CHAPTER 2
ALTERNATIVES

INTRODUCTION

This chapter contains information, including management practices and mitigation measures, relative to the Action and No Action Alternatives. Chapter 2 also provides the documentation on how the alternatives were developed and the reasons for excluding some alternative from detailed analysis. A comparison of the alternatives can be found at the end of the chapter.

PUBLIC INVOLVEMENT PROCESS

A public scoping letter was sent to interested citizens on December 7, 2001 asking for comments on the Helena NF Noxious Weed Control proposal. A Notice of Intent to prepare an EIS on the proposal was published in the Federal Register on February 20, 2002. Publication of this notice initiated a public scoping period through June 1, 2002. In total, written comments were received from 11 individuals and 10 organizations or agencies during the scoping period.

Comments received during scoping were categorized by issue. The categories include Significant Issues, Concerns, Issues, and Alternatives Not Studied in Detail. Also included in the comment categories are those suggestions for mitigation and monitoring. Significant issues were used to develop alternatives to the Proposed Action. Concerns were used to help define the scope of analysis. Issues that were considered outside the scope of the EIS are described and alternatives that were not studied in detail along with the rationale for dismissing them from detailed review are included in that section. Suggestions for mitigation and monitoring were included in at least one of the alternatives, unless impractical. A detailed analysis of the comments and how they were used is in the project file (PF - *Scoping Issues*).

SIGNIFICANT ISSUES

Comments from the public and Helena NF IDT members were used to determine issues of concern that could result from implementing the Proposed Action. The following issue was considered by the IDT to be significant, because there is no way to resolve the conflict within the confines of the Proposed Action. The best way to address it is through development of a new alternative. An "Issue Indicator" is specified which is a statement of how the effects will be measured in the "Summary Comparison of Alternatives" section at the end of the chapter.

POTENTIAL EFFECTS ON HUMAN HEALTH, NON-TARGET VEGETATION, AND WILDLIFE FROM AERIAL APPLICATION

Comments during scoping indicated there is a perception that, regardless of the required Environmental Protection Measures (EPM) designed to minimize unintended herbicide exposure, aerial application may cause herbicides to be deposited in unintended locations and affect non-target species. This issue is addressed through development of Alternative B, which contains no aerial application of herbicides. Under Alternative B, all weed treatments would be conducted using ground application of herbicides, biocontrol methods, livestock grazing, or mechanical treatment. In some areas, due to worker safety and effectiveness of available control methods, no treatment would occur.

Issue Indicator

Acres of aerial herbicide application (total) will be used to indicate differences between alternatives.

CONCERNS

Other concerns were expressed which were not used to develop alternatives (non-significant issues), because within the confines of the Proposed Action, EPMs were developed to reduce the perceived conflict. These concerns are analyzed in Chapter 4. These concerns include:

- Effects of weed treatment on water quality, groundwater and fisheries;
- Effects of weed treatment on native grasses, forbs, shrubs, and trees;
- Effects of weed treatment on wildlife;
- Cost of proposed treatments for the initial treatments and retreatments;
- Effects on human health from herbicide use;
- Effects of weed treatment on insects;
- Effects of weed treatment on recreationists and adjacent landowners;
- Effects of weed treatment on wilderness, inventoried roadless areas, research natural areas, and unroaded areas;
- Effects of weed treatment on sensitive areas and important ecological communities;
- Effects of herbicide use on soil;
- Weed treatment effectiveness; and
- Effects of noxious weeds on other resources, such as vegetation, wildlife, fish, wilderness, recreation, etc.

ISSUES AND ALTERNATIVES NOT STUDIED IN DETAIL

Comments were received suggesting that other plans of action be considered. Alternatives derived from these issues were either outside the scope of the analysis or did not meet the Purpose and Need. Some issues, such as actions to address the existence of noxious weeds on adjacent privately owned land, and their disposition can be found in the project file (PF-*Scoping Issues*).

Aerial applications should not take place in areas anywhere near (at least ¼ of a mile away from) water or private land and should not include any restricted use herbicides

Various buffer widths for herbicide application areas were considered. This alternative was not considered in detail because buffer areas proposed for aerial spraying have already been determined to be effective through past monitoring to prevent drift to water and private land on the Lolo National Forest (PF-*Aquatics*). Not using restricted herbicides in aerial applications was not considered in detail because restricted herbicides would be used safely when applied carefully and in accordance with herbicide labels as proposed.

