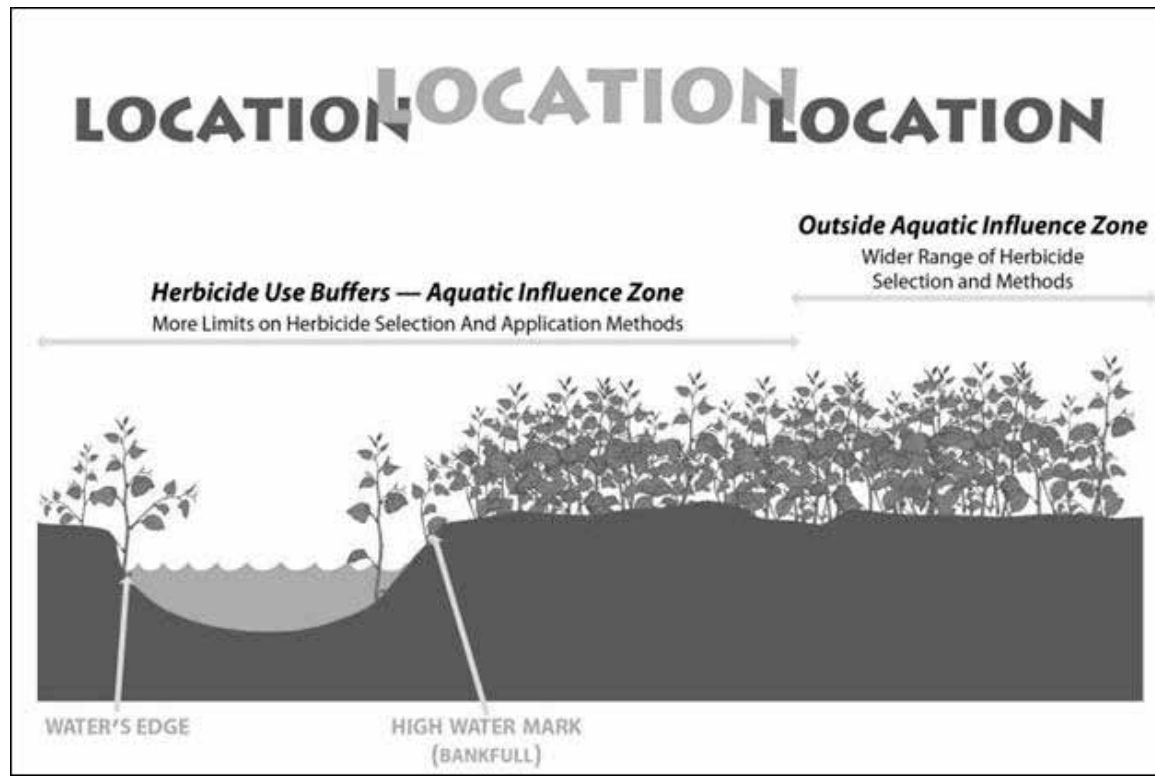
Herbicide	Wetlands			
	Aerial	Broadcast	Spot	Hand/ Select
<b>Aquatic Labeled Herbicides</b>				
Aquatic Glyphosate	Not proposed	100**	Water's edge	Water's edge
Aquatic Triclopyr-TEA	None Allowed	None Allowed	15	Water's edge
Aquatic Imazapyr*	Not proposed	100**	Water's edge	Water's edge
<b>Low Aquatic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

\*\* If wetland, pond or lake is dry, there is no buffer.

**Table 10-Buffer widths required for aerial applications**

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

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



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

Figure 11 illustrates how the Aquatic Influence Zone restricts application methods and herbicides only to those approved for use in aquatic areas. “Aquatic Influence Zone” is not synonymous with “buffer widths” listed in the tables above. The Aquatic Influence Zone is defined by the innermost half of the Riparian Habitat Conservation Area (RHCA). For instance, a 300-foot RHCA will have an Aquatic Influence Zone of 150 feet. Establishing buffer widths reduces the potential for herbicides to come in contact with water via drift, leaching, and runoff at or near concentrations of concern.

### Early Detection, Rapid Response Herbicide Use Decision Process

Early Detection, Rapid Response (EDRR) is aimed at controlling new infestations that are small in size, thus decreasing cost and the need for repeated applications. It is also advantageous because: 1) the precise location of individual target plants is subject to rapid or unpredictable change, and 2) presently known infestations may grow during the time it typically takes to complete the NEPA process. The selected alternative allows the treatment of new invasive plant detections, as long as the treatment method is

within the scope of this EIS. Project Design Features will apply to EDRR treatments. Invasive plant sites discovered subsequent to the current invasive plant inventory may be treated following the steps outlined below in the EDRR Decision Use Tree.

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

**Yes (use herbicides):** List potential herbicide choices and integrated prescription. Review label directions and project design criteria. Consider non-target vegetation surrounding treatment sites and use selective herbicides as appropriate. Consider soil conditions at the treatment site. Consider previous treatments that have occurred on the site. Were they effective? Would another herbicide or combination of methods be more effective? Also note that triclopyr may not be used in areas of known special forest product or subsistence collection. Go to 2.

