Park Unit	Currently Active Partnerships
Golden Spike	NRM-EPMT (NPS) Box Elder County (road spraying) Utah Conservation Corps
Grant-Kohrs	NRM-EPMT (NPS) Adjacent Landowners Inholding with NPS Scenic Easement (Treated by NPS) Inholding (City Sewage Lagoons) (no treatment) Inholding (Railroad) (no treatment) Gold Creek Cooperative Weed Management Area Powell County Weed District
Hagerman Fossil Beds	NRM-EPMT (NPS)
Little Bighorn	NRM-EPMT (NPS) ROMN (NPS) Bighorn Canyon National Recreation Area (NPS) Rocky Mountain CESU Montana State University BIA NRCS
Minidoka	NRM-EPMT (NPS)
Nez Perce: Bear Paw	NRM-EPMT (NPS) Blaine County Highway Department (road spraying) Boy Scouts
Nez Perce: Big Hole	NRM-EPMT (NPS) Adjacent USFS (collaborative spraying) Beaverhead County Adjacent ranchers

9. Measures to Avoid, Minimize or Mitigate Impacts

There are currently few specific measures that partner parks use to avoid, minimize or mitigate impacts from nonnative invasive plants aside from those mentioned in section 1. *Prevention and Early Detection.* Those measures that are used by the parks primarily have to do with avoiding impacts from construction and are applied individually as the parks undertake construction projects. These measures include importation of clean fill, reseeding and other revegetation of areas disturbed by construction, etc. As park invasive plant management programs and standards continued to develop, it is likely that additional measures to avoid, minimize or mitigate impacts would be employed more routinely by the parks in Alternative 1.

B. Alternative 2: Implement Comprehensive Invasive Plant Management Program (Preferred)

Introduction: Unlike Alternative 1, this alternative is a comprehensive proposal that includes the following elements for the management of invasive plants that would be systematically implemented by the 10 partner parks:

1) Prevention and Early Detection;
2) Implement Seven Step Decision-Making Tool;
3) Recordkeeping;
4) Interpretation / Education;
5) Partnerships;
6) Adaptive Management;
7) Measures to Avoid, Minimize or Mitigate Impacts; and
8) Consistency Analysis for Site Specific Plans.

Under this alternative, resource managers would identify high priority invasive species for treatment; determine what treatments are feasible to reduce the number of or population of plants; identify the most reasonable management strategy or strategies; and then select the most appropriate treatment option or combination of treatments to minimize potential impacts and maximize overall management success. To do this resource managers would use systematic, documented and comprehensive methods and analysis through a new 7-Step Decision-making Tool.

1. Prevention and Early Detection

a. Application of Law and Policy

Actions would be the same as in Alternative 1 for application of law and policy. The parks would continue to comply with the weed management laws and policies listed in Alternative 1. The parks would continue to rely on state and county priorities in combination with other information to determine which weeds to treat.

b. Prevention

As noted in Alternative 1, prevention techniques are among the most cost-effective and efficient strategies in an invasive plant management program. When invasive plants are detected early, treatment is often quicker and more effective. Without prevention, resource managers must often direct limited resources to fighting more established infestations. Once a species has established a viable population, control is expensive and eradication may be difficult to impossible. In addition to the best management practices and prevention strategies identified in Alternative 1, managers would employ a more directed decision-making process to prevent the spread of (contain) existing nonnative invasive plant infestations from affecting new areas.

Under Alternative 2, the Northern Rocky Mountains partner parks would rely on the list of potential new invaders found in Appendix J: *List of Potential New Invaders* developed as part of this plan to look for new invasive species. The parks would systematically monitor heavily developed or high use areas ("hot spots" or vectors for new invasions), including campgrounds, parking lots, housing and administrative areas, road shoulders, river corridors, and trails and trailheads to detect new invasive species establishment.

Compared to Alternative 1, the parks would apply a more rigorous series of prevention techniques and best management practices (BMPs). These practical and proactive techniques would be designed to prevent invasion and permanent establishment of invasive plants during the course of daily or routine activities and operations and are listed as mitigation measures in section 7. *Measures to Avoid, Minimize or Mitigate Impacts* and in Chapter V: *Environmental Consequences* and summarized in Appendix K.

General objectives of the mitigation measures and BMPs include:

- Incorporating nonnative invasive plant prevention and control into project planning;
- Avoiding introduction of nonnative invasive plant seed, or removing sources that would introduce weed seed and propagules, to prevent new nonnative invasive plant infestations and additional spread of existing weeds;
- Avoiding the creation of environmental conditions that promote nonnative invasive plant germination and establishment;
- Re-establishing vegetation to prevent conditions conducive to establishment of nonnative invasive plants when project disturbances create bare ground;
- Setting work standards that prevent nonnative invasive plant spread (i.e. seed removal from personal equipment, vehicles, etc.); and
- Improving the effectiveness of prevention practices through nonnative invasive plant awareness and education.

A more detailed list of techniques associated with the implementation of this plan may be found in section 7. *Measures to Avoid, Minimize or Mitigate Impacts* and in Appendix K: *Impact Avoidance, Minimization*

and Mitigation Measures. Compared to the 14 general and four EPMT strategies identified in Alternative 1 and applied inconsistently by the parks, in Alternative 2 the parks would employ the greatly expanded number of strategies identified in section 7 and Chapter V and summarized in Appendix K.

c. Early Detection and Rapid Response (EDRR)

Actions would be similar to Alternative 1, however the parks would have:

- A more systematic decision-making tool available,
- A more comprehensive list of species to watch for in the parks,
- This plan, and
- Improved cooperation with the NRM-EPMT.

This plan therefore, makes it more likely that the parks would learn from each other about new invasive species. In addition, because the decision-making tool incorporates additional monitoring strategies, the parks would likely be more successful at finding and eradicating new invaders.

As a result of this plan, parks would implement the following steps:

- Use the list of nonnative invasive plants occurring in the area compiled for this plan (Appendix J: *List of Potential New Invaders* and Appendix L: *Top 10 Early Detection Rapid Response (EDRR) Plants in the 10 Northern Rocky Mountains Parks)* to identify species that might occur in the future.
- Make this list available to field personnel and volunteers to identify potential nonnative invasive plants and to allow reporting of any occurrences to the person responsible for managing weeds in the park.
- Inventory roadsides, high-use areas, and other disturbed areas to detect new nonnative invasive plants.

Although preventing the introduction of nonnative invasive plants is the most successful and preferred strategy for resource managers, the realities of globalization, tight fiscal constraints, and limited staff time essentially guarantee that nonnative invasive plants would likely continue to emerge in parks. Fortunately, nonnative invasive plants often undergo a lag period between introduction and subsequent colonization of new areas. Managers, then, can take advantage of early detection monitoring to ensure nonnative invasive species are found and successfully eradicated before populations become well established.

This strategy requires that resource managers be able to: 1) detect invasive exotic species early (i.e., find a new species or a population of an existing species while the infestation is small), and 2) respond rapidly (i.e., implement appropriate management techniques to eliminate the invasive plant and all of its associated regenerative material). Therefore, most early detection work would be focused on weed vector areas, those areas susceptible to or already containing disturbance.

The UCBN is currently developing an EDRR protocol for UCBN parks and the ROMN is developing an EDRR protocol for ROMN parks. Until these monitoring protocols are available, parks would inventory and map state-listed noxious weeds and continue to take preventative measures to treat these nonnative invasive plant populations.

2. Implement Seven-Step Decision-making Tool

Unlike Alternative 1, the parks would implement the following systematic and comprehensive Decision-making Tool (Figures 14-17, 21-25) (designed by the parks) to:

- ❖ Step 1: Identify Nonnative Plants (Figure 14)
- ❖ Step 2: Determine Whether Nonnative Plant Meets Action Thresholds (Figure 15)
- ❖ Step 2a: Monitor to Determine Whether Nonnative Species is Invasive (Figure 16)

- ❖ Step 3: Identify Species Management Priorities (Figure 17)
- ❖ Step 4: Identify Area Management Strategy and Evaluate and Select Treatment Method(s) (Figure 21)
- ❖ Step 5a: Confirm Compliance for Chemical and/or Biological Treatment Method(s) (Figure 22)
- ❖ Step 5b: Confirm Compliance with NEPA (including NHPA, ESA, CWA, etc.) (Figure 23)
- ❖ Step 6: Implement Selected Treatment(s) (Figure 24), and
- ❖ Step 7: Monitor Treatment to Assess Control Efficacy (Figure 25)

a. Step 1: Identify Nonnative Plants

1) Defining Nonnative Plants Managed under this Plan (Figure 14)

Only plants defined as nonnative would be managed under this Invasive Plant Management Plan (IPMP). This IPMP does not include or apply to management of native plants, even those that are considered pests or problems in natural or cultural landscapes or in recreation areas. Examples of these types of plants that would not be managed as part of this plan include native, troublesome plants like poison oak or poison ivy.

Native plants and nonnative (exotic) species are defined as follows in *Management Policies*:

> *Native species are defined as all species that have occurred, now occur, or may occur as a result of natural processes on lands designated as units of the national park system. Native species in a place are evolving in concert with each other* (NPS 2006: Section 4.4.1.3).
>
> *Exotic species are those species that occupy or could occupy park lands directly or indirectly as the result of deliberate or accidental human activities. Exotic species are also commonly referred to as nonnative, alien, or invasive species. Because an exotic species did not evolve in concert with the species native to the place, the exotic species is not a natural component of the natural ecosystem at that place. Genetically modified organisms exist solely due to human activities and therefore are managed as exotic species in parks* (NPS 2006: Section 4.4.1.3).

2) Identifying a Nonnative Plant

Among those resources available to determine whether the plant meets the definition of a nonnative plant are the following:

- Federal, State or County Noxious Weed Lists

Species on these lists are a management priority because their treatment is mandated by executive order, regulation or law.

- NRCS, USDA Plant Database

This database can be found at http://plants.usda.gov and contains a searchable component for *native status.* Plants may be searched via scientific or common name. The database also contains maps of states, which may be enlarged to identify counties, including presence absence data.

Two other commonly used floras are also available (see Chapter VII: *References* for bibliographical information).

- *Flora of the Pacific Northwest: An Illustrated Manual* (C. Leo Hitchcock and Arthur Cronquist)
- *Intermountain Flora: Vascular Plants of the Intermountain West, U.S.A.* (Arthur Cronquist *et al.*)

Figure 14: Decision-making Tool Step 1

❖ Step 1: Identify Nonnative Plants

Note: Identified plants may come from early detection protocol, from federal, state or county noxious weed lists, new invaders database, cooperators, or from other floral surveys, etc.