Develop an alternative that does not include chemical treatments

Some people believe herbicides may present a risk to people, animals, and native plants. Although herbicides proposed for weed control in the Proposed Action have gone through rigorous scientific testing and government approval, some people perceive use of these herbicides as unsafe. An alternative that did not use chemical treatments was not considered in detail because, for many of the most troublesome noxious weeds, other methods are not effective, or are not feasible. For example, because of its physical characteristics, pulling, digging, and mowing are not effective treatments for Dalmatian toadflax (Lajeunesse *et al.* n.d.), one of the most common weeds. The rhizomatous root systems cause re-sprouting after pulling or digging, requiring repeated treatments for up to 15 years. Mowing tends to spread the seed and reduces competition from native vegetation.

Another example is knapweed, where infestations are so large that pulling and digging could not reasonably be accomplished. Hand-

pulling is labor intensive and only suitable for small infestations (Lacey *et al.* 1995). Given the availability and cost of labor combined with slow rates of accomplishment, it is unlikely that enough acres could be treated annually to address the Purpose and Need. Mowing is not physically possible in many areas. Knapweed and toadflax make up 80 percent of known weed infestations (PF-*Weed Database*).

The Beaverhead-Deerlodge Noxious Weed Control Program Final Environmental Impact Statement (FEIS) (USFS 2002a) analyzed an alternative that contained no herbicide use and determined the alternative provided the lowest level of protection for native plant communities from weed invasion with no reduction of weed-caused impacts to soil and water. The analysis of the alternative that used herbicides did establish that herbicide use would result in no anticipated, adverse impacts on human health from properly used herbicides as required by label specifications and Forest Service policy.

The Lolo National Forest Big Game Winter Range and Burned Area Weed Management FEIS (USFS 2001a) analyzed an alternative that eliminated use of herbicides and determined that elk grass forage would decline, possible long-term losses to flammulated owl prey base would occur, and decline of wildflowers with possible loss of most native species would occur as a result of noxious weeds. This EIS also established that there was a low risk to human health where herbicides were used at prescribed rates.

The Bureau of Land Management (BLM) in their 1991 Vegetation Treatment on BLM Lands in Thirteen Western States FEIS (USBLM 1991) considered a no herbicide use alternative and determined that without herbicide treatment, noxious weed control would be ineffective for species that had no biological control agents, making public land an infestation source for adjacent land under other ownership. More erosion was likely than under alternatives that allowed herbicide use. The no herbicide alternative also resulted in the most adverse impacts from uncontrolled noxious weeds.

An alternative that does not have chemical control would not meet the Purpose and Need because it would not effectively treat existing and potential weed infestations. In addition, it is not physically or financially feasible.

Aerial spray weeds in wilderness areas

This alternative was suggested with the rationale that aerial spraying would be considered a "minimum impact tool" for weed treatment in wilderness areas. This alternative was not considered in detail because at the present time, weed treatment areas in wilderness are in small, isolated patches; aerial treatment would not meet Forest Plan standards for wilderness; and it would not comply with wilderness regulations pertaining to low flying aircraft.

Require lease/permit holders to eradicate noxious weeds on land they use.

This alternative was considered at the suggestion of the public. This alternative was not considered in detail because of complications involved with ensuring that permittees applying herbicides on NFS land are licensed to apply herbicide; that lessees would write and submit pesticide use plans for approval as required by Forest Service policy; and ensuring that the correct amount of herbicide, timing of application, and appropriate use of herbicides by permittees was occurring. Although requiring permittees/lease holders to hand pull weeds could be implemented, it would not effectively treat weed in those areas. See *"Develop an alternative that does not include chemical treatments"* above.

Do not treat weeds in wilderness areas.

Some people indicated that weed management within wilderness contradicted the definition of wilderness and therefore weed treatment should not occur. An alternative that would eliminate wilderness area treatments was considered, but not studied in detail because management practices, such as weed treatment that maintains the natural ecosystem in Wilderness areas, are allowed (see the effects on wilderness in Chapter 4). Only about 80 acres of weed treatment is proposed in

wilderness areas and potential adverse effects on wilderness attributes are not expected.

Develop public volunteer programs using schools, businesses, even prisons, to pull weeds.

This activity already occurs to some degree as part of the Helena NF's integrated weed management strategy. In addition, pulling weeds is not an effective treatment in most instances, but where it is, it is part of the Proposed Action. Another concern is safety of volunteers (allergic reactions, steep terrain, exposure to heat and cold).

Eradicate all weeds, not just new and existing ones.

Eradication of all weeds is an impossible task at this time. Weed seeds last for years, even decades and there are thousands of acres in Montana where no effective weed treatments are planned. It is unlikely that weed establishment in new areas could be completely prevented, given the vectors for transportation and distribution of seeds (water, wind, animals, and humans).

Analyze a true "no action" alternative.