**No:** Use non-herbicide methods.

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

**Yes:** Is the treatment site within the aquatic influence zone and/or on a road that has high potential to deliver herbicide to surface waters? Is the site in a wildlife habitat that has specific restrictions to broadcasting? Go to 3a.

**No:** Go to 3b.

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

**Yes:** Do not broadcast. Go to 4.

**No:** Go to 3b.

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

**Yes:** Survey as needed within suitable habitats. Apply botanical buffers as appropriate (see table 25). Broadcast may still be acceptable if botanical species of local interest are covered by barrier. Go to 4.

**No:** Broadcasting is an acceptable treatment method for herbicides except triclopyr. Use lowest effective label rates for each given situation. Do not exceed typical label rates. Favor other surfactants besides NPE and do not broadcast NPE at a rate exceeding 0.5 lbs. active ingredient per acre. Do not broadcast spray NPE in animal habitats (see table 35). Do not broadcast imazapyr at a rate greater than 0.7 lbs per acre. Consider wildlife habitats in the area and implement seasonal restrictions if required.

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

**Yes:** Apply spot/selective buffers and use aquatic labeled herbicides as appropriate.

**No:** Seek approval for treatment through additional decision process (NEPA Section 18 or a new NEPA process).

**Figure 12 – EDRR Herbicide Use Decision Tree Process**



---

## Annual Implementation Planning and Monitoring

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

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

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

### **2. Develop site prescriptions**

- Use Integrated Weed Management principles to identify possible effective methods of treatment. Non-herbicide treatments should be considered when sites are small or target plant densities are low, particularly after several years of herbicide treatments. Prescribe herbicides as needed based on the biology of the target species and size of the infestation (for instance, manual treatment alone cannot effectively eradicate rhizomatous species). Determine that the prescribed treatment is within the scope of those analyzed in the EIS. If treatments would not be effective once Project Design Features are applied, further NEPA would also be required to authorize the effective treatment.
- Apply appropriate Project Design Features. Consider the soil texture and type and potential for ground water contamination to ensure that label guidance and PDFs related to soils are followed. Consider the presences of small unmapped small wetlands and ensure PDFs are appropriately applied.
- Determine that the prescribed treatment is consistent with the ESA consultation.
- Review compliance criteria for the Forest Plan and any other environmental standards indicated by the label or state regulations. Develop an Invasive Plant Prevention Plan, a public notification plan, and coordinate with local Tribes.
- Complete Form FS-2100-2, Pesticide Use Proposal. This form lists treatment objectives, specific herbicide(s) that will be used, the rate and method of application, and Project Design Features that apply. Apply for any herbicide application permits when needed for treatments in Riparian Areas.
- Confirm that acceptable plant or mulch materials are available for cultural treatments/restoration. If the prescription includes extensive site preparation, additional NEPA is required.
- Coordinate with adjacent landowners, water users, agencies, and partners.
- Apply annual caps Forest-wide, a cap for the life of the project, and an annual cap for riparian areas including individual watersheds. (Cap acreages refer to first-time treatment acres and do not count retreatment of those same acres). The Caps include:
  - A maximum of 8,000 acres per year Forest-wide
  - A maximum for the life of the project of 40,000 acres (combined treatment acreage of known, presently undetected, and future new infestations)
  - A maximum of 4,000 acres of riparian treatment per year

**3. Accomplishment and Compliance Monitoring**

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

**4. Post Treatment Monitoring**

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

**Attachment D**

**Wallowa Whitman Weed Prevention Practices and Analysis Guidelines**

## Wallowa-Whitman National Forest

### Weed Prevention Practices and Analysis Guidelines

#### *A. Prevention Strategies and Tactics from the Forest Integrated Noxious Weed Management Plan (1992)*

##### Project Planning

1. Noxious weed management is to be treated as a mandatory issue or concern within ALL NEPA planning activities where ground disturbance is likely. Prevention will be addressed as a part of the management constraints or requirements as well as being an evaluation criterion where appropriate.
2. NEPA analyses must consider the costs associated with preventing the occurrence or spread of noxious weeds
3. Project level personnel should be able to recognize noxious weeds occurring on or adjacent to their Districts and should be able to recognize potential invaders.