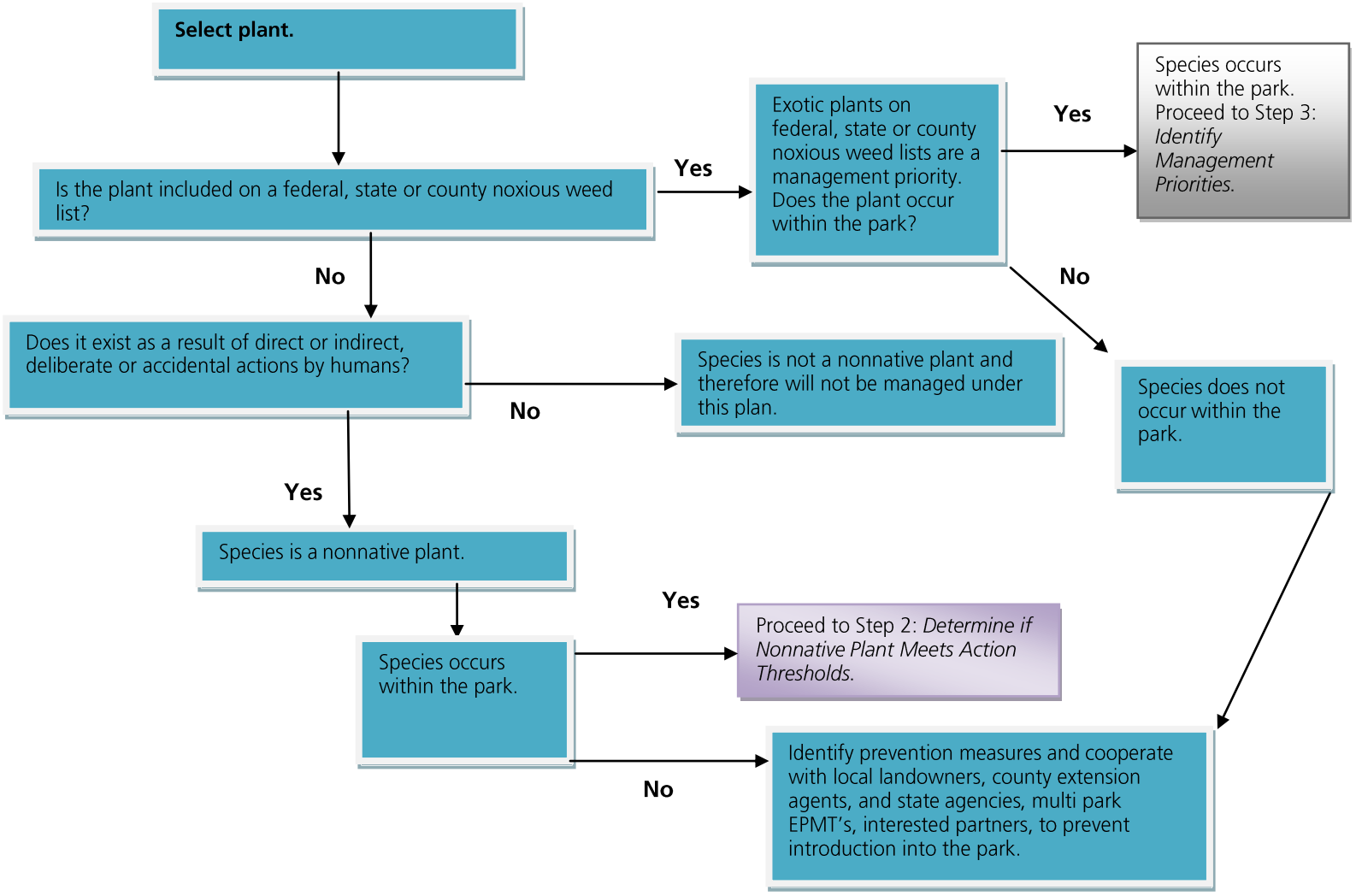
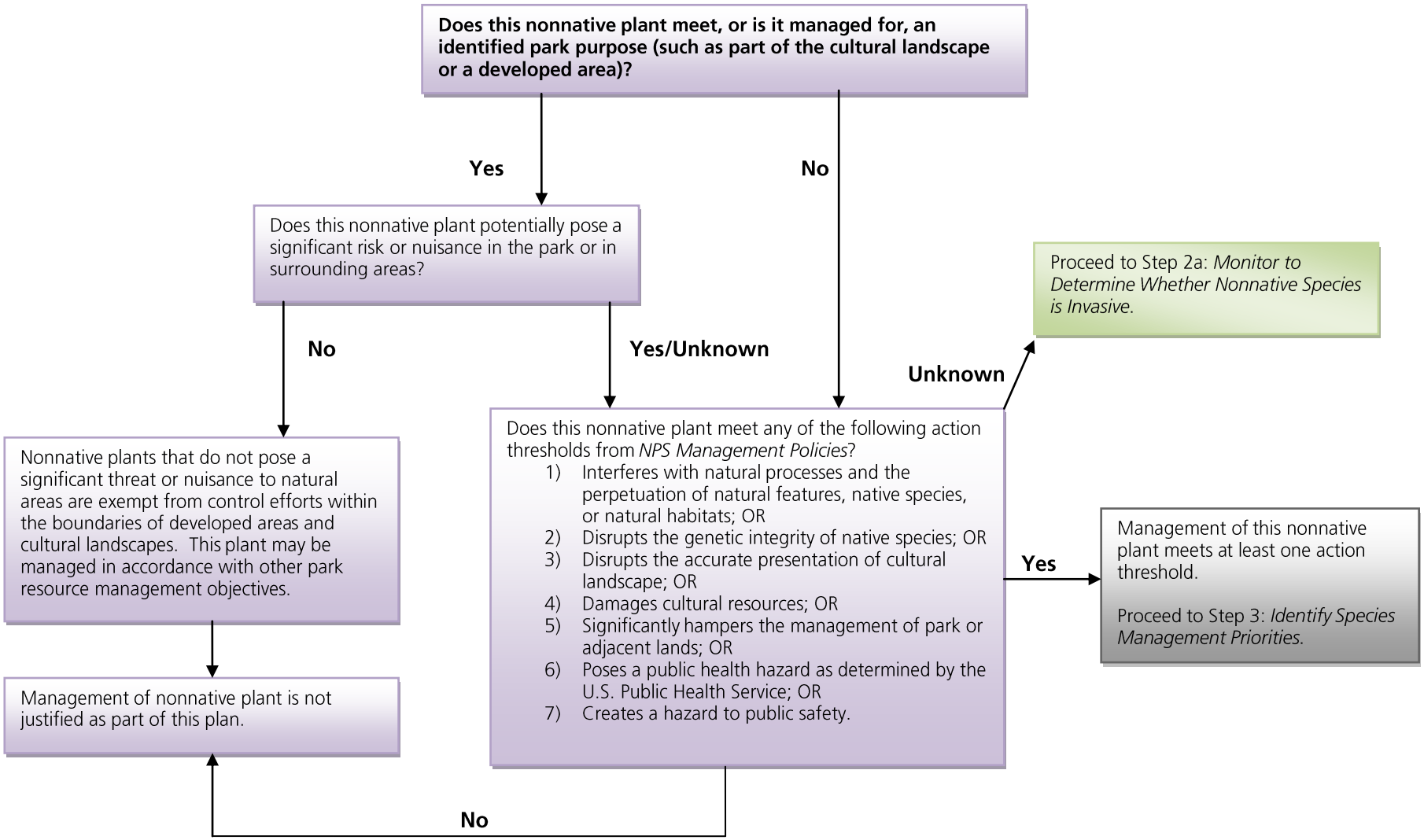


Figure 15: Decision-making Tool Step 2

❖ Step 2: Determine whether Nonnative Plant Meets Action Thresholds



3) Plant Identification Assistance

- **Idaho**

Erickson Weed Diagnostic Lab
University of Idaho
Box 442339
Moscow, Idaho 83844-2339
This lab accepts scanned photos, or fresh samples. See this link for instructions on submitting samples.
http://www.cals.uidaho.edu/weeds/forms/Guidelines.pdf

Parks in Montana can also send specimens needing identification to:

- **Montana**

Schutter Diagnostic Laboratory
Attn: Melissa Graves
Montana State University
119 Plant BioScience Building
P.O. Box 173150
Bozeman Montana 59717

Call 406-994-6297 with questions.

This is currently a free service. (see http://diagnostics.montana.edu/Schutter%20Lab/Plant/index.html). A form is found at http://diagnostics.montana.edu/Schutter%20Lab/Plant/PLANT%20IDENTIFICATION%20FORM.pdf.

- **Utah**

Intermountain Herbarium
Utah State University
Attn: Michael Piep
5305 Old Main Hill
Logan, Utah 84322-5305
435-797-0061

- **Wyoming**

See links on the Wyoming Weed Identification Site.
http://ces.uwyo.edu/WYOWEED/wyoweed.htm

b. Step 2: Determine Whether Nonnative Plant Meets Action Thresholds

1) Determine whether the nonnative plant is part of an identified park purpose, such as managed as part of a cultural landscape (Figure 15)

Nonnative, non-invasive plants that meet an identified park purpose, such as location within a cultural landscape (where it is important to retain even nonnative plants that recreate the historic scene) would not be managed as part of this plan.

2) Determine whether the plant poses a significant risk or nuisance to native plant populations or other ecological aspects of the park or surrounding area

Nonnative plants that are on noxious weed lists or that have demonstrated the ability to move into a native landscape and to occupy habitat within it pose a risk to native plant populations.

3) Determine whether the plant meets one of the management thresholds established in *Management Policies*

Each plant species that meets the definition of a nonnative species is subject to management under this plan. Not all plants defined as nonnative plants, however, would necessarily be managed. Under NPS *Management Policies*, to be managed, a nonnative plant must also meet several criteria:

All exotic plant and animal species that are not maintained to meet an identified park purpose will be managed—up to and including eradication—if (1) control is prudent and feasible, and (2) the exotic species

- *interferes with natural processes and the perpetuation of natural features, native species or natural habitats, or*
- *disrupts the genetic integrity of native species, or*
- *disrupts the accurate presentation of a cultural landscape, or*
- *damages cultural resources, or*
- *significantly hampers the management of park or adjacent lands, or*
- *poses a public health hazard as advised by the U. S. Public Health Service (which includes the Centers for Disease Control and the NPS public health program), or*
- *creates a hazard to public safety (NPS 2006: Section 4.4.4.2).*

Only nonnative plants that meet both the definition in Step 1 (above) and at least one of these criteria would be managed under this IPMP.

a. Step 2a: Monitor to Determine Whether Nonnative Species is Invasive

If a new nonnative plant is observed and has not been identified as invasive (or toxic, or otherwise known to pose a threat to NPS lands, agricultural lands or other resources) by cooperative weed management partners, the county, the state or other NPS areas, this step would be used to assess the effects of the nonnative species on the surrounding vegetation and ecosystem to determine whether it should be a priority for treatment (Figure 16). In Step 4 (as discussed later), not all nonnative plants become a priority for treatment. Non-high priority plants may be ubiquitous (such as common dandelion in some areas) or they may not spread into native ecosystems, and/or they may not displace native plants. In addition, as noted in the explanation of Figure 16, based on differences in local conditions a nonnative species that is clearly having a high impact in one plant community may not have the same high impact in another plant community. If the impacts of displacement or spread are not occurring, park resource managers would likely continue to focus nonnative plant management efforts elsewhere to more effectively use limited staffing and funding.

Although Step 2a does not prescribe a monitoring protocol, a sample monitoring program is provided below as an example that explains how this step could be achieved.

Sample Monitoring Program

a) Identify plots

Set up a vegetation monitoring protocol to determine if target weed species is increasing, ask for technical assistance, or use the following example to determine whether the weed is increasing.

Randomly locate six patches: in each patch, set up three 0.25, 0.5 or one square meter frames just inside and just outside of the patch border. Determine frame size based on the size of the plant and density. The frame must be large enough to capture numerous plants, but not so large that observers would be counting more than 200 plants on average per frame.

b) Record Data

1) Record all species present in the plot (refer to the Resources Section in Appendix B: *Natural History and Control of Nonnative Invasive Plants in 10 Northern Rocky Mountains Parks* for assistance with plant identification.
2) Record density and percent cover of the target weed species
3) Record density and percent cover of the three most abundant native species in the plot.
4) Record density and percent cover of two other of most abundant nonnative species in the plot (if present).
5) Permanently mark diagonals of each plot (e.g. with rebar). GPS plot and include on a map to the site. Ensure directions to find plot, data sheets, directions for collecting data are written clearly so they can be used by someone unfamiliar with the project in the future.
6) Photograph plots and mark photographs with plot information.

c) Collect data for at least three years.

Make backup copies of the data, and make sure clear directions describe plot locations, how to collect the data, the date, and who collected the data.

d) Analyze Data

Determine whether the plant is increasing or decreasing. For plots just inside the patch border and plots just outside the patch border record plot density and percent cover of the target weed compared to other species in the plot. Is there a decrease in native species? Is this associated with an increase in the target weed species?

If the data is highly variable:
1) Assess whether there are differences among the patches (such as some in very healthy plant communities, others in very disturbed areas).

2) If there is a unifying characteristic in the plots where the weed is having an impact, e.g. when native plant cover is low, or only when on a south facing slope, proceed to Step 4, and focus on weed patches with that unifying characteristic.

If there is no clear factor to explain the variation, or why the weed is having a high impact in some plots, and not in others, the weed is affecting native plant populations, and warrants management actions. Proceed to Step 4, start with eradication.

Figure 16: Decision-making Tool Step 2a

❖ Step 2a: Monitor to Determine Whether Nonnative Species is Invasive

Note: This monitoring is to assess the effect of nonnative species on the surrounding vegetation and ecosystem relevant to land management goals. A nonnative invasive plant that has high impact in one area may not have high impact in another, based on differences in the plant communities, climate, soil type etc. If a species is not having a high impact, resources would be better spent focusing on other nonnative invasive plants. The key to monitoring for impact is that it has to be done over time – one assessment is not sufficient. Data from only one year can be confounded by annual variation in weather, an unusual disturbance event (a spike in an insect population), etc.