The "No Action" Alternative (*Alternative C*) as described in this EIS is a continuation of the current weed treatment program. The "No Action Alternative" can be described as no change in action (as in this EIS) or no action at all (Council on Environmental Quality's "40 most asked question concerning CEQ's National Environmental Policy Act Regulations" question 3). A No Action Alternative that has no weed treatment activities was not studied in detail because it would require eliminating all previously approved treatment plans, would violate state and federal laws and policies, and would not meet the Purpose and Need.

Outside the Scope of the Decision

The following comments, suggestions, and concerns are outside the scope of the decision as described in Chapter 1 based on the Purpose and Need to treat existing and new infestations:

- Preventing weeds from establishing in new areas;
- Eliminating or minimizing human activities that spread weeds;
- Doing a Forest Plan amendment to address all causes of weed spread;
- Filing a complaint about adjacent private property infested with weeds;
- Seeking to establish licensing of off road vehicles (ORVs) and snowmobiles the same as required on full-sized vehicles;
- Limiting use of ORVs;
- Rerouting trails or roads around the infestation to reduce available vectors for spread;
- Considering road construction, closure, and obliteration on existing, ongoing, and planned roads/routes in the project area;
- Limiting snowmobile use to designated routes and play areas; and
- Researching consequences of spray techniques and compounds on wildlife.

ALTERNATIVES CONSIDERED IN DETAIL

ALTERNATIVE A – PROPOSED ACTION

The Helena NF's proposed weed control program includes treatment on four landscape areas totaling approximately 23,000 acres.

Implementation would occur over a 12-year period. Not all acres would be treated in the first year, but some areas would be treated repeatedly on a 2 or 3-year rotation to ensure effective control. Monitoring would be used to determine effectiveness and to identify areas that would need re-treated or if treatment areas could be reduced based on effectiveness of previous treatments. **Table 2-1** shows proposed weed spray and grazing acres by

Landscape Area. Maps of these landscape and treatment areas are included at the end of this chapter (**Figure 2-1** through **Figure 2-4**).

Activities described under *Features Common to All Alternatives* and under *Environmental Protection Measures* apply to this alternative. These sections are included in this chapter. This project is part of the Helena NF's effort to implement the treatment portion of integrated weed management.

Herbicides

Chemical treatments would include both ground and aerial herbicide applications, in addition to activities described under the No Action Alternative (*Alternative C*). Environmental Protection Measures (**Table 2-4**) have been designed and included to reduce drift and other potential impacts of aerial application. Chemical applications would take place at the appropriate time of year for targeted weed species and environmental considerations such as proximity to water or residential areas would be adhered to. Equipment such as helicopters, trucks, ATVs, horse, and backpack sprayers would be used. Herbicides proposed for use include: picloram, 2,4-D, clopyralid, dicamba, glyphosate, imazapyr, hexazinone, chlorsulfuron, imazapic, metsulfuron methyl, sulfometuron methyl, and triclopyr. Following the Adaptive Management Strategy, other herbicides permitted by EPA and registered for use by the Montana Department of Agriculture may be used when they become available, if the herbicide is water soluble and less environmentally persistent than Tordon (picloram). This would occur after interdisciplinary review and line officer approval.

Surfactant adjuvant would be used in certain situations to increase efficacy, primarily on target species with a waxy cuticle (especially toadflax), or when temperature and humidity are not optimal (but still within label and more restrictive locally-prescribed limits) yet other conditions (such as plant phenology) are ideal. Surfactants may be used during periods of drought. Surfactants used would be a silicone-blend type, (including silicone components mixed with non-silicone components such as modified seed oils) such as Phase II®, added to tank mixes. Phase II® would not be used in riparian areas, but other surfactants labeled for aquatic use might be. Surfactant adjuvant would be used following label requirements for both

TABLE 2-1
Alternative A Weed Treatment by Landscape Area*

Treatment Acres	Weeds of Concern	Proposed treatments
Belts/Dry Range		
9,903 (5,817 aerial) (1330 grazing**)	Spotted, diffuse and Russian knapweed, Dalmatian toadflax, leafy spurge, musk thistle and Canada thistle	Ground and aerial chemical treatment, biocontrols, grazing, mechanical
Elkhorns		
1,792 (710 aerial)	Spotted and diffuse knapweed, Dalmatian and common toadflax, leafy spurge, hounds tongue, musk thistle and Canada thistle	Ground and aerial chemical treatment, biocontrols
Blackfoot		
5,261 (2,883 aerial)	Spotted knapweed, St Johnswort, musk thistle and Canada thistle	Ground and aerial chemical treatment, biocontrols
Continental Divide		
5,631 (1,664 aerial) (26 grazing**)	Spotted knapweed, musk thistle, Canada thistle, common toadflax, Dalmatian toadflax and leafy spurge	Ground and aerial chemical treatment, biocontrols, grazing
22,668	**Total**	

Notes:

* Includes ongoing activities and new treatment areas.