##### Vegetation Management

4. To the extent practical and feasible, with full consideration of other silvicultural and resource objectives, silvicultural prescriptions should strive to maintain as much shade as possible on site and to limit the amount of soil disturbance.
5. Logging systems should consider the objectives of maintaining ground cover, maintaining shade providing features, and minimizing ground disturbance when designing logging systems for a particular stand.
6. Stand exams, botanical inventories, range analyses, and other resource inventories will include a process for inventorying noxious weed occurrences by stand, species, size of infestation and location as a minimum.
7. Project or contract maps will show currently inventoried, high priority noxious weed infestations as a means of aiding in avoidance or monitoring.
8. Commensurate with anticipated risk of invasion or spread of noxious weeds, ground disturbing activities may need to include both a pre and one or more post project surveys to document pre-existing infestations and to evaluate the effects of the project on noxious weeds. The intensity and frequency of this survey should vary according to the risk/probability of the project affecting or being affected by noxious weed infestations. This risk should be evaluated during initial or periodic project planning and should be coordinated with the District noxious weed coordinator. Where monitoring is needed, it should be planned to continue for at least five years.
9. Where existing inventories or pre-project inventories indicate that an infestation occurs on or near a ground disturbing project, the project will be designed, in coordination with the District noxious weed coordinator, to plan for the long term management of the infestation and to prevent the spread of the infestation off site.

Depending on an assessment of the potential risk for introduction or spread of noxious weeds, this will often involve designing projects (including the implementing contracts, permits, etc.) so that the operator will not be working on high risk areas during the time when the weeds are capable of being spread by the operation. In the timber sale contract, C5.12 (Use of Roads by Purchaser), C5.4 (General and Special Maintenance Requirements, and C6.315 (Sale Operation Schedule) give the Districts the flexibility to keep contract vehicles out of high risk areas during the high risk times of the season. These type of requirements can also be incorporated in Federal Acquisition Regulation contracts in Section H – Special Contract Requirements.

10. Contract clause language will be developed along the following general lines. These clauses will be submitted to the Regional Office for review and final approval. Implementation will not occur until such time as the clauses have received Regional Office approval.

If an assessment of risk conducted by the Forest Officer in charge of a project, and in full coordination with the District noxious weed coordinator, indicates a high risk of introduction or spread of noxious weeds through transport by logging, road construction, or other ground disturbing equipment, and unless otherwise agreed to in writing, all equipment to be operated on a project area will be cleaned in a manner sufficient to prevent noxious weeds from being carried on to the project area. This requirement does not apply to passenger vehicles or other equipment used exclusively on roads. Cleaning, if needed, will occur in a site to be established by the District Ranger, in coordination with the equipment owners or operators and the County Weed Board. Cleaning will be inspected and approved by the Forest Officer in charge of the specific project.

Where log trucks or other large equipment make delivery to or haul from purchaser's/contractor's yards infested by noxious weeds, the yard owner will be required to eradicate the noxious weeds from the yard/scaling site through an amendment to the yard scaling agreement or other contract provision as appropriate.

11. Where timber purchaser' log yards or other contractors equipment yards are known or suspected to be infested by noxious weeds, encourage their cleanup through working with the purchaser/contractor and the County Weed board.

### Revegetation/Restoration

12. Ensure that all disturbed ground is revegetated as soon as possible after disturbance. Consider regeneration or other resource objective needs in planning for species to be seeded to be seeded, timing rates, etc. Rehabilitate bare ground unless it can be documented that natural or artificial regeneration can accomplish the same prevention objectives as seeding within a reasonable time frame.

13. Favor the use of native species (or domestic varieties of native species) in preference to introduced species for seeding for site protection when the native species can accomplish the site objectives in a reasonable timeframe and costs are not excessive.

14. Within the constraints of meeting other resource objectives, use the species and mixes that will most rapidly occupy a site. Consider seeding a fast germinating annual in the mix to provide a suitable ground cover as rapidly as possible.

15. Where there are no other multiple resource constraints, such as along road cuts and fills, consider use of sod-forming species as a major part of the mix.

16. All seed purchased or otherwise designated or accepted for use on National Forest System Lands will be required to be tested for “all states noxious weeds” according to AOSA (Association of Official Seed Analysts) standards and will be certified in writing a Registered Seed Technologist or Seed Analyst as meeting the requirements of the Federal Seed Act and the appropriate State Seed Law for the state in which application is planned to occur, regarding the testing, labeling, sale and transport of prohibited and restricted noxious weeds.

Prior to acceptance of purchased seed, or use of seed by a purchaser, contractor, subcontractor, cooperator, or by the Forest Service, a sample meeting the AOSA standards for sample size and method of acquisition (see Appendix O) will be submitted to either the Oregon State University Seed Testing Laboratory or another seed testing facility for testing by a Registered Seed Technologist or Seed Analyst (as certified through either the AOSA for State and Federal analysts/technologists of the Society of Commercial Seed Technologists) for “all states noxious weeds.” Only after a finding and documentation in writing of no weed seeds on the “all states noxious weeds” listing in excess of state limitations for prohibited and restricted weed seed will the seed be accepted and used.

17. When hay or straw is to be used for mulching, for erosion control, fire rehabilitation or other uses, it should be noxious weed free. Until a Regional or State process can be developed to ensure certification of hay or straw, the following process will be followed:

Contact the local County Extension Agent to determine which farmers in the area are participating in the certified grass seed or grain programs. The County Agent may also be able to aid in determining which of the certified growers may also be baling the straw. To the extent possible, use only straw obtained from fields participating in the certification program.