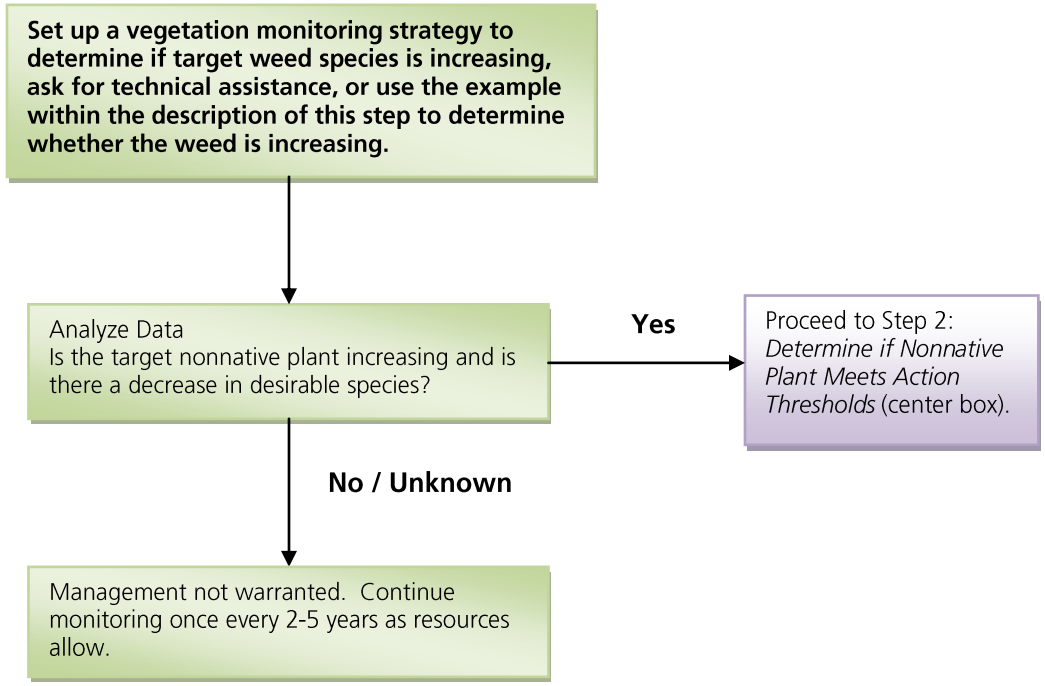
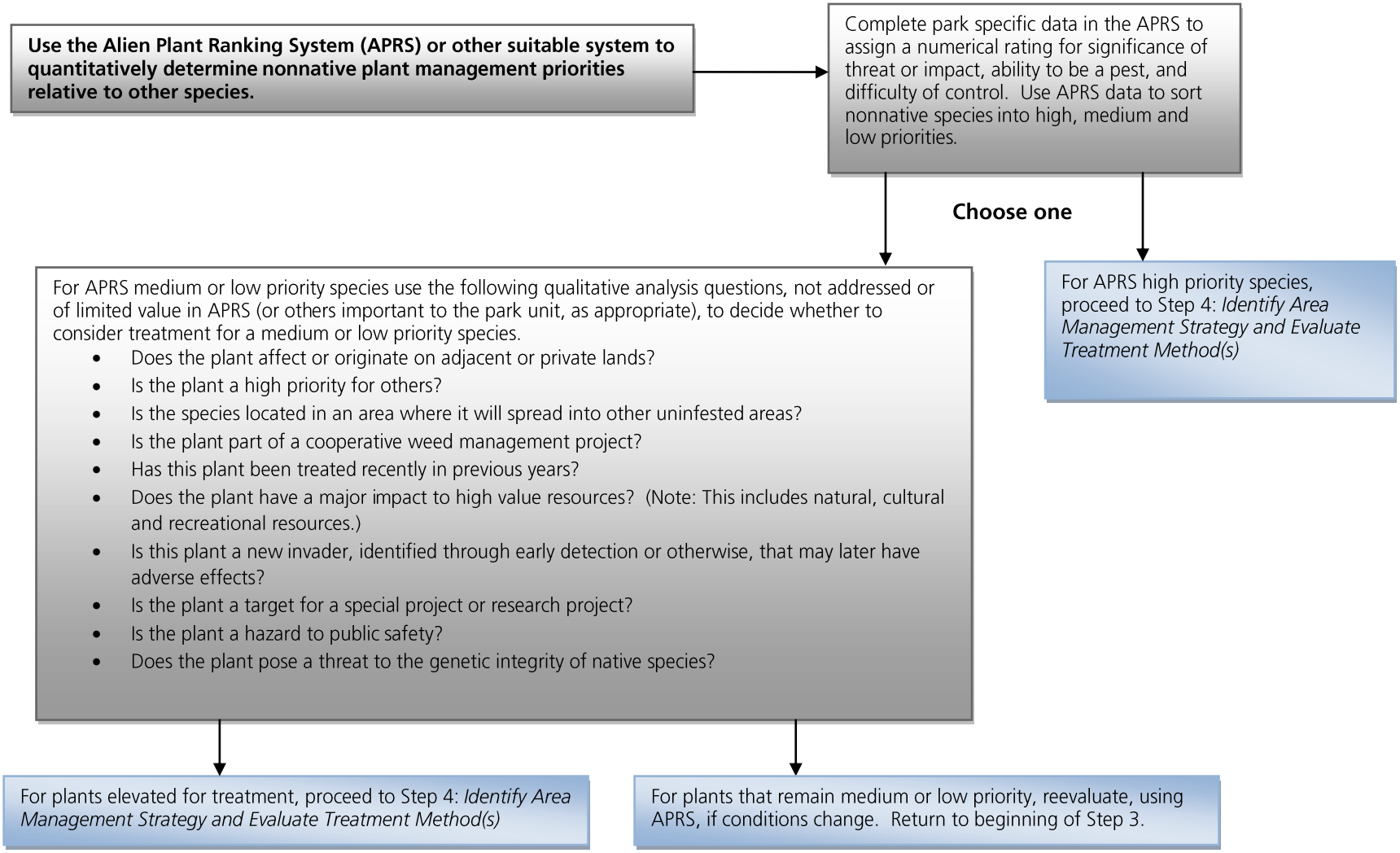


Figure 17: Decision-making Tool Step 3

❖ Step 3: Identify Species Management Priorities

Note: The highest priority is to manage disruptive exotic plants that have, or potentially may have, a substantial impact on park resources, and can reasonably be expected to be controlled. Lower priority would be given to innocuous exotic plants that have almost no impact on park resources or likely cannot be successfully controlled.



b. Step 3: Identify Species Management Priorities

In Alternative 1, parks currently use a variety of means to determine management priorities for invasive plants. In Alternative 2, the parks would use the Alien Plant Ranking System (APRS), a system published by the USGS to assess invasive plant characteristics, to obtain relative priorities and then one of two methods to rank invasive plants for treatment as high, medium or low (Figure 17). Because APRS does not address qualitative characteristics associated with invasive plants (see Figure 17 and below), the partner parks have also identified the need to increase the rank of a medium or low priority species if certain characteristics are present. All the high ranked species would be considered for treatment. Medium and low ranked species would be considered for treatment only if they were found to be important through the qualitative process.

Based on *Management Policies*:

> *High priority will be given to managing exotic species that have, or potentially could have, a substantial impact on park resources, and that can reasonably be expected to be successfully controlled. Lower priority will be given to exotic species that have almost no impact on park resources or that probably cannot be successfully controlled. Where an exotic species cannot be successfully eliminated, managers will seek to contain the exotic species to prevent further spread or resource damage* (NPS 2006: Section 4.4.4.2).

1) Alien Plant Ranking System (APRS)

APRS provides a systematic means of evaluating the following characteristics of nonnative species based on:

a) Significance of Threat or Impact (Site Characteristics),
b) Innate Ability to Be a Pest (Species Characteristics), and
c) Difficulty of Control.

The relative likelihood of each of these criteria is determined in APRS by answering a series of questions. Of these questions, 12 are plant specific (based on biological / autecological history, including seed production, etc.); eight questions are park specific (areal extent in the park, number of populations, etc.); and four questions are primarily plant specific but could differ based on features unique to parks, such as the presence or absence of a water body and whether or not grazing occurs. By providing answers to these questions, the APRS allows park resource managers to more objectively determine what plants can potentially be managed. A list of the APRS questions with recommended guidance in applying them can be found in Appendix M.

Upon responses to the questions, APRS provides a series of graphs to demonstrate how plants rank relative to each other for these criteria. These criteria can be analyzed to obtain a relative priority list. Because the APRS program does not identify high, medium and low priorities, two methods have been developed by the parks to obtain relative *high*, *medium*, and *low* priorities based on the answers to the APRS questions. The parks would use one of the following methods, or another appropriate synthesis of the APRS data, to determine priorities for treatment of nonnative invasive plants.

The first method scores the *Significance of Threat or Impact* and *Innate Ability to Be a Pest* to obtain a numerical value for each park-occurring species. The resultant list is then analyzed to determine where there are natural breaks in the APRS scores and to rank the highest scoring third as "high," the next third as "medium" and the lower third as "low." Depending on the park, approximately the top 20 species were ranked this way.

In the second method, add scores for *Significance of Threat or Impact* and *Innate Ability to Be a Pest* then rank the totals as high, medium and low by using this Excel equation:

> [*=IF(D2>+133. "high", IF(D2>67, "medium,""low"))*].

In this way, all species that were ranked between 133 and 199 (the top third) in APRS are labeled "high". All species ranked between 67 and 133 are labeled "medium." All species ranked below 67 are labeled "low." Each rank is then assigned a numerical score of 3 for high, 2 for medium and 1 for low. This assigned value is arbitrary and only important for the third step of the ranking process. Then the third criteria (Ease of Control) is ranked high, medium and low in the same manner (high = easy to control). Again, the high, medium, and low ranked species are assigned an arbitrary value of 1, 2, or 3. The "value for control" column Excel equation is:

[=IF(H2="medium", "2",IF(H2="high","3","1"))].

When the values are added together, they should equal a number between 2 and 6. Those that add up to 5 or 6 are given a ranking of "high," those that add up to 4 are designated "medium," and those that add up to 3 or 2 are designated "low" priority for treatment.

2) Qualitative Analysis

Answers to the following questions would also be used by the parks to raise the relative ranking for a medium or low priority species (as determined by using the APRS) to a high priority species. These qualitative analysis questions are either not addressed by APRS or are of limited value in APRS. For example, although APRS asks whether the plant hybridizes with native plants (see last bullet below), answering yes does not increase the score that much.

- Does the plant affect or originate on adjacent or private lands?
- Is the plant a high priority for others?
- Is the species located in an area where it could spread into other uninfested areas?
- Is the plant part of a cooperative weed management project?
- Has this plant species been treated in previous years? (Once treatment is begun, it is usually important to continue until control is obtained because stopping could allow the plant to reestablish more rapidly than before.)
- Could the plant have a major impact on high value natural, cultural or recreational resources?
- Is this plant a new invader, identified through early detection or otherwise, that may later have adverse effects?
- Is the plant a target for a special project or research project?
- Is the plant a hazard to public safety?
- Does the plant pose a threat to the genetic integrity of native species?

These questions were developed by the partner parks to address issues important to NPS resource managers in the areas of partnerships, native landscape integrity, impacts on key natural, cultural or recreational resources, scientific research, inventory and monitoring programs, and public safety. There may also be other questions developed later by the parks to address other concerns important to individual park units.

When compared to Tables 4-13 in Alternative 1, Tables 19-28 show how using a quantitative analysis system (APRS) would change the priorities for park nonnative invasive species treatment as of the development of this plan. The number of species ranked would also vary among parks and based on staffing and funding at each park.

Although the plants are listed in priority order below, the actual list of species treated in any given year, would vary depending on previous year's treatment success, the phenology of the plant at the time of proposed treatment, the season of treatment, seasonal variations in weather conditions (wet vs. dry years), and other factors. Actual treatment would also depend on the park's ability to treat the species and how many nonnative invasive plants are present in the park.