**Grazing occurs on acres counted in "ground" application.

the herbicide and the surfactant products.

Initial treatment in aerial application areas would include ground application to treat areas that were avoided, such as buffers or areas that were skipped. These areas are estimated at 20 percent of the aerial treatment acres. Based on monitoring, follow-up treatments are expected to occur on one to ten percent of the treatment area, in both aerial and ground application areas. By the third and forth year, portions of the seed that remained in the soil would have germinated, and a plan for treatment similar to the initial aerial or ground treatment, followed by follow-up treatment would be made. Based on past monitoring, it is likely the treatment areas would then enter "maintenance mode" where spot treatments of infestations would occur.

Aerial application of herbicides would occur in high-risk fire areas dating back to 1984, big game winter and summer ranges, large infestations, and smaller (2 acres or less) or less dense infestations in remote/rough terrain. These targeted infestations are areas that have received limited or no treatment due to access, terrain, or safety. Environmental Protection Measures would be required to reduce impacts from aerial application.

Ground applied herbicide treatments would occur in areas where aerial spraying is not practical due to size of infestations, locations, or site conditions. Herbicides would only be applied by ground spraying in designated wilderness areas, research natural areas, and near sensitive areas (such as sensitive plants).

Biological Controls

Existing and newly approved biological controls would be introduced where appropriate.

Grazing

Livestock grazing such as with sheep or goats would occur on approximately 1,356 acres. Grazing treatments would have herbicide treatments around the perimeter with livestock grazing in the interior. Noxious weeds targeted with grazing include leafy spurge, Dalmatian toadflax, and spotted knapweed.

Grazing for weed control would be done on a contract basis (government pays for the service). Grazing would be high-intensity, short-duration with animals specially conditioned to graze on target weed species. Grazing animals would be intensively herded.

Mechanical Treatment

Mechanical treatment such as hand pulling, mowing, or cultivation would occur on particularly sensitive areas or areas of small or new infestations.

Forest Plan Amendment

As indicated in the February 20, 2002 Notice of Intent to prepare an Environmental Impact Statement (Federal Register, Vol. 67, No. 34 pg 7666) an amendment to the Forest Plan would be included. Appendix X of the Forest Plan currently states, "all weed treatment will be performed by back pack sprayers, use of granules and ground rigs with hand held sprayers" (FP pg X/1). Methods of chemical application would be expanded to include aerial application. Appendix X would be replaced with:

APPENDIX X - Noxious Weed Control

"Emphasis for control of noxious weeds on the Helena National forest will be under cooperative weed control agreements with the County Weed Boards. As part of the control program, the Forest expects to annually treat weeds where there is a danger of noxious weed infestation. The noxious weed inventory indicates where these areas are located. (Helena Forest noxious weed inventory is available at the Supervisor's Office, file 2240). Weed species to be treated are identified in the Montana State, County Weed Boards', or North American noxious weed lists. According to Integrated Pest Management principles, weed treatment could include mechanical, biological, cultural or chemical control including aerial (e.g. helicopter or airplane) or ground (e.g. boom

truck, ATV, or backpack or handheld sprayer or granule) application."

This amendment is considered non-significant. It is not anticipated to result in changes to the six types of Forest Plan decisions (goals, objectives, management areas and prescriptions, standards and guidelines, monitoring and evaluation, and "lands not suitable" determination) and is consistent with changes deemed not significant as described at FSM 1922.51 and FSH 1909.12, 5.32.

ALTERNATIVE B – NO AERIAL HERBICIDE APPLICATION

Under Alternative B (**Table 2-2**), chemical weed treatments would include ground herbicide applications, in addition to the ongoing activities described under the No Action Alternative (*Alternative C*). Approximately 19,000 acres would be treated under Alternative B. Many acres proposed for aerial application would be treated through ground application, but some acres would not be treated at all due to remoteness, steepness of terrain, cost, or safety. Mechanical, biological, and grazing treatments would occur as in Alternative A. **Figures 2-5** through **2-8** are maps of proposed treatment areas under Alternative B.

Activities described under *Features Common to All Alternatives* and under *Environmental Protection Measures* (**Table 2-4**) below apply to this alternative.

Forest Plan Amendment

Alternative B would not require an amendment to the Forest Plan.