Monitor the applications site on a scheduled basis for a minimum of five years after use of the straw. This program will not ensure that the straw is totally weed free but is the best option available at this time.

## Range Management

18. In the development of Allotment Management Plans and Annual Operating Plans, consider the potential for introduction of noxious weed seed through animal transport. 19. Where the livestock are entering the Forest from a known noxious weed infested area, consider requiring the feeding of the animals (at permittee expense) weed free hay (or other weed free forage or feeds) for 9 to 10 days prior to permitting ingress on to the general area of the National Forest allotment. The feeding area will, if at all possible, be on non-National Forest System lands. If this is not practical, confine the animals in as small a pasture as feasible for the 9-10 day period. This pasture will then require annual monitoring for the occurrence of noxious weeds (and management as appropriate). Under no circumstances will this strategy be applied in a manner inconsistent with Forest Plan standards nor in a manner which will result in resource degradation.

19. Consider the exclusion of livestock (and wildlife where feasible) from high priority noxious weed sites where the animals are likely to cause a spread of the weed off site.

20. In the AMP's to the extent possible, provide for the use of livestock as a tool in preventing palatable, non-poisonous noxious weeds from setting seed (e.g.: sheep grazing of leafy spurge).

21. In the Annual Operating Plans, provide information to the permittees regarding noxious weed infestations. To the extent possible after seed set, encourage livestock to avoid sites where the seeds are likely to be transmitted by the livestock (i.e., either through ingestion and excretion or through attachment to the animal and then dropping off).

22. In the Annual Operating Plans, provide information to the permittees regarding noxious weed identification, methods of spread and prevention measures.

### Mining

23. Review Mineral Operating Plans to ensure that proper actions are taken to prevent the establishment of new infestations or the spread of existing ones. Ensure that disturbed sites are rehabilitated and revegetated as soon after disturbance as possible. Consider the use of annual cover crops where an area will be left in a disturbed condition for period of time prior to being re-worked.

### Recreation

24. For recreational livestock use authorized under permit (such as outfitter-guide permits), permit only the use of feeds with a high probability of being free of noxious weeds (such as heat treated and pressurized pelletized feed).

25. For recreational and other livestock use not required to be under a permit, develop a process to prohibit the use of feeds on National Forest System lands unless they are accompanied a certification insuring their weed free status or are such that they have a high probability of being free of noxious weeds (such as heat treated and pressurized pelletized feed).

26. Where feasible, cooperate with the County Weed Boards and other cooperators to provide a hay exchange program during hunting seasons (e.g., Wallowa County).

27. Where recreational vehicle activity such as off road vehicle (ORV) use is occurring in an area where noxious weeds are present or are resulting in a ground disturbing activity such that potential invasion sites are available for noxious weeds, consider closing the area to motorized vehicle use and/or conducting revegetation efforts to minimize sites available for weed spread or invasion.

Where ORV use is restricted to a specified area, that area, because of the extensive disturbance to the soil and vegetative cover, will need to be closely monitored for noxious weeds. Planning for the ORV area must consider prevention as a high priority.

28. By District or Zone, conduct a Forest-wide inventory for noxious weeds. Concentrate on high priority species (e.g., potential and new invaders) and on areas where ground disturbing activities are common.

### Travel and Access Management

29. Road management objectives should consider the benefits and costs associated with allowing or encouraging desirable herbaceous vegetation growth on shoulders, cuts and fills versus the potential for invasion by noxious weeds and the long term costs associated with treatments and off site effects.

30. Road maintenance planning will address practices to prevent the spread of noxious weeds.

31. Where shoulders or drainage ditches are covered by desirable herbaceous cover, consider leaving it in place rather than blading it off if such a practice can be done without causing excessive damage to the road surface or significant public safety hazards.

32. When blading, brushing, rock raking, or otherwise maintaining a road surface where a noxious weed infestation is located the COR/ER (or road maintenance foreman) will work with the District noxious weed coordinator to ensure that appropriate inventory and treatment measures are applied. The following are suggested practices:

Ensure that the contractor notifies the COR/ER in timely enough manner so that the road can be checked for the current status of noxious weeds prior to any work occurring. Weed sites should be managed as follows:

- if the weed is not in flower, or will not reproduce through damaged plant parts (e.g., vegetatively) proceed with maintenance,
- if the weed has flowered, either hand pull or cut all topes, bag in a plastic bag, then proceed with maintenance; or flag the site for avoidance by the contractor until the District can properly treat the infestation (dispose of weed seed heads by burning),
- if the weed is known or suspected to sprout vegetatively from cut parts, flag the site to ensure avoidance by the contractor until the weed can be treated by proper means.

To the extent possible, in full consideration of road maintenance and public safety objectives as well as silvicultural needs, do not remove trees or brush from adjacent to the road. The objective is to provide as much shade as possible on the unvegetated or sparsely vegetated road surface, cuts and fills.