1) City of Rocks

Table 19: City of Rocks APRS High Priority Species

Common Name	Scientific Name
Diffuse knapweed	*Centaurea diffusa*
Canada thistle	*Cirsium arvense*
Bull thistle	*Cirsium vulgare*
Spotted knapweed	*Centaurea stoebe*
Musk thistle	*Carduus nutans*
Scotch thistle	*Onopordum acanthium*
Black henbane	*Hyoscyamus niger*
Hounds tongue	*Cynoglossum officinale*
White Top	*Cardaria draba*

2) Craters of the Moon

Table 20: Craters of the Moon APRS High Priority Species

Common Name	Scientific Name
Bull thistle	*Cirsium vulgare*
Scotch thistle	*Onopordium acanthium*
Diffuse knapweed	*Centaurea diffusa*
Spotted knapweed	*Centaurea stoebe*
Dalmatian toadflax	*Linaria dalmatica*
Burdock	*Arctium minus*
Russian knapweed	*Acroptilon repens*
Leafy spurge	*Euphorbia esula*
Yellow Sweetclover	*Melilotus officinalis*
Canada thistle	*Cirsium arvense*
Cheatgrass	*Bromus tectorum*
Dyers woad	*Isatis tinctoria*
Rush skeletonweed	*Chondrilla juncea*
Field bindweed	*Convolvulus arvensis*
Crested wheatgrass	*Agropyron cristatum*
Musk thistle	*Carduus nutans*
Black henbane	*Hyoscyamus niger*
Puncture vine	*Tribulus terrestris*

3) Fossil Butte

Table 21: Fossil Butte APRS High Priority Species

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Cheatgrass	*Bromus tectorum*
Yellow Sweetclover	*Melilotus officinalis*
Hoary cress / whitetop	*Cardaria draba*
Crested wheatgrass	*Agropyron cristatum*
Musk thistle	*Carduus nutans*
Field bindweed	*Convolvulus arvensis*
Flixweed	*Descurainia Sophia*
Kentucky bluegrass	*Poa pratensis*
Quackgrass	*Elymus repens*
Smooth brome	*Bromus inermis*
Creeping meadow	*Alopecurus arundinaceus*

Common Name	Scientific Name
St. Johnswort	*Hypericum perforatum*
Spotted knapweed	*Centaurea stoebe*
Russian knapweed	*Agroptilon repens*
Bull thistle	*Cirsium vulgare*
Black henbane	*Hyoscyamus niger*

4) Golden Spike

Table 22: Golden Spike APRS High Priority Species

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Scotch thistle	*Onopordum acanthium*
Bindweed	*Convolvulus arvensis*
Cheatgrass	*Bromus tectorum*
Hoary Cress	*Cardaria draba*
Musk thistle	*Carduus nutans*
Prickly Russian thistle	*Salsola tragus*
Spotted knapweed	*Centaurea stoebe*
Leafy spurge	*Euphorbia esula*
Common mullein	*Verbascum thapsus*
Diffuse knapweed	*Centaurea diffusa*
Russian knapweed	*Acroptilon repens*
Dyers woad	*Isatis tinctoria*
Saltcedar	*Tamarix ramosissima*
Yellow starthistle	*Centaurea solstitialis*
Sulfur cinquefoil	*Potentilla recta*
Moth mullein	*Verbascum blattaria*
Oxeye daisy	*Chrysanthemum leucanthemum*
St. Johnswort	*Hypericum perforatum*

5) Grant-Kohrs Ranch

Table 23: Grant-Kohrs Ranch APRS High Priority Species (ranked by *difficulty* of control)

Common Name	Scientific Name
Field bindweed	*Convolvulus arvensis*
Yellow toadflax	*Linaria vulgaris*
Leafy spurge	*Euphorbia esula*
Perennial pepperweed	*Lepidium latifolium*
Common tansy	*Tanacetum vulgare*
Canada thistle	*Cirsium arvense*
Hoary cress / white top	*Cardaria draba*
Cheatgrass	*Bromus tectorum*
Tall buttercup	*Ranunculus acris*
Russian knapweed	*Acroptilon repens*
Hounds tongue	*Cynoglossum officinale*
Spotted knapweed	*Centaurea stoebe*
Kochia	*Kochia scoparia*
Baby's breath	*Gypsophila paniculata*
Sulfur cinquefoil	*Potentilla recta*

6) Hagerman Fossil Beds

Table 24: Hagerman Fossil Beds APRS High Priority Species

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Salt cedar	*Tamarix ramosissima*
Purple loosestrife	*Lythrum salicaria*
Hounds tongue	*Cynoglossum officinale*
Common teasel	*Dipsacus fullonum*
Diffuse knapweed	*Centaurea diffusa*
Rush skeletonweed	*Chondrilla juncea*

7) Little Bighorn

Table 25: Little Bighorn APRS High Priority Species

Common Name	Scientific Name
Spotted knapweed	*Centaurea stoebe*
Dalmatian toadflax	*Linaria dalmatica*
Canada thistle	*Cirsium arvense*
St. Johnswort	*Hypericum perforatum*
Cheatgrass	*Bromus tectorum*
Saltcedar	*Tamarix ramosissima*
Prickly lettuce	*Lactuca serriola*
Smooth brome	*Bromus inermis*
Yellow sweet clover	*Melilotus officinalis*
Russian olive	*Elaeagnus angustifolia*
Field bindweed	*Convolvulus arvensis*
Kentucky bluegrass	*Poa pratensis*

8) Minidoka

Table 26: Minidoka APRS High Priority Species

Common Name	Scientific Name
White bryony	*Bryonia alba*
Canada thistle	*Cirsium arvense*
Russian knapweed	*Acroptilon repens*
Bull thistle	*Cirsium vulgare*
Musk thistle	*Carduus nutans*
Yellow starthistle	*Centaurea solstitialis*
Scotch thistle	*Onopordum acanthium*

9) Nez Perce: Bear Paw

Table 27: Bear Paw APRS High and Medium Priority Species

Common Name	Scientific Name
Canada thistle	*Cirsium arvense*
Kochia	*Kochia scoparia*
Yellow sweet clover	*Melilotus officinalis*
Rush skeletonweed	*Chondrilla juncea*
Field bindweed	*Convolvulus arvensis*
Prickly lettuce	*Lactuca serriola*
Prickly Russian thistle	*Salsola tragus*

10) Nez Perce: Big Hole

Table 28: Big Hole APRS High and Medium Priority Species

Common Name	Scientific Name
Spotted knapweed	*Centaurea stoebe*
Canada thistle	*Cirsium arvense*
Yellow sweet clover	*Melilotus officinalis*
Hoary alyssum	*Berteroa incana*
Field bindweed	*Convolvulus arvensis*
Leafy spurge	*Euphorbia esula*
Common tansy	*Tanacetum vulgare*
Dandelion	*Taraxacum sp.*
Common mullein	*Verbascum thapsus*

c. Step 4: Identify Area Management Strategy and Evaluate and Select Treatment Methods

As in Alternative 1, the parks would use the full suite of treatment methods (cultural, manual / mechanical, biocontrol, chemical (herbicide), and fire) to effectively treat nonnative invasive plants (Figure 21). This includes, in Alternative 2, the use of some treatment methods that have not previously been used by the partner parks, such as the proposed use of biocontrol and aerial herbicide applications by Craters of the Moon and the proposed use of fire at Little Bighorn (pending revision of the Fire Management Plan). Depending on the plant, patch size, and other variables including available research regarding effectiveness, parks would select the best treatment method or combination of methods. Treatment methods would also be based on the current management strategy (eradication, containment, or suppression) identified for the plant. A general description of treatment methods is provided in Alternative 1.

1. Management Strategy

Although the overall goal would always be eradication, because of the patch size and distribution of the plant, effectiveness of treatment methods, and cost-effectiveness, initial goals may be containment or suppression instead. In all cases, means of eradicating the plant would be looked at first. Then, if eradication is not cost effective or feasible, the management strategy would move to containment of the invasive population. If containment is not cost effective or feasible, the management strategy would move to suppression of the invasive population. As a result, if containment or suppression was the selected management strategy, later treatments would switch back to eradication or containment as soon as it was determined to be cost effective and feasible.

Whereas treatment methods in Alternative 1 are based on NRM-EPMT recommendations or the history of treatment of the nonnative invasive species in the park unit, in Alternative 2 treatment methods would be systematically analyzed over time to determine the most cost effective, eradication effective and environmentally friendly means of controlling the target species. The treatment method would also be based on the intended management strategy (eradication, containment or suppression). Treatment priorities would be based on the characteristics of the plant, its presence in the park, and its response to available treatments (see also Step 3). The goal is to identify what treatment options work for this species, area and management strategy.

Among the questions resource managers would consider in determining what treatment options to apply to a nonnative invasive species include:

- What is the species? (Also considered would be co-occurring native and nonnative species.)

[Note: In using Step 4, resource managers would ideally focus on one species at a time and look for overlap in the results from the process. Selecting the best treatment method is necessarily an iterative process and therefore may often require answering the same questions from a different angle to arrive at the best answer. For instance, the co-occurrence of two (or more) species requiring treatment could indicate use of a method that works for both species.]

- How much of this species occurs in the park unit?
  (To answer this question, park resource managers would consider the distribution and density of the species, including the number of patches. These characteristics could affect the feasibility, including cost-effectiveness, of the initially selected treatment method.)

- Where is it?
  [To answer this question, park resource managers would consider access to the site; area GMP management zone; type of site (upland, wetland, boundary, etc.); threatened, endangered, sensitive species/habitat; and other site characteristics. The presence of sensitive resources could require delineation of buffer areas to avoid impacts to sensitive species or areas or it could require that another treatment method be selected. Presence in wilderness in Craters of the Moon could also indicate the need for a different treatment method.]

- What treatment methods are effective given this plant population and its location?
  (To answer this question, park resource managers would consider whether the initially selected treatment method is feasible based on the size of the population. Park resource managers would use Appendix B: *Natural History and Control of Nonnative Invasive Plants found in 10 Northern Rocky Mountains Parks or another means to determine the answer.)*

- Select the best treatment method with the least environmental impact.
  [To address this, park resource managers would consider the following when trying to determine what method(s) would have the least impact on the environment: non-target treatment effects (other plants, other wildlife); life history of plant (annual, biennial, perennial, etc.); timing (season, time of day); number of site visits needed for treatment; carbon footprint of treatment method; need for restoration of the site following treatment; plant community; plant community composition; presence of rare, threatened or endangered species; presence of water, wilderness, archeological sites, sacred sites, and/or cultural landscapes; genetic integrity; proximity to visitors; proximity to park boundary (e.g. organic farm); health and safety of applicators/employees (toxicity of proposed herbicide); access to the site; soundscape (i.e. particularly for aerial spraying or other mechanical methods); air quality; research natural area or other sensitive or pristine habitat; buffer areas; phenology of non-target plants; and cumulative impacts, etc.]

Management Strategy Definitions

Eradication
Reducing the reproductive success of a noxious weed or specified noxious weed population in largely uninfested regions to zero and permanently eliminating the species or populations within a specified period of time. Once all specified weed populations are eliminated or prevented from reproducing, intensive efforts continue until the existing seed bank is exhausted.

Containment
Maintaining an intensively managed buffer zone that separates infested regions, where suppression activities prevail, from largely uninfested regions, where eradication activities prevail; does not usually mean reducing the current infestation.

Suppression
Reducing the vigor of noxious weed populations within an infested region, decreasing the propensity of noxious weeds to spread to surrounding lands, and mitigating the negative effects of noxious weeds on infested lands. Suppression efforts may employ a wide variety of integrated management techniques; the reduction of abundance of a weed species is typically measured or estimated in terms of canopy cover or plant density.

Step 4 would be repeated to change the management strategy and to change the treatment methods when other variables change (including patch size, availability of staffing and funding resources, etc.). Table 29: *Selecting a Treatment Method* demonstrates an idealized scenario where selecting a management tool moves from manual / mechanical to chemical methods based on the infested area and the management strategy. Though this scenario is often true, sometimes a chemical treatment may have fewer environmental impacts than a manual or mechanical treatment (such as when additional ground disturbance would cause a marked increase in the plant being treated). This scenario also presumes that treatment methods are essentially equally effective, whereas practice shows that effectiveness of treatment methods varies depending on the plant and population size, among other variables. This graphic, however, is useful to illustrate how a treatment method could be selected.