ALTERNATIVE C – NO ADDITIONAL WEED TREATMENT

This alternative is the No-Action Alternative (**Table 2-3**). Current activities would continue as planned (see *Ongoing Weed Treatment, Prevention, and Education Program* below) with approximately 16,000 acres treated. Some measures under *Environmental Protection Measures* would also apply. No additional herbicide treatments would occur in wilderness areas. Maps of these landscape and treatment areas are attached (**Figure 2-9** through **Figure 2-12**).

Forest Plan Amendment

This alternative would not require a Forest Plan amendment.

TABLE 2-2
Alternative B Weed Treatment by Landscape Area*

Treatment Acres	Weeds of Concern	Proposed treatments
Belts/Dry Range LA		
7,917 (1330 grazing**)	Spotted, diffuse and Russian knapweed, Dalmatian toadflax, leafy spurge, musk thistle and Canada thistle	Ground and aerial chemical treatment, biocontrols, grazing, mechanical
Elkhorns LA		
1,756	Spotted and diffuse knapweed, Dalmatian and common toadflax, leafy spurge, hounds tongue, musk thistle and Canada thistle	Ground and aerial chemical treatment, biocontrols
Blackfoot LA		
3,938	Spotted knapweed, St Johnswort, musk thistle and Canada thistle	Ground and aerial chemical treatment, biocontrols
Continental Divide LA		
5,302 (26 grazing**)	Spotted knapweed, musk thistle, Canada thistle, common toadflax, Dalmatian toadflax and leafy spurge	Ground and aerial chemical treatment, biocontrols, grazing
18,913	**Total**	

Notes:

* Includes ongoing activities and new treatment areas.

**Grazing occurs on acres counted in "ground" application.

ONGOING WEED TREATMENT, PREVENTION, AND EDUCATION PROGRAM

CONTROL

Over the last six years, the Helena NF noxious weed control program has focused on reducing weed populations within major travel corridors. As a result, Forest Service personnel, external agencies, and the public have noticed a decrease in weeds along travel routes and elsewhere.

The existing Helena NF weed control program consists of a Forest-wide approach with emphasis placed on Fire Restoration areas of 2000. The elevated concern about existing weed spread and new invaders becoming established has resulted in an intensified effort in the Integrated Pest Management Program consisting of: prevention, education, biological control, herbicide control, mechanical control, and monitoring. Since the fires of 2000, increases in program accomplishments have been made, particularly in prevention, education, biological control, herbicide control, and monitoring. Weed treatments (biological and herbicide) have occurred on approximately 10,000 acres annually, while inventory and monitoring efforts have occurred on all blackened area within fire perimeters.

Typically, the Helena NF noxious weed appropriations average around $270,000 annually, while fire restoration budgets and grant money available in the Elkhorn Mountains has increased the weed program to nearly $1.8 million. Funding comes from Forest Service appropriated funds and fire restoration funds, along with several grants and agreements with Montana State Trust Funds, Rocky Mountain Elk Foundation, Sikes Act, Mule Deer Foundation, and the Foundation for North American Wild Sheep. Restoration money is used to control existing weed populations, inventory blackened areas, and treat new invaders and new populations. Current restoration planning encompassed a five-year program (beginning in 2000); however, future revenue for restoration work is unlikely. When developing a weed control project, cost and efficiency, along with likely available funding, and the amount of area needing treatment must be considered.

Recent specialized equipment purchases have allowed the Helena NF to expand treatment into more difficult terrain. The public has become more aware of this expansion of herbicide application as a result of seeing equipment tracks visible on steep open hillsides.

This program has generated a greater need for posting signs in response to public comments.

Monitoring plots established in remote areas treated with the latest equipment indicate successful herbicide treatments. The Helena NF has established a goal of reducing weed

TABLE 2-3
Alternative C - Weed Treatment by Landscape Area

Treatment Acres	Weeds of Concern	Current Planned Treatments
Belts/Dry Range LA		
7,240	Spotted, diffuse and Russian knapweed, Dalmatian toadflax, leafy spurge, musk thistle and Canada thistle	Ground chemical treatment, biocontrols, mechanical
Elkhorns LA		
1,473	Spotted and diffuse knapweed, Dalmatian and common toadflax, leafy spurge, hounds tongue, musk thistle and Canada thistle	Ground chemical treatment, bio controls
Blackfoot LA		
2,918	Spotted knapweed, St Johnswort, musk thistle and Canada thistle	Ground chemical treatment, biocontrols
Continental Divide LA		
4,240	Spotted knapweed, musk thistle and Canada thistle, common toadflax, Dalmatian toadflax and leafy spurge	Ground chemical treatment, biocontrols
15,871	**Total**	

populations by 70 percent Forest-wide between 2000 and 2010.