33. Pit/Quarry plans will consider noxious weeds in the development of long-term plans and will develop plans to prevent introduction or to prevent the spread of existing infestations. Minerals materials procured from non-Forest Service pits will also be checked to be sure the material is not infested with noxious weed seed.

34. In planning for Access and Travel management ensure that management of noxious weeds will be a consideration. If a road is to be closed, coordination with the District noxious weed coordinator should occur to ensure that if noxious weeds exist within the closed portion of the road, the sites are inventoried, IWM decisions are made regarding their management, and provisions are made for access as needed to implement the IWM treatments and monitoring. Roads to be closed should be seeded (with tested and certified weed free seed) to minimize potential invasion sites.

### Intergovernmental Cooperation

35. Each District/Zone will coordinate closely with the associated County Weed Board to ensure sharing of information regarding infestations, treatments, etc.

36. Coordinate with adjacent Districts, Forests and BLM Areas to ensure that animals or equipment moving from the adjacent lands onto the District are either moving from weed free areas or are treated/Quarantined as appropriate. Encourage coordinated policies between adjacent lands.



## Wildfire Suppression

37. To the extent possible, do not use noxious weed infested sites for fire crew bases. Where emergency situations dictate that the base must be located on a site infested by noxious weeds, ensure that noxious weeds on the site are prevented from going to seed and that appropriate short and long term inventory, mitigation and management measure are applied to rehabilitate the site and to manage the infestation. Do not use noxious weed infested sites as a helibase unless appropriate long-term actions are taken to prevent seed production and to ensure eradication of the weeds and rehabilitation of the site.

See Appendix A – Hells Canyon National Recreation Area, for further direction regarding weed prevention practices within HCNRA.

## Site Implementation Guide Example

The purpose of this exercise is to demonstrate how the implementation planning process would work to ensure individual treatments are within the scope of the EIS analysis. The example location was not a known site in the 2006 inventory used for the Invasive Plant Treatment EIS, thus the prescription followed the Early Detection Rapid Response (EDRR) Herbicide Use Decision Tree associated with the action alternatives.

The Wallowa Whitman FEIS describes a process for characterizing the infestation, developing site prescriptions, and monitoring. Using the process, the following prescription was developed:

This site is proposed for herbicide treatment. The distance from a road and size of the infestation, along with the deep rooted, aggressive nature of the invasives, render manual and mechanical treatments ineffective (see common control measures in the FEIS). No biological control agents are available for these species. Based on the phenology of the plants, applications are most effective in the spring and fall. Due to Project Design Features that apply to this treatment, treatment would occur during times of the year when wetter areas are driest.

Passive restoration is prescribed at this time. The site will continue to be part of a sheep grazing allotment and the timing that sheep are turned out there will be affected by herbicide use and label requirements and the presence of invasive plants. The FS will coordinate invasive plant treatment and prevention strategies with the permittees.

No wildlife or botanical SOLI would be affected and consultation with biologists revealed no additional survey needs. The 4 acres is mostly more than 100 feet from the Grande Ronde River. Soil type on the site is silt/clay mix with organic matter so glyphosate used within 50 feet zone adjacent to water is very unlikely to reach the river. Picloram will not move through this vegetated buffer with these soil types. The amount of glyphosate that could possibly enter the river from herbicide use at this site would be very small and instantly diluted in the large river. The predicted herbicide exposure would be within the scope of analysis in the R6 2005 FEIS and the 2009 W-W FEIS/Biological Opinions.

A map of the area follows.