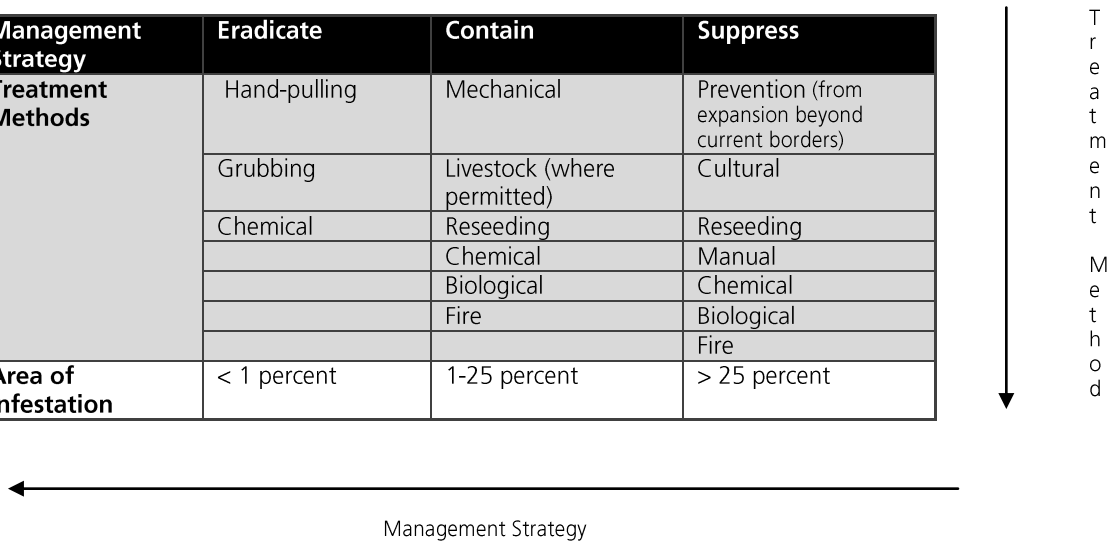
2. Treatment Methods

Once a treatment is selected, as in Alternative 1, existing methods of using that treatment (manual / mechanical, cultural, chemical, biological and prescribed fire) on invasive plants would continue. See Alternative 1 for common manual / mechanical and chemical treatment methods. It is also likely that the same herbicides that have been approved over the last six years would continue to be used, however as new treatments arose, they could also be used (see *Adaptive Management* section below). Biological insect and pathogen control agents would also be the same as or similar to those that have been approved for other national parks, though these too would likely change as new information develops, with some species being withdrawn and some species being added based on research by APHIS and others.

Unlike Alternative 1, Alternative 2 would formalize generalized restrictions associated with special management zones for chemical and/or fire treatment methods employed in the parks. As appropriate, these more specific restrictions would be employed by the park units when selecting treatment methods that affect the areas noted in Table 30: *Park Herbicide Use Special Protection Areas* and Table 31: *Park Fire Use Special Protection Areas*.

Table 29: Selecting a Treatment Method

Management Strategy	Eradicate	Contain	Suppress
Treatment Methods	Hand-pulling	Mechanical	Prevention (from expansion beyond current borders)
	Grubbing	Livestock (where permitted)	Cultural
	Chemical	Reseeding	Reseeding
		Chemical	Manual
		Biological	Chemical
		Fire	Biological
			Fire
Area of Infestation	< 1 percent	1-25 percent	> 25 percent



a) Cultural Treatments

Cultural treatments would be similar to Alternative 1, however these could target different nonnative invasive species as these arose in the parks.

b) Manual / Mechanical Treatments

Manual / Mechanical treatments would also be similar to Alternative 1, however these could also target different nonnative invasive species as these arose in the parks.

c) Biological Control Treatments

Biological Control treatments would be similar to Alternative 1. As appropriate, parks would either initiate or continue to use biocontrol methods to suppress some nonnative invasive species. Insect and microorganism biological control agents proposed for use in the parks would be those approved by APHIS, by the states and/or counties as applicable, and by the NPS IPM program. Grant-Kohrs Ranch would also continue to use livestock to reduce weed populations. Other parks could also use livestock in carefully controlled situations, pending consistency with other approved plans, and/or analysis of impacts.

Refer to Table 24 for current APHIS approved biological control agents for invasive plant species currently affecting the parks included in this plan. Note that the release of biological control agents in a park requires a Biological Use Proposal to be submitted to the Regional IPM Coordinator, and approved prior to releases for each calendar year.

As future biocontrol methods are approved by the states, these would potentially be tried in parks. Even if the biocontrol agents were not specifically introduced to parks, their availability would likely cause them to be tried in surrounding areas (such as within cooperative weed management areas, on adjacent private lands, and on adjacent federal lands, for example on USFS and BLM lands, etc.), thereby affecting the parks. For instance, Craters of the Moon has noted biocontrol effects on both rush skeletonweed and diffuse knapweed but does not know where the biocontrol agents were originally released and although Grant-Kohrs released *Larinus* sp., *Cyphocleonus achates*, *Urophora* sp., and *Agapeta zoegana* to treat spotted knapweed in the 1990s, the list of biocontrol species found at the Ranch in 2009 (Table 24: *APHIS Approved Biological Control Agents in the Pacific West and Intermountain Region Parks 2004-2009*) far exceeds this release (see summary of current program in Alternative 1).

d) Chemical Treatment

Herbicide treatment methods would be similar to Alternative 1, however as new chemical agents were approved by the EPA and their use evaluated in an EPA or USFS Risk Assessment, approval of these new herbicides could occur on a case-by-case basis through the PUPs system by NPS regional and/or national IPM Coordinators. Herbicide use would primarily target weeds that pose a serious ecological threat to native plant communities (including federally and state-listed noxious weeds). Herbicides would primarily be selected when manual, mechanical, or biological controls are not effective or unavailable. Herbicides could also be used in conjunction with other treatments as necessary to meet the management goal to eradicate, contain or suppress the plants.

The ability to use herbicides as they become registered with the EPA would allow more options and an array of herbicides that could better match treatment goals and application conditions. This would also permit the use of newly approved herbicides that may pose less risk to treatment areas or other park resources than currently used herbicides, which would both increase the effectiveness of treatments and decrease their adverse effects.

Under Alternative 2, some parks would use aerial spraying or other chemical application methods not previously used in current programs for future treatments. Grant-Kohrs Ranch has used aerial spraying (via helicopter) in the past and would continue to use it as appropriate. Craters of the Moon, Little Bighorn and Golden Spike would also consider using aerial spraying if application were to meet the criteria identified below (associated with special protection zones and avoiding impacts to other resources).

Aerial spraying consists of using fixed wing aircraft or helicopters to broadcast spray an herbicide over a specific target area that primarily consists of the target species and where it would not affect other native plants, wildlife or cultural resources. Any aerial spraying done within NPS lands requires annual review and approval prior to application by the Regional and WASO IPM Coordinators, and must meet DOI (517 DM 1) and NPS (2006 NPS Management Policies 4.4.5.3, NPS-77, DO 77-7) policies and guidelines for pesticide use.

Aerial application of pesticides would only be conducted for sites that meet at least one of the following criteria:

- The infestation covers a large area and would be most effectively treated from the air. (There is no acre limit for using aerial application, however aerial application sites are typically over 20 acres and have fairly dense exotic plant coverage.)
- The infestation covers a small area but can be successfully treated using a microfoil boom or similar apparatus that allows for a limited band of spray. (A microfoil boom can be used to spray widths as small as 12 feet, effectively treating small infestations. Microfoil booms are designed specifically to minimize pesticide drift.)
- The infestation is very remote and treatment using other application methods would require an inordinate amount of time for crews to arrive and apply ground treatment.
- The infestation is located on rough, steep terrain that prevents ground application and is too dangerous for employees on foot (NPS NGP 2005).

Aerial application of herbicides would not be used in designated wilderness or wilderness study areas. If such use was proposed in the future at Craters of the Moon, separate environmental analysis would occur.

1) Herbicide Special Use Protection Areas

To avoid unintentional spill-over impacts to special use areas, herbicides would either not be used or would have limitations on use in the following Herbicide Use Special Protection Areas in applicable parks (Table 30). As appropriate, additional areas would be added to these protection areas or the areas would be modified as new information develops. Additional explanations, where needed, are below.

Table 30: Park Herbicide Use Special Protection Areas

Park Unit	Herbicide Use Special Protection Zones	Reason	Notes
City of Rocks	Granitic soils	Granitic soils are very coarse and may require special treatment measures.	Track weather forecast prior to and conditions after application.
Craters of the Moon	Boundary Area for Lava Lake Land and Livestock, LLC	Lava Lake Land and Livestock, LLC produces organic lamb.	This is described in a General Agreement.
Craters of the Moon	Kipukas	Kipukas are sensitive areas with plant communities left intact by lava flows.	Herbicide use could occur but would only be proposed following specific evaluation of proposed affected areas.
Craters of the Moon	Wilderness	Requires preparation of minimum requirement / minimum tool analysis.	In addition, proposals for treatment with herbicides would require a consistency analysis with this plan for the specific area.
Craters of the Moon	Wilderness Study Areas	Requires preparation of minimum requirement / minimum tool analysis.	WSAs at Craters were previously managed by the BLM and supported some grazing, therefore some of these areas are affected by large populations of invasive species. In addition, to the treatment of dyers woad and leafy spurge in park WSAs, new proposals for herbicide use to treat other nonnative invasive plants in WSAs would require a consistency analysis with this plan for the specific area (See Appendix N: *Craters of the Moon Wilderness Minimum Requirement / Minimum Tool Analysis*).
Fossil Butte	Legislatively permitted stock trail corridors	Treat at appropriate times to avoid stock animals	
Golden Spike	Areas with Passey onion (*Allium passeyi*)	Passey onion is a special status species.	
Grant-Kohrs	None	None	
Hagerman Fossil Beds	Sensitive areas containing fossils	Protect fossils uncovered and lying on top of ground	
Little Bighorn	Water intake area	The underground collection system provides public drinking water.	In cooperation with the Public Health Officer, guidelines have been developed regarding herbicide use in the water intake area.
Minidoka	None	None	
Nez Perce (Bear Paw)	None	None	
Big Hole	Lemhi penstemon (*Penstemon lemhiensis*) habitat	Lemhi penstemon is a state watch species.	No herbicides would be used near known habitat.
	Nez Perce Encampment	The Nez Perce Encampment area is a location of extreme cultural sensitivity to the Nez Perce people.	Any proposal for herbicide use would be reviewed through the NHPA Section 106 process in close consultation with the Nez Perce people.

a) Craters of the Moon

Two areas of Craters of the Moon (Figure 18) are proximate to Lava Lake Land and Livestock properties (either privately owned or leased from BLM). Craters of the Moon staff actively cooperates with this private landowner to maintain their organic certification; however, there is nothing that restricts the park

from using the means necessary in NPS areas as long as the action is confined to these areas (because the areas used are adjacent federal leased or private lands). Craters of the Moon also works annually with Lava Lake to control weeds manually on their leased BLM Monument lands (see *Partnerships*).

Kipukas are remnant vegetation communities surrounded by lava flows. They were specifically highlighted for their scientific value in the proclamation expanding the Monument in 2000. Some of these contain intact native plant communities largely unaffected by nonnative invasive plants. Decisions as to whether herbicide use would be appropriate would be made on a case-by-case basis.

b) Fossil Butte

The park would avoid treatment during stock trailing, which occurs twice a year.

c) Golden Spike

The Passey onion occurs at Golden Spike. Herbicides would not be used where these patches occur or an herbicide special use protection area would be established.

d) Grant-Kohrs

Grant-Kohrs currently has no Herbicide Use Special Protection Areas. If deer Indian paintbrush or Idaho sedge were detected, an herbicide special use protection area would be established.

e) Hagerman Fossil Beds

Pesticide effects on exposed fossil resources are unknown.

f) Little Bighorn

In cooperation with the Public Health Officer, guidelines have been developed regarding herbicide use in the water intake area (Figures 19 and 20).