Herbicide Control

The Helena NF strategy has changed from a few years ago, when all roads were high priority for treatment. Aggressive treatment of all roads and trailheads (consisting of approximately 371 miles of infested roads and trailheads, totaling about 3,600 acres) over the past five years has decreased weed populations in these areas (PF-*Weed Database*). This success required a shift in strategy to continue with a maintenance level program that consists of spot treatments along roads and trailheads, while expanding treatment onto rangeland and timber harvest units outside road corridors.

This expansion of treatment required purchase of equipment that can access difficult terrain. Currently, land located off of road corridors with slopes less than 35 percent is targeted for treatment, which has enabled treating approximately 2,500 to 3,500 additional acres with herbicides each year using picloram, 2,4-D, glyphosate and dicamba.

The fires of 2000 and completion of the Burned Area Emergency Rehabilitation Project allowed treatment to expand to approximately 5,000 acres in 2001, 2002, and 2003. This program incorporated use of chlorsulfuron, metsulfuron methyl and clopyralid herbicides. Chlorsulfuron has proven to be very effective in control of Dalmatian toadflax, while being more selective and not harming desirable native vegetation.

Three sites within the Scapegoat Wilderness infested with spotted knapweed and Canada thistle have been periodically treated with 2,4-D and picloram. Trailheads and wilderness boundaries are focus points for treatment; however, locations such as the Big Log area that burned in 1984 (North Hills Fire) have experienced spread of leafy spurge and Dalmatian toadflax toward the Gates of the Mountains Wilderness. Blow-down in this area prevents access with ground-based spray equipment and makes these areas unsafe for backpack or horsepack operations.

Biocontrol

The Helena NF biological control program has expanded over the past three years. Leafy spurge, Dalmatian toadflax, spotted knapweed, and musk thistle are the primary species selected for biological insect releases. All insect release sites are mapped using a Global Positioning System (GPS). Selection of these species is based on accessibility and treatment effectiveness. Due to the success with the *Apthonia ssp*. on leafy spurge, efforts have been concentrated on a large-scale release program targeting large or remote infestations of leafy spurge. Over two million *Apthonia* insects have been released over the last three years (PF-*Weed Database*). Insectary monitoring indicates that if site conditions favor survival of the insect, reduced weed populations can be observed within three to five years. To date, 104 releases have occurred on approximately 3,734 acres of leafy spurge, Dalmatian toadflax, spotted knapweed, and musk thistle.

Mechanical Control

In the past, hand-pulling has been implemented in conjunction with light applications of herbicide to control spotted knapweed and common burdock within the Gates of the Mountains picnic areas and along isolated sections of selected riparian areas. Hand-pulling as the sole method of eradicating weeds appears to be ineffective due to long-term viability of seed in the soil, some of which remain for 10 years; however, combining hand-pulling with light applications of herbicides has reduced spotted knapweed and common burdock infestations to a maintenance level requiring only annual spot treatments (PF-*Monitoring*). Hand-pulling weeds has been coordinated with volunteers and high school students for the past three years.

Prevention and Education

Prevention and education work together to reduce the spread and introduction of noxious weeds.

The current prevention program places emphasis on limiting introduction, establishment, and spread of noxious weeds by implementing many techniques. Techniques include:

- Limiting weed seed dispersal from major routes;
- Attempting to contain neighboring weed infestations;
- Minimizing soil disturbance;
- Signing trailheads and requiring weed seed free forage for backcountry users;
- Properly managing forage based on condition class of the vegetative community; and
- Implementing Best Management Practices (BMPs) that include washing of all vehicles when moving into a new area.

The Northern Region (Region 1) of the Forest Service has prepared a comprehensive guide to Noxious Weed Prevention Practices (see **Appendix E**) for use in planning forest and wildland resource management activities and operations. This guide assists managers and cooperators in identifying weed prevention practices that mitigate identified risks associated with weed introduction and spread.

Public education and weed prevention programs are used to deter establishment of "new invader" species. Public education programs on noxious weeds have been active since 1990, and noxious weed awareness information is readily available to visitors. Several noxious weed programs are presented annually throughout the Helena valley for educational purposes. Programs include staffing public information booths at fairs in cooperation with local counties and BLM representatives, giving presentations at local schools and local community group meetings, and organizing public spray days with community residences adjacent to the Helena NF. These programs have helped raise public awareness about noxious weeds, which in turn, is believed to have reduced the establishment of new weeds, and limited spread of existing weed infestations on private and Helena NF land.

Monitoring

The weed monitoring program has expanded over the past three years. All known weed infestations are currently mapped through use of a Geographic Information System (GIS). The current monitoring program has identified and mapped approximately 70 permanent plots where the following are measured: 1) density and rate of spread of Dalmatian toadflax; 2) effects of aggressive plant species on natural resources; 3) effects of herbicides on noxious weeds and non-target vegetation; 4) coverage application of herbicides; and 5) effectiveness of biological control agents.