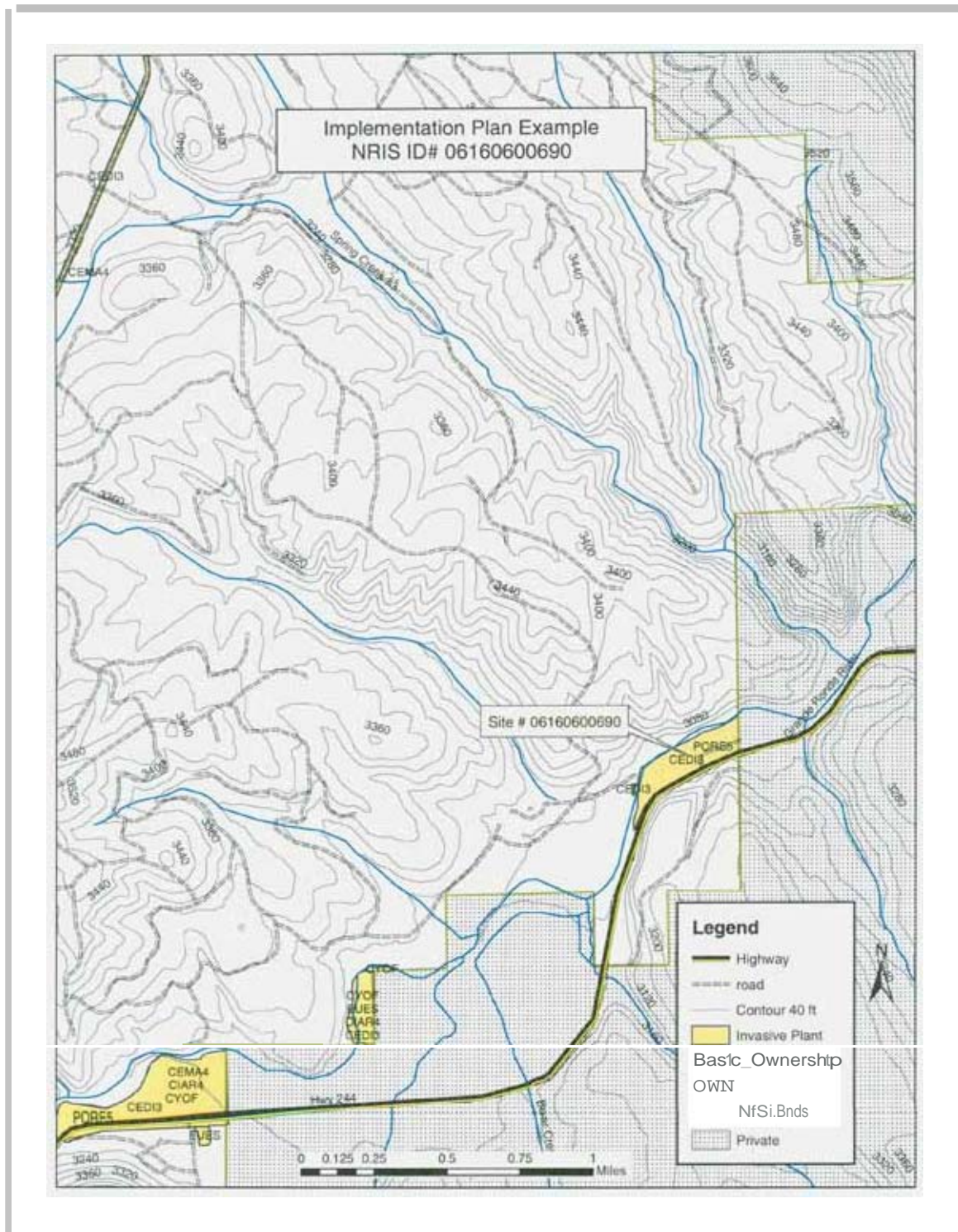


Figure B-L Implementation Plan Example

## 1. Characterize the Infestation

### A: Map and describe the target species, density, extent, treatment strategy, and site conditions:

- Sulfur Cinquefoil (*Potentilla recta*) - PORE5; NRIS ID 06160600690;
  - Extent: E2.5 acres in patches across a 27.7 acre area.
  - Density: in patches, Daubenmire cover class 4 (50-75% crown cover).
  - Diffuse knapweed -.
- Diffuse Knapweed (*Centaurea diffusa*); NRIS ID 06160600389
  - Extent: 1.5 acres; spotty throughout the 27.7 acre area
  - Density: Daubenmire cover class 1 (0-5%)
- Treatment Strategy: Control and reduce cover. Control means to prevent the species from reproducing or spreading off site.
- Site Conditions: Open meadow with scattered pines; rangeland, active sheep allotment; Invasive plants are not nearer than 50 feet to the Grande Ronde River. Some sulfur cinquefoil may be within 50 feet of a small wetland area. Site is adjacent major road (OR 244) but invasive plants are not near the roadside. Site consists of riparian vegetation, scattered pines, annual grasses, bunch grass, and forbs. Site is adjacent private property. Invasive plants are not known to occur on the adjacent private parcel.
- Soils: vary from loam to finer than loam with a silt/clay mix (North Dakota Department of Water quality, non-point source pollution program).  
[http://www.ndhealth.gov/wq/sw/z1\\_nps/pdf\\_files/soil\\_texture\\_feel\\_test.pdf](http://www.ndhealth.gov/wq/sw/z1_nps/pdf_files/soil_texture_feel_test.pdf)
- See attached Early Detection Rapid Response (EDRR) Herbicide Use Decision Process Example

### B: Resource Concerns:

- The Grande Ronde River is habitat for migratory bull trout, summer steelhead and spring/summer Chinook salmon. No T&E plants or wildlife species nearby, and no plant or wildlife species of local concern (SOLI) habitat; additional SOLI surveys are not needed. Invasive plant dispersal vectors include the river, road, permitted sheep, wind, and wildlife). Sulfur cinquefoil and diffuse knapweed are degrading rangeland/grassland condition.

## 2. Develop Site Prescriptions

### A. Treatment Methods Options

- Manual – not effective because site is too large; deep rooted
- Bio/Cultural –biological agents are available for diffuse knapweed, but not sulfur cinquefoil.
- Chemical – effective chemicals exist and applicable to site conditions (picloram (both species), clopyralid (diffuse knapweed), aquatic labeled glyphosate (both species).

**B. Apply Appropriate Project Design Features****A - Pre-Project Planning**

A-1: Documented in #1 above.