Figure 18: Craters of the Moon Herbicide Special Protection Areas

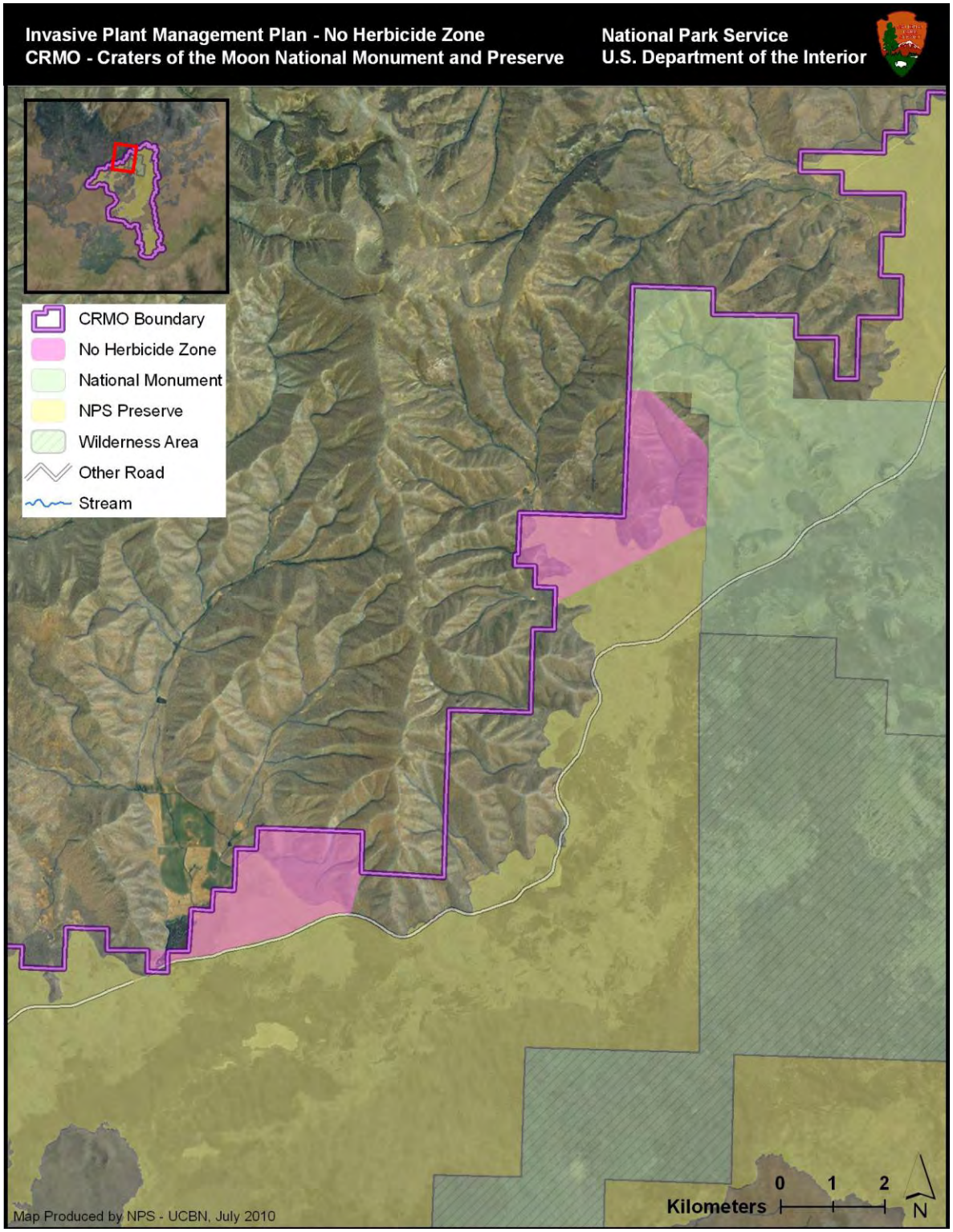


Figure 19: Little Bighorn Custer Battlefield Herbicide Protection Zone

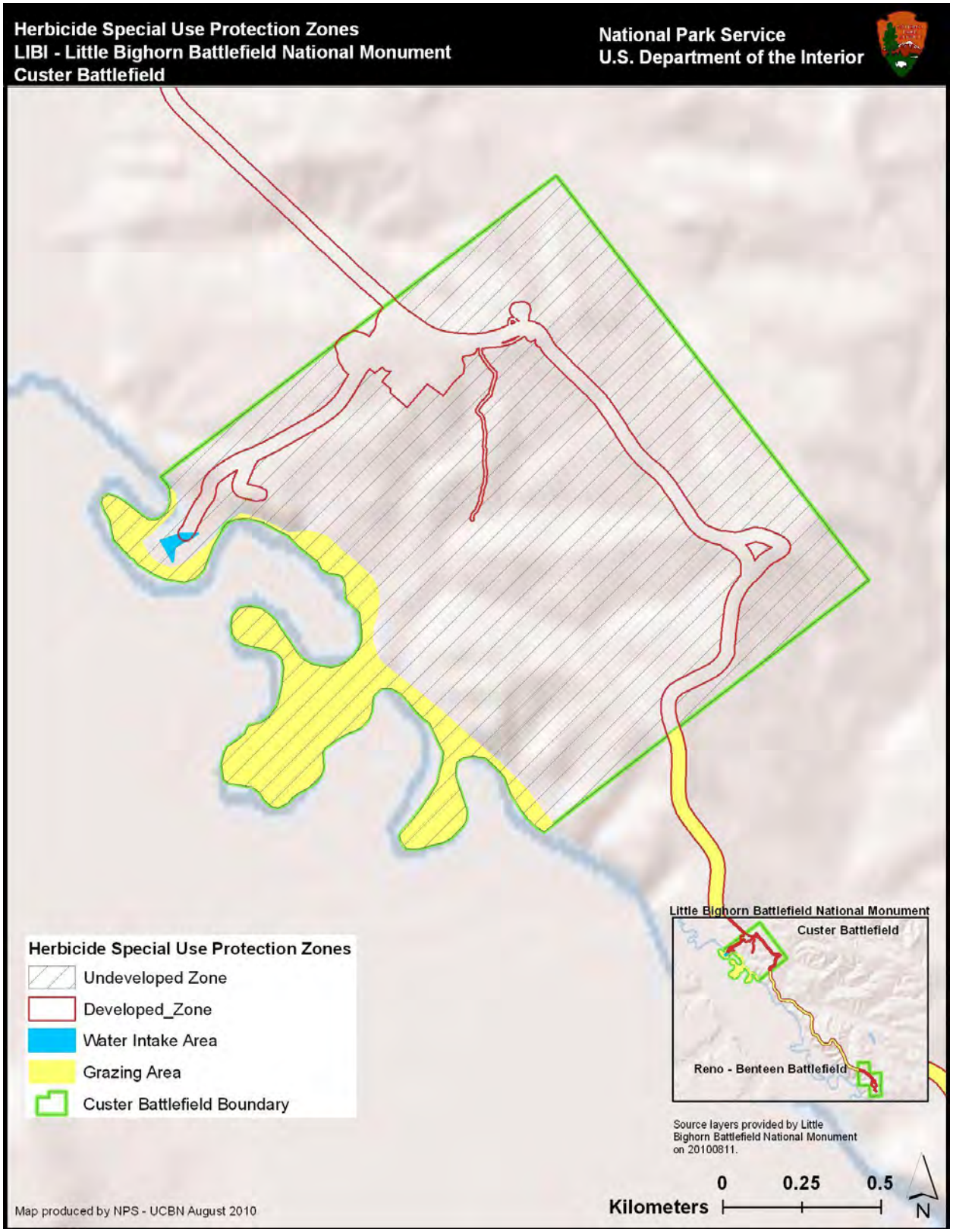


Figure 20: Little Bighorn Reno-Benteen Battlefield Herbicide Protection Zone

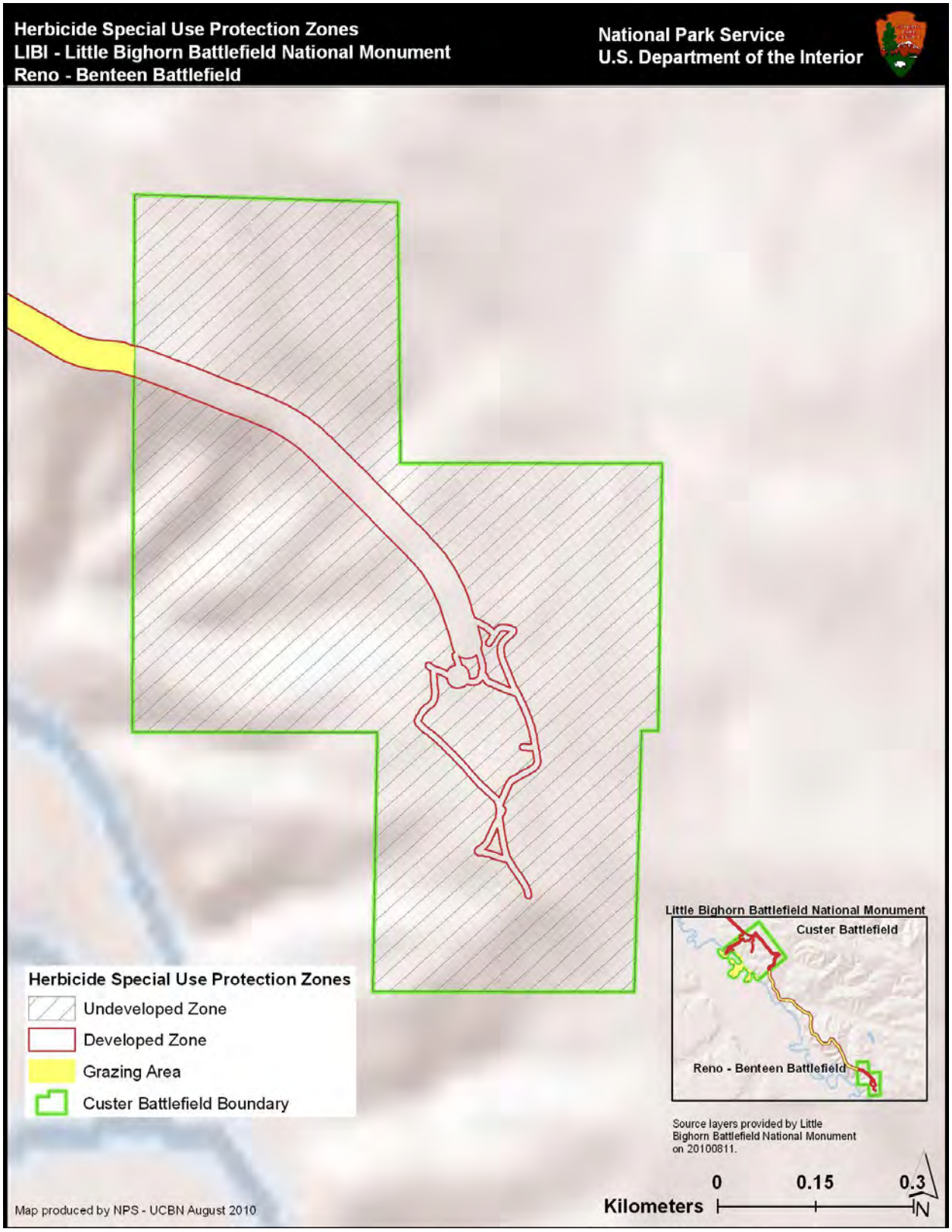
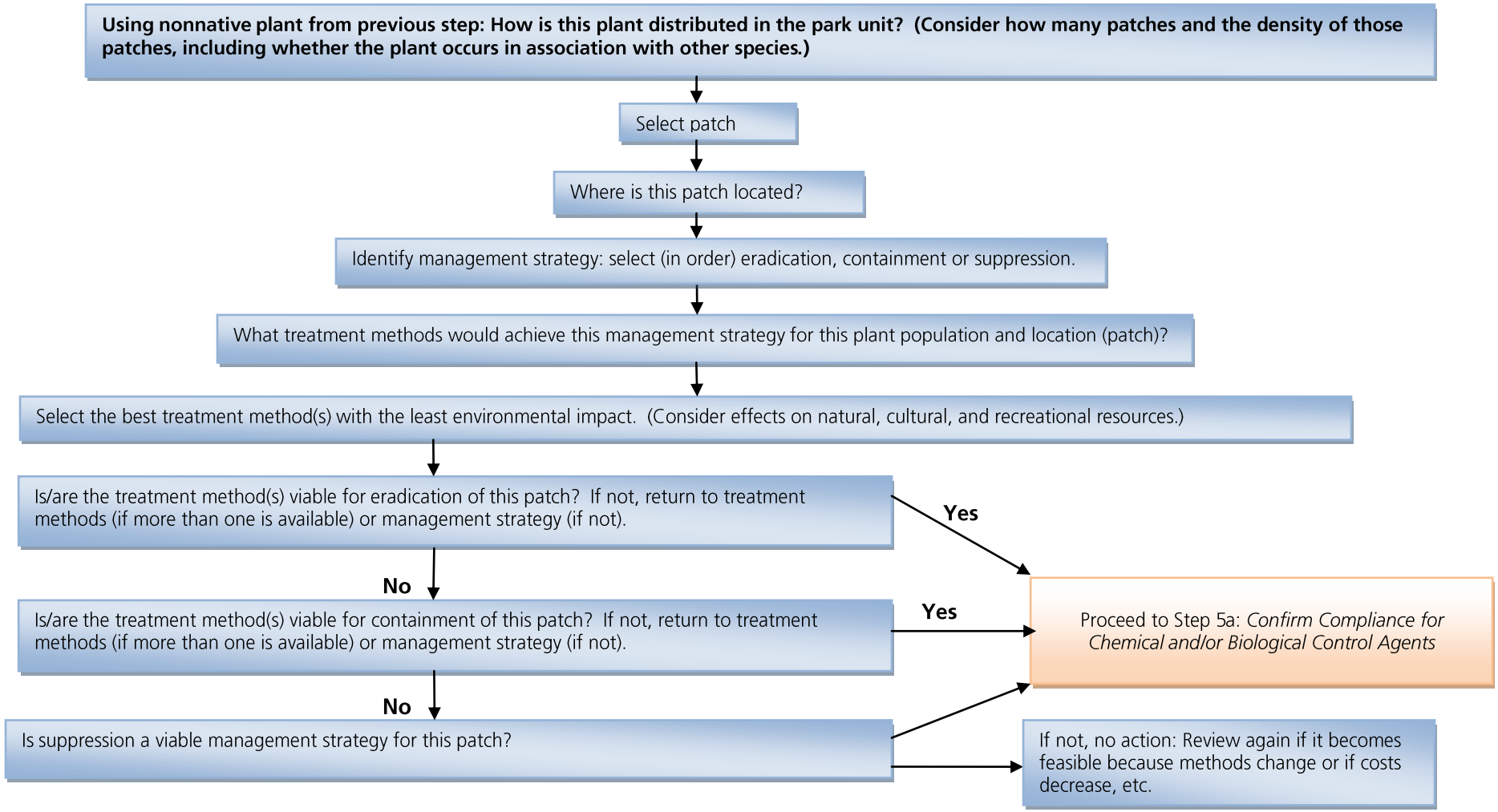


Figure 21: Decision-making Tool Step 4

Note: For Step 4, treatment options must meet management objectives and be feasible, given potential costs, available resources, potential impacts, effectiveness, and applicable regulations and policies. Because the goal is always eradication, treatments that start as suppression or containment would eventually also revert to eradication once it becomes feasible / affordable. Managers may have to repeat Step 4 many times to determine treatment techniques, management goals and methods for treating the same species in different areas. Step 4 should also be repeated if variables change (e.g. patch size changes, if additional resources become available or if success has been achieved for management strategy).