Herbicides such as Plateau® are currently under study in cooperation with Dow Elanco within the burned areas, measuring effectiveness and non-target mortality. Cooperative monitoring is also being conducted with the Rocky Mountain Research Labs in Missoula and Bozeman, as well as with Montana State University, University of Montana, and several federal and state agencies.

FEATURES COMMON TO ALL ALTERNATIVES

- People would be encouraged to notify the Helena NF of weed populations.
- Best Management Practices (BMPs) would be included and followed (Forest Service Manual 2081 – Management of Noxious Weeds, see Appendix E).
- Revegetation (reseeding with native grass mix) would be used on any site where the vegetation density is low enough to allow reinfestation, introduction of the noxious weeds, or erosion.
- The Administrative Travel Policy would be enforced. The policy conforms to the letter written by (then) Regional Forester Dale Bosworth in the Off-Highway Vehicle FEIS for Montana, North Dakota and Portions of South Dakota, Appendix D (USBLM 2001) regarding administrative

off-road travel. The Helena NF policy states: motorized access on National Forest roads, trails and areas closed to the public will be authorized when it is determined that such motorized use results in efficiencies and cost savings and resource concerns are considered. Examples of types of appropriate motorized access include, but are not limited to, noxious weed spraying, fuel reduction projects, transport of fish and game species, timber management activities, resource monitoring and administration of permits.

ENVIRONMENTAL PROTECTION MEASURES

Table 2-4 shows the environmental protection measures that would be implemented for each alternative. Measures applicable to Alternative C are measures already incorporated into the current program. Aerial Herbicide Application for Noxious Weed Control in the Northern Region: Observations, Recommendations and Considerations by Andy Kulla (USFS 2003) has many suggestions for making aerial herbicide as effective and low-impact a possible based on past experience. These observations, recommendations and considerations would be used in the Helena National Forest Weed Treatment Project whenever possible.

Table 2-5 describes the treatment acre thresholds that would be used to limit picloram use in sensitive watersheds.

TABLE 2-4
Environmental Protection Measures

Measure	Applies to Alternative(s)
Aerial Application	
On each side of streams, a 300-ft buffer would be established where aerial application would initially not be allowed. Through site-specific drift monitoring at time of application, this buffer may be reduced by 50-foot increments as long as monitoring results are favorable. In no case would aerial application buffers be less than 100 feet.	A
Aerial spray would not occur over areas with over 30% live tree canopy.	A
Aerial spray over areas with 10-30% live tree canopy would be reviewed and an on-site decision as to whether or not to aerial spray would be based on factors such as climate, drought, target species, and non-target species present.	A
Aerial spray units would 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 would be used in spray helicopters and each treatment unit mapped before the flight to ensure that only areas marked for treatment are treated.	A
Cost efficiency of treating smaller infestations would be evaluated based on proximity to larger spray units proposed for aerial treatment.	A
Helicopters would avoid, by ¼ mile, known raptor nesting territories when flying to and from treatment sites, and would not spray a known nest site during the following periods: ➢ northern goshawks - from April 1 through August, ➢ bald eagles - February 1 through August 15, ➢ red-tailed hawks - March 1 through August 15, ➢ peregrine falcons - April 1 through July, and ➢ golden eagles - March 1 through July.	A
Most aerial applications would occur in the late summer or early fall depending on availability of the helicopter/ contractor. Certain combinations of target species and non-target species, chemicals, and site-specific weather dependant conditions may warrant aerial spraying in the spring.	A
Aerial applications would be excluded from Research Natural Areas, candidate RNAs, and designated Wilderness.	A
Press releases would be submitted to local newspapers indicating potential windows of treatment for specific areas. Signing and on site layout would be performed one to two weeks prior to actual aerial treatment.	A
To reduce risk of chronic effects on aquatic species, aerial spray operations would be closely monitored, and site characterizations near streams made to ensure a reduced risk of groundwater/surface water contamination.	A
Constant communications would be maintained between the helicopter and the project leader during spraying operations. Ground observers would have communication with the project leader. Observers would 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.	A
Plastic spray cards would be placed out to 350 feet from and perpendicular to perennial creeks to monitor herbicide presence. Non-toxic dye would be added to make herbicide visible on spray cards. Dye would allow observers to see herbicide as it is sprayed and to visually monitor drift or vortices from boom and rotor tips.	A
if needed, aerial treatment areas would be treated repeatedly on a 2 or 3-year rotation to ensure effective control. Monitoring would show which areas would need to be re-treated or if treatment areas can be reduced based on effectiveness of previous treatments.	A
Temporary area and road closures would be used to ensure public safety during aerial spray operations.	A
Drift Reduction	
Drift reduction agents, nozzles that create large droplets, and special boom and nozzle placement, would be used to reduce drift during aerial spraying.	A
Drift control agents may be used in aerial spraying during low humidity to reduce drift into non-target areas. Products that reduce volatility, have been shown to keep droplet sizes larger, and are appropriate adjuvant for the herbicide (as specified by labeling of both the herbicide and the drift agent, in consultation with the herbicide manufacturer) would be used.	A
Aerial application of herbicides would occur when wind speeds are less than 6 mph and blowing away from sensitive areas.	A
Weather conditions would be monitored on-site (temperature, humidity, wind speed/direction), and spot forecasts would be reviewed for adverse weather conditions.	A