**B - Coordination with Other Landowners and Agencies**

B-1: Coordination: Site on Forest lands; contact range permittee at annual meeting.

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

C-1: Prevention: Educate crews and permittees; sign roads.

**D - Wilderness Areas**

D-1: Wilderness: Not applicable (NA) – site is not in a wilderness area.

**E - Non-Herbicide Treatment Methods**

E-1: Will limit crew size working on site within 150 feet of streams.

E-2: Fueling will not occur within the RHCA.

**F - Herbicide Application**

F-1: Labels: All label restrictions will be followed. Selected herbicides, picloram and glyphosate comply with this PDF.

F-2: Forest Plan standards will be followed.

F-3: Surfactants: POEA surfactants, urea ammonium nitrate or ammonium sulfate will not be used.

F-4: Lowest Effective Label Rates: Infestation will be treated prior to bloom stage with picloram at 1% solution, and with Aquatic Glyphosate at a 3% rate, the lowest effective label rates.

F-5: Wind: Guideline will be followed.

F-6: Nozzle: Guideline will be followed.

F-7: NA - sulfonyleurea herbicides are not proposed for this site.

F-8 Aerial: NA, treatment ground based.

**G - Develop Herbicide Transportation and Handling Safety/Spill Prevention and Containment Plan – The transportation and handling/safety will be developed as outlined.****H - Soils, Water and Aquatic Ecosystems**

H-1: Buffers- will broadcast spray picloram beyond 100 ft. from the water's edge; spot spray picloram from 100 ft. to 50 ft. from river; and spot spray aquatic labeled glyphosate within 50' of wetland.

- H-2: Broadcast on roads – NA, highway roadside not proposed for treatment.
- H-3: Riparian vehicle use– will spot spray with backpack in riparian areas.
- H-4: Clopyralid on porous soils – NA, not using clopyralid.
- H-5: Chlorsulfuron on clay soils- NA, not using chlorsulfuron.
- H-6: Picloram on shallow or coarse soils - NA, soils finer than loam
- H-7: Sulfometuron methyl on shallow or coarse soils - NA, not using chlorsulfuron.
- H-8: Lakes and Ponds – NA, no lakes or ponds present.
- H-9: Wetlands – will implement treatment when soils are driest.
- H-10: Foam – NA
- H-11: Wells – NA, no such developments
- H-12: Boat transport – NA – not needed
- H-13: Aquatic influence zone- not treating between water's edge and bank full line; will treat much less than 1 acre within the aquatic influence zone along any 1.6 mile length including this site.

#### **I - Vascular and Non-Vascular Plant and Fungi Species of Local Interest**

- I-1: Consultation with district botanist revealed no need for additional surveys in the area of the infestation. Species of Local Interest (SOLI) or their habitats are not present.
- I-2: Habitat – NA, no documented sites
- I-3: SOLI – No SOLI identified in treatment area
- I-4: T&E - no habitat or sites for *Mirabilis macfarlanei* and *Silene spaldingii*
- I-5: T&E - no habitat or sites for *Mirabilis macfarlanei* and *Silene spaldingii*
- I-6: Nonvascular SOLI - no documented sites or habitat
- I-7: Aerial Application – NA
- I-8: Monitoring to refine SOLI Buffers - NA
- I-9: SOLI monitoring - NA, no known SOLI sites or habitat
- I-10: Compliance Monitoring – this implementation plan documents compliance with PDFs, etc.
- I-11: Implementation Monitoring - The treatment form will be used to document compliance during implementation
- I-12: Effectiveness Monitoring: Results of effectiveness monitoring will be reported in FACTS the Forest Service corporate database of record.

**J - Wildlife Species of Local Interest**

J-1: Wildlife: consultation with the district Wildlife Biologist revealed no areas of special concern or additional surveys needed.

**K - Public Notification**

K-1: The treatment site will be posted and the public will be notified via the press through an annual notification.

**L - Special Forest Products**

L-1: Special Forest Products – NA and triclopyr is not the preferred herbicide

**M - American Indian Tribal and Treaty Rights**

M-1: Indian Tribes will be notified annually

**N - Rangeland Resources**

N-1: Not applicable

N-2: Permittee will be notified during annual operating meeting

N-3: EPA labels will be followed for grazing – GF

**O - Human Health**

O-1: Not applicable; sulfometuron methyl will not be applied

O-2: Picloram rate will not exceed 0.35lb/acre

O-3: Not applicable; triclopyr will not be applied

**P - Restoration**

P-1: will monitor to determine potential restoration opportunities

P-2: Not applicable, not highly disturbed

P-3: Will monitor site following treatment to determine need for further restorative actions.

**3: ESA Consultation (Biological Opinion consistency)**

The prescribed treatment to spot spray aquatic glyphosate within 50 feet of the wetland and spot spray picloram from 50 feet – 100 feet of the river and wetland, and broadcast spray with picloram beyond the 100-foot stream buffer is consistent with the PDFs and ESA consultation.