❖ Step 4: Identify Area Management Strategy and Evaluate and Select Treatment Method(s)



a) Nez Perce: Big Hole

Herbicides would not be used in close proximity to known populations of Lemhi penstemon (*Penstemon lemhiensis*) within Big Hole. Lemhi penstemon is a short-lived perennial forb that is endemic to Lemhi County in eastern Idaho and four counties in southwest Montana, including Beaverhead County where Big Hole is located. The species is known from only 191 occurrences, 102 of which are in Idaho, and 89 are in Montana. Over 50 percent of these populations are made up of 30 plants or less. There are only three known large populations with over 300 plants. One of these occurs in Big Hole and it may be the largest known population of the species. Lemhi penstemon is listed as a sensitive species by the USFS and the BLM, and is ranked G3 and S3 (rare but not imperiled with 21-100 occurrences in the state) by the Montana Natural Heritage Program. The species has reportedly been in decline throughout its range, and is facing threats from altered fire regimes and invasion by spotted knapweed. The species requires bare soil microsites to become established and prescribed burning has been demonstrated to be effective in stimulating germination and population growth.

The location of the Nez Perce encampment in 1877 would generally not be considered for herbicide application. If a compelling need for application arises, however, the proposal would be reviewed for compliance with Section 106 of the NHPA in close consultation with the Nez Perce people.

e) Prescribed Fire Treatment

Prescribed fire treatment would be the same as Alternative 1, wherein parks with approved Fire Management Plans (FMP) that allow the use of prescribed fire to treat nonnative invasive plants could use this technique. In addition, the use of flaming could also occur where allowed by approved FMPs. Table 31: *Park Fire Use Special Protection Areas* shows which parks that use fire would have special protection areas for prescribed fire and/or flaming. Table 32 shows parks that currently do not propose to use fire as part of their invasive plant management treatment program (reasons noted).

Table 31: Park Fire Use Special Protection Areas for Invasive Plant Treatment

Park Unit	Use of Prescribed Fire?	Use of Flaming?
Craters of the Moon	Park Facilities	Park Facilities
Golden Spike	Developed Zone	None
Grant-Kohrs	Historic and Administrative Structures	Historic and Administrative Structures
Little Bighorn	Developed Zone	None

1) Craters of the Moon

Although Craters of the Moon has a currently approved FMP (NPS CRMO 2000), the plan applies only to the original monument area. Therefore, until fire use is approved in other areas through revision of the plan, use of fire under the IPMP would only occur in the original monument area. Use of fire in other areas (the preserve) is generally undesirable since invasive exotic plants like cheatgrass commonly dominate after wildfires (even without previous disturbance), following revision and approval of a new FMP that applied to these areas. If appropriate, however, prescribed fire could be proposed in the expanded monument and preserve.

2) Fossil Butte

Although Fossil Butte has an approved FMP (NPS FOBU 2004) that includes the use of fire to treat nonnative invasive species, Fossil Butte has not used fire to treat invasive species. A recent prescribed fire was used to remove decadent sagebrush and to increase the diversity and abundance of forbs and grasses. Fossil Butte is leaning toward no use of fire because the most recent fires have increased the predominance of cheatgrass and one new nonnative invasive plant before was also later found in the burned area.

3) Golden Spike

Although Golden Spike has an approved FMP (NPS FOBU 2004) that includes the use of fire to treat nonnative invasive species, Golden Spike is also leaning toward no use of fire to treat invasive plants because the prescribed fire increased the predominance of cheatgrass.

4) Grant-Kohrs

Opportunities for prescribed fire use exist in grass rangeland and riparian/woodland areas. Objectives would include rangeland improvement, integrated pest management, and habitat maintenance. The FMP may need to be amended and updated with monitoring expanded in proportion with wider uses of prescribed burning.

5) Little Bighorn

To avoid potential conflicts associated with facilities and high visitor use areas, no prescribed fire would be used in the developed zone. Although Little Bighorn currently does not meet the requirements for the use of prescribed fire to treat invasive plants, the intended future revision of the plan would allow both prescribed fire and flaming.

Table 32: Parks That Would Not Use Fire to Treat Invasive Plants in Alternative 2

Park Unit	Future Intent?	Reason
City of Rocks	None	Increase in spread of cheatgrass and potential for fire escape.
Craters of the Moon	Some potential benefits as part of a restoration plan (i.e. remove cheatgrass stubble prior to herbicide application and reseeding with native plants).	Increase spread of cheatgrass and other invasive plants
Fossil Butte	None	Allowed by existing FMP but no intent to use.
Golden Spike	None (due to past results)	Allowed by existing FMP
Hagerman Fossil Beds	None	Not addressed in FMP
Minidoka	None	No approved FMP
Nez Perce (Bear Paw)	None	Not addressed in FMP
Nez Perce (Big Hole)	None	Not addressed in FMP

d. Step 5a: Confirm Compliance for Chemical and Biological Treatment Methods

In this step, park resources managers would ensure that the proposed treatment complies with laws, regulations and NPS policy (see Chapter II: *Purpose and Need*) (Figure 22). Step 5a also confirms that the use of pesticides or biological control agents is appropriate only following consideration of other alternatives. NPS policy and guidance for the use of restricted use pesticides requires annual review and approval by the Regional and WASO IPM Coordinators prior to application in the parks. Federal and state laws and NPS policy for the use of any pesticides also require that pesticide use meet the label requirements and be in compliance with other key criteria, such as application or supervision by a certified pesticide applicator.

Regional and Washington Office IPM Specialists routinely refer to the directory of herbicide risk assessments to determine whether or not to approve a pesticide for use in a national park unit. These herbicide risk assessments have been prepared by the EPA and the USFS. Although NPS intends to become a partner in the risk assessment process, until this occurs, the NPS would continue to rely on risk assessment information as provided by partner agencies. Pesticide risk assessments are found at the following website: http://www.fs.fed.us/foresthealth/pesticide/risks.html.

These risk assessments take into account normal uses by land management agencies and the effects on pesticide applicators, visitors, threatened and endangered species, etc. This information is disclosed in the risk assessment and was consulted for Chapter V: *Environmental Consequences.*

e. Step 5b: Confirm Compliance with NEPA (including NHPA, ESA, CWA, etc.)

In this step, park resource managers would ensure that proposed invasive plant management actions taken under this plan comply with it and the provisions of applicable environmental (including cultural) laws (Figure 23). To do this, review of this plan would occur prior to undertaking proposed invasive plant management actions. If actions do not comply with this plan, then additional environmental analysis, such as a categorical exclusion (CE) or EA, is required.

Several NPS categorical exclusions are applicable to invasive plant management. Currently, there are no Departmental CEs (43 CFR S 46.210) that would allow for treatment of nonnative plants. The following NPS CEs were approved again in May 2009 and may be used for those categories of actions specifically described. The guidance sections were taken from a memo to parks from the Acting Director, NPS to the NPS National Leadership Council dated May 22, 2009.

516 DM 12, E (2): Restoration of noncontroversial native species into suitable habitats within their historic range and elimination of exotic species.

> Guidance: This CE is most appropriate for exotic plant species. When considering elimination of animals that are exotic species, it is likely that large scale elimination of these species would result in more than minor impacts and require additional analysis. Restoration may be controversial when restoring species that are likely to leave the park or may require special management actions, such as listed or candidate threatened and endangered species.

516 DM 12, E (3): Removal of park resident individuals of non-threatened / [non-]endangered species which pose a danger to visitors, threaten park resources or become a nuisance in areas surrounding the park, when such removal is included in an approved resource management plan.

> Guidance: This CE should be used only when an imminent danger to visitors or immediate threat to park resources exists. The CE should not be used to treat more than individual plants or more than one specimen of a species (or, at most, a small isolated grouping of individuals). If treatment extends over a large geographic area or to a large numbers of individuals, additional analysis is needed. This CE applies to both native and nonnative species.

If neither of these CEs nor this plan relate to the action being proposed, additional environmental analysis (reviewing the list of Departmental and NPS CEs to determine if any others might apply or preparing an EA) is needed.

Note: For the monitoring and research conducted in Steps 7 and 8, this plan and the following CEs apply (one is specifically for the NPS and one is a Departmental CE):

516 DM 12, E (6): Nondestructive data collection, inventory (including field, aerial, and satellite surveying and mapping), study, research, and monitoring activities.

> Guidance: This CE applies to many I&M activities, including vegetation plots and monitoring, soil surveys, species monitoring, and other nondestructive research activities which require a research permit. This CE should be used for activities which are not covered under the CE for day-to-day resource management.

43 CFR S 46.210 (Y): Day-to-day resource management and research activities.

> Guidance: This CE applies to cultural and natural resource management and research activities that have no impact on the human environment and that are not otherwise listed in section 3.4.

To determine whether the proposed action complies with Section 106 of the NHPA, the park or regional Section 106 coordinator needs to review the *Programmatic Agreement Among the National Park Service (U.S. Department of the Interior), the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers for Compliance with Section 106 of the National Historic Preservation Act.* (Note: Separate Section 106 consultation would occur at Little Bighorn with the Crow Tribe, because the tribe is not a signatory to this Programmatic Agreement.)