**4: Forest Plan Compliance Review**

Because the project is consistent with all applicable PDFs, it is consistent with the Forest Plan, label guidelines, public notification requirements, and coordination with American Indian Tribes.

## 5: Pesticide Use Proposal

Site is to be included in annual pesticide use proposal form FSM 2150.

## 6: Restoration

No immediate restoration is anticipated; however, as invasive plant cover decreases, the site will be evaluated for restoration opportunities.

## 7: Coordination

Will coordinate treatment with the grazing permittee via the annual operating plan and per PDF N-2.

## 8: FS Caps

Project will be included among acreages tallied for annual treatment caps.

### *Treatment strategy*

Because of the proximity of this site to vectors like the highway and the river, and because it is adjacent to private land, immediate action to control this site is warranted. The site will be treated with herbicides. Biological controls will not be used on diffuse knapweed because of the time lag required for control. Although clopyralid is effective in controlling diffuse knapweed, picloram is the sole herbicide to be used. Using one herbicide increases efficiency (cost-effectiveness) and eliminates the need to mix additional herbicides. This reduces the opportunity for accidental spills and worker exposure. In the areas beyond the 100-foot buffer from the edge of the river and the wetland, the site will be treated using ATV broadcast techniques with Picloram (at 1% sol.). Between 50 and 100 feet from the river and wetland, invasive plants will be spot sprayed via backpack with picloram (1% sol.). Plants nearer than 50 feet to the wetland will be treated by spot spraying aquatic labeled glyphosate at 3 percent solution. The recommended timing for application is early fall during low flow of the river. The site will be monitored for treatment efficacy and need for revegetation following treatment.

### Early Detection Rapid Response (EDRR) Herbicide Use Decision Tree Example

#### **1. Is the target population of the size, phenology, density or distribution that warrants herbicide use?**

**YES, Target Population:** The site is infested with two species: diffuse knapweed (*Centaurea diffusa*) and sulfur cinquefoil (*Potentilla recta*). Diffuse knapweed grows in numerous small spots totaling 1.5 infested acres spotted throughout the 28-acre area. Sulfur cinquefoil grows in fewer, larger, dense patches totaling 2.5 infested acres throughout the 28-acre area.

The site consists of an open meadow with scattered pines. The desired native plant community consists of riparian vegetation, annual grasses, bunch grasses, and forbs. The area is used as rangeland and is within an active sheep allotment. A small wetland lies within the mapped area but is 100 feet away from invasive plants. The site is 1000 feet from a major road (OR 244) and is adjacent to private property. No infestations noted on the private property at this time. Soils vary from loam to finer than loam with a silt/clay mix.

The long term desired condition for this area is control of the invasive species to the point that desirable forbs and grasses can reestablished and. Control would mean that this area would no longer provide a source for spread of invasive plants off site.

**Treatment Options:** Biological controls exist for diffuse knapweed but not for sulfur cinquefoil. Manual treatment is not effective in controlling sulfur cinquefoil, nor for diffuse knapweed at this site because it is large and would be too costly to treat. Volunteers are not available. Herbicides that are effective for both invasive plants are available.

**YES use herbicides** due to the high potential for spread via travel vectors and to adjacent private land. (Go to step 2)

Herbicide Choices:

- Diffuse knapweed: Common Control Measures lists picloram and clopyralid as most effective herbicides and glyphosate as a secondary option.
- Sulfur Cinquefoil: Picloram is considered the most effective herbicide. Metsulfuron methyl is a secondary choice.

## **2. Do the size, density and distribution of invasive plants warrant broadcast application?**

**YES, sulfur cinquefoil** is in large dense patches that warrant broadcast application. Portions of the infestation are within the aquatic influence zone, but not along the nearby road. (Go to step 3a)

**NO, diffuse knapweed** infestation is too scattered with light density to warrant broadcast application. (Go to step 3b)

### **3a. Apply surface water buffers.**

In the areas beyond the 100-foot buffer from the edge of the river and the wetland, the site will be treated using ATV broadcast techniques with Picloram (at 1% sol.). Between 50 and 100 feet from the river and wetland, invasive plants will be spot sprayed via backpack with picloram (1% sol.). Plants growing nearer than 50 feet to the wetland will be treated by spot spraying aquatic labeled glyphosate at 3 percent solution.

**Is the site within an area where broadcasting is prohibited?**

**YES**, portions of the infestation are nearer than the 100-foot broadcast buffer. (Go to step 4)

### **3b. Are there botanical species of interest (SOLI) or suitable habitat within 100 feet of the proposed broadcast site?**

**NO**, botanical SOLI or suitable habitat are not present. (Go to step 4)

## **4. Will spot or selective methods be reasonably effective in this situation?**

**YES**, backpack treatment of sulfur cinquefoil and diffuse knapweed is possible at this location. Between 50 and 100 feet from the river and wetland, invasive plants will be spot sprayed via backpack with picloram (1% sol.). Plants growing nearer than 50 feet to the wetland will be treated by spot spraying aquatic labeled glyphosate at 3 percent solution.