Figure 22: Decision-making Tool Step 5a

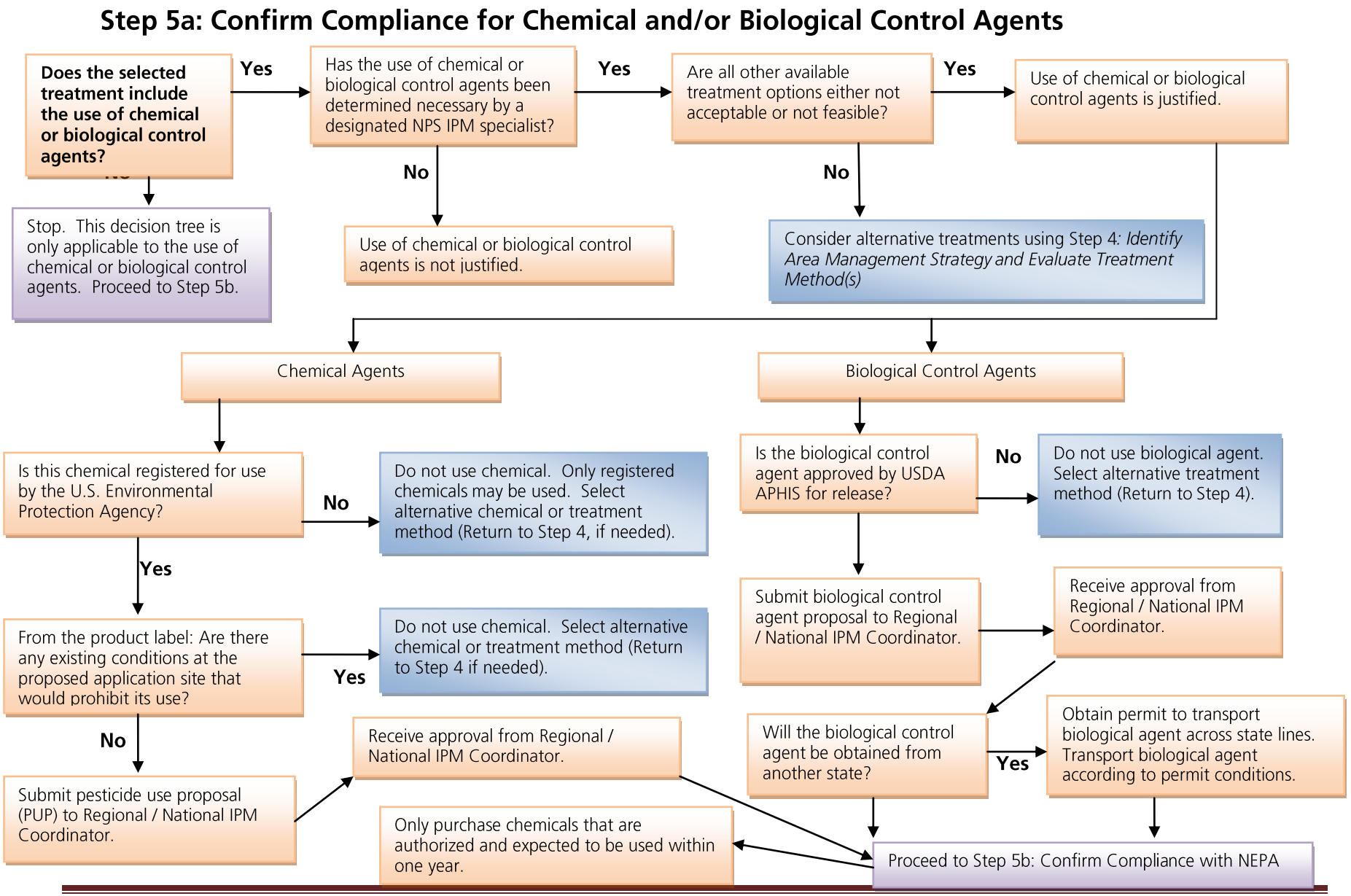
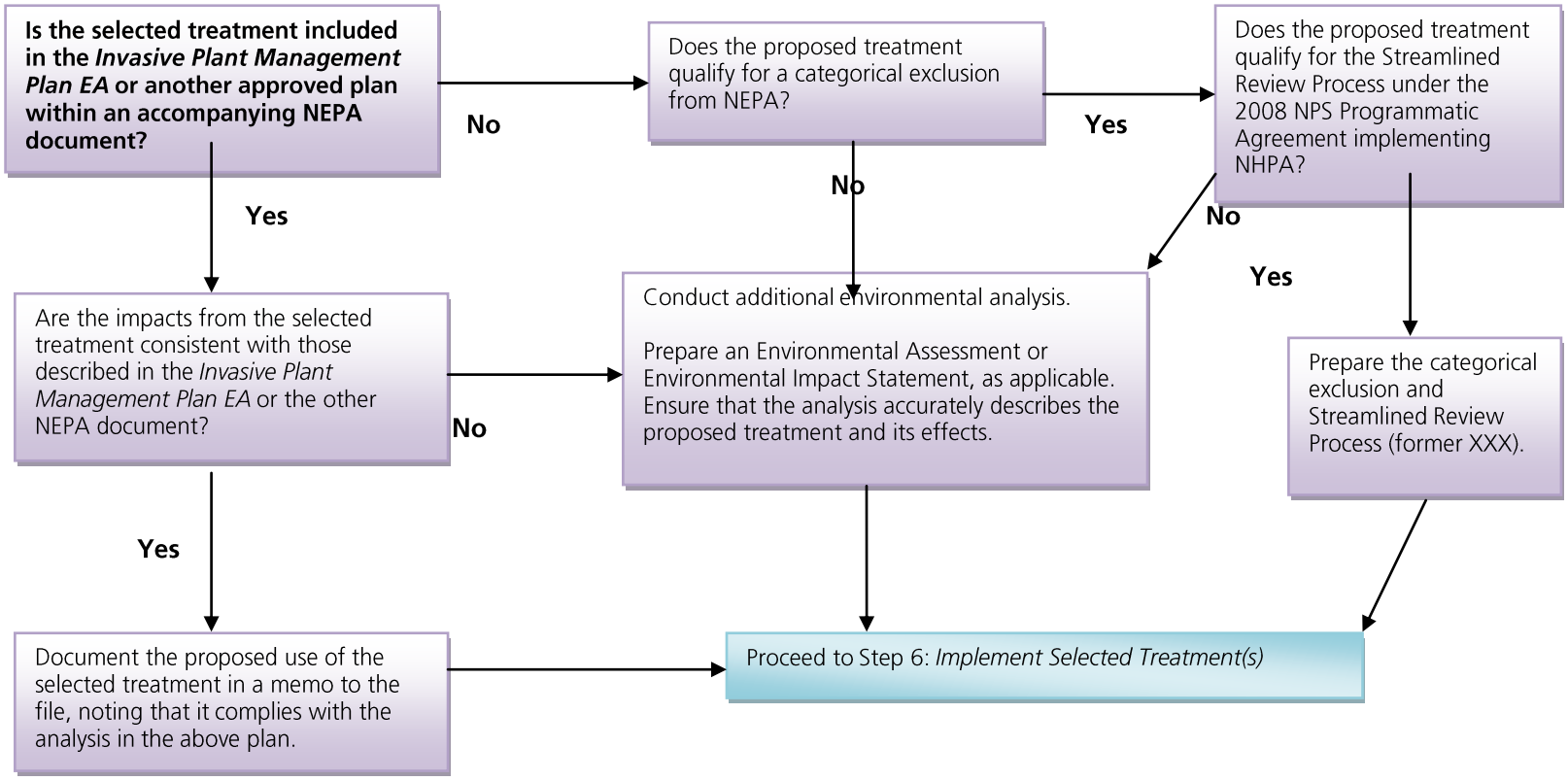


Figure 23: Decision-making Tool Step 5b

❖ Step 5b: Confirm Compliance with NEPA

Note: Prior to implementing the selected treatment, confirm that the selected treatment method has the necessary compliance with NEPA.



f. Step 6: Implement Selected Treatment(s)

As in Alternative 1, during the appropriate season and as time and staffing permit, parks would implement selected treatment methods to reduce nonnative invasive species (Figure 24). These treatments would be implemented by park staff, volunteers, park partners or cooperators (agencies, organizations and neighbors) and the NRM-EPMT.

If any additional permits are needed to implement the project, these would be obtained.

Because implementation would be followed by monitoring and would include recordkeeping appropriate to the treatment method, implementation actions would change over time to respond to reductions or increases in the nonnative invasive plant population.

g. Step 7: Monitor Treatments to Assess Control Efficacy

As noted in the Dinosaur National Monument Integrated Weed Management Plan, monitoring is the repeated collection and analysis of information to evaluate progress and effectiveness in meeting resource management objectives (Elzinga *et al.* 1998 in NPS DINO 2005) and is an essential part of an integrated weed program. Based on inventory and ranking criteria, a good monitoring program saves time and money by telling managers which control techniques are working and which ones are not. Monitoring programs can range from simple, such as taking photo points, to more complex plot and transect data collection, but all are ongoing processes that would detect useful trends with each year of repetition. Without monitoring, there is no way of knowing whether control efforts are contributing to fulfillment of desired management objectives (CNAP 2000 in NPS DINO 2005), nor is it possible to use adaptive management.

In addition to the limited monitoring conducted by the NRM-EPMT, the parks would conduct additional monitoring (Figure 25) as needed to determine the effectiveness of applied invasive plant treatments. These monitoring programs would likely differ based on the species and park in question; however, each would be used to answer the following questions:

- Were management objectives (eradication, containment, suppression or other) met?
- What was the plant's response to the treatment method?
- Is the treatment cost-effective?
- Are there variables in the treatment (season, timing of treatment, etc.) that are not being measured or that would impact the treatment?

While monitoring may not show immediate results or the result may be attributed inaccurately, monitoring is important to justify funding proposals or treatment programs to stakeholders; to influence decision-making; and to determine the effectiveness of and to select the best treatment methods. Unfortunately, if monitoring is not measuring the right attributes or if results are mixed, it may not be immediately useful. As a result, parks would consult with technical experts to design or to take advantage of monitoring programs that are quick and easy to do; repeatable (with low observer bias); require little expertise to accomplish; are effective (responding quickly to an increase or decrease in plants); and are adaptable to different environments (individual plants, small and large patches, sparse and narrowly distributed plants, and/or dense and widely distributed plants).

At a minimum, monitoring programs would record the site location, what was there, what plant was treated with what method, what effect it had and the results would be documented so they could shared with other parks. At a minimum, the effect would be measured by recording density and/or percent cover. For large patches, density and/or percent cover would be sampled and then averaged using three or more sampling frames. When patches are small enough, all plants within the patch would be counted.

More detailed inventory and monitoring programs are being conducted regionally by the three inventorying and monitoring networks (UCBN, UCPN, and ROMN) that assist with park resource programs. These networks either collect or assist parks in collecting data on the location or condition of a specific resource and then monitor how this resource is changing over time.

Aside from monitoring applied treatments, these broader inventory and monitoring programs can assist park managers in assessing current invasive species conditions in a park and in developing management strategies to complement current conditions. NPS inventory and monitoring networks are collecting information on invasive plants. These inventories would benefit parks and managers in developing monitoring programs and assess ongoing needs for invasive species management.

Figure 24: Decision-making Tool Step 6

❖ Step 6: Implement Selected Treatment(s)

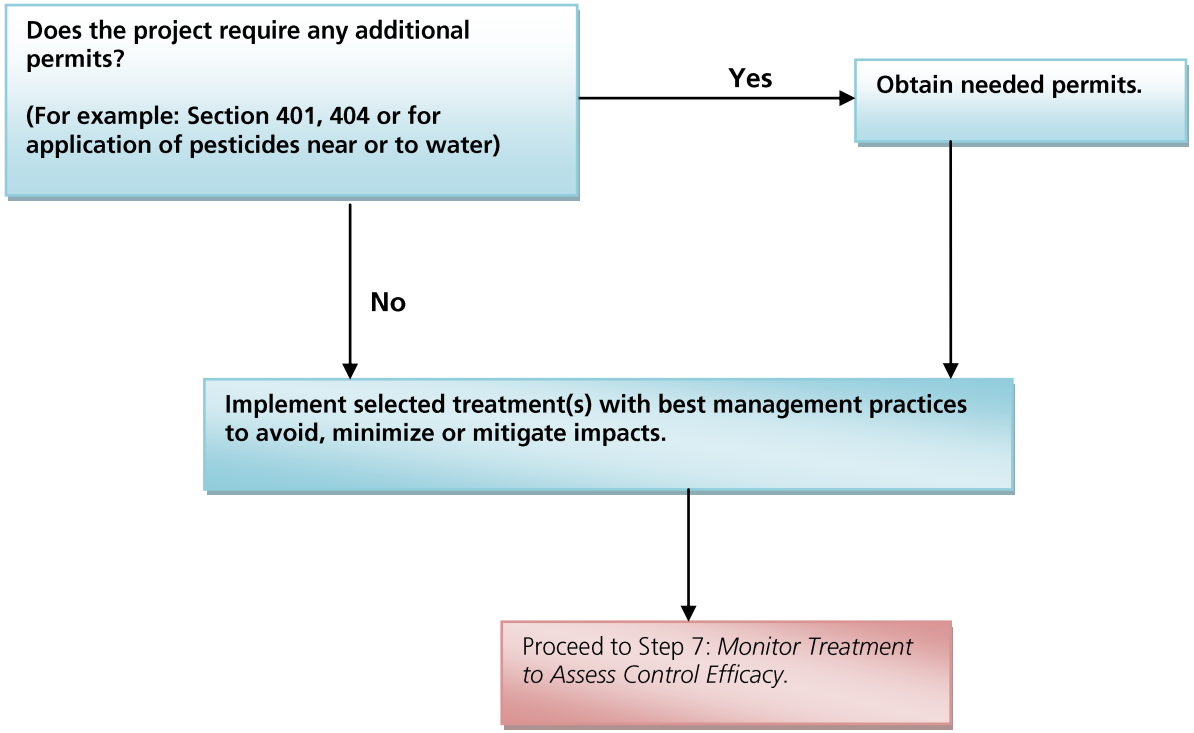


Figure 25: Decision-making Tool Step 7

❖ Step 7: Monitor Treatment to Assess Control Efficacy