TABLE 2-4 Environmental Protection Measures	
Measure	**Applies to Alternative(s)**
Herbicide Use	
Aerial or ground spraying in mule deer fawning areas, elk calving areas, and bighorn sheep lambing areas during May and June would be avoided.	A, B
Picloram would not be used within 50 feet of streams or subirrigated land, regardless of the application method. Relative Aquifer Vulnerability Evaluation (RAVE)/site characteristic evaluation may indicate more restrictive distances than 50 feet.	A, B, C
Treatment sites would be evaluated for sensitive plant habitat suitability; suitable habitats would be surveyed as necessary before treatment. A 100-foot buffer would be placed around occurrences of threatened or sensitive plant species within ground and aerial spraying treatment areas. Herbicide use within this buffer is allowed if herbicides that do not affect the specific plant species are available and effective, or if they can be applied so as to avoid detrimental impacts to individual threatened or sensitive plants, as determined by the Forest botanist. If these methods are not available or effective, site-specific mechanical or biological controls are permissible. Livestock grazing for weed control would not occur in areas where threatened or sensitive plants occur.	A, B
Designated Wilderness Areas (Gates of the Mountains and Scapegoat Wildernesses), RNAs (Cabin Gulch, Red Mountain, and Indian Meadows) and the candidate RNA (Granite Butte) would only be treated by horse pack or backpack spraying equipment. Motor vehicles would not be used in Wilderness Areas.	A, B, C
Herbicides would be used in accordance with USEPA label instructions and restrictions. Application would be done or supervised by licensed applicators, as required by law.	A, B, C
Use of herbicides would be consistent with the Generic Management Plan and future pesticide Specific Management Plans. This activity would be coordinated with the Montana Department of Agriculture.	A, B, C
Notification of weed spraying operations would be published in the "Outdoor" section of the Helena Independent Record. At trailheads and other entry points, signs would be posted before spraying occurs or when motorized vehicles would be used to spray in areas normally closed to motorized use (on or off road).	A, B
Procedures for mixing, loading, and disposal of pesticides and a spill plan would be followed. These procedures are outlined in Appendix F.	A, B
Glyphosate, picloram, imazapyr, hexazinone, triclopyr, 2,4-D, and dicamba would not be directly sprayed on aspens due to their habitat importance for wildlife.	A, B
Surfactants	
Silicone-base surfactants (including silicone components mixed with non-silicone components such as modified seed oils) would be used outside of riparian areas or other high-runoff sites. They would be tank-mixed and used according to labeling for both the herbicide and surfactant. They would be used primarily on target weeds having a waxy cuticle (especially toadflax and leafy spurge), but other target species in the area may be sprayed from the same tank mix. Surfactants may be used in treatment of a wider variety of target species during periods of drought, or to extend treatment windows when temperatures are acceptable but on the upper end of desired range AND combined with low humidity. Products would be selected that contain only active components and inerts recognized as generally safe by USEPA, or which are a low priority for testing by USEPA. Site characteristic evaluation procedures (RAVE scores) would be used to determine where the application of herbicides mixed with surfactants is suitable.	A, B, C
Dyes	
Water-soluble colorants, such as Hi-Light® blue dye, would be used in some situations to enable applicators and inspectors to better see where herbicide has been applied.	A, B, C
Biocontrols	
Biological agents would not be released until screened for host specificity and approved by the USDA Animal Plant Health Inspection Service. A list of currently available biological controls can be found in **Table 2-8**.	A, B
Biological controls would not be released in designated or recommended wilderness.	A, B, C
Cultural Treatments	
Seeding with native seed would only occur if desirable competitive plants do not reemerge and dominate the vegetation community after the weed species is controlled. This need is predicted to occur on very shallow (poor) soil.	A, B

TABLE 2-4 Environmental Protection Measures	
Measure	**Applies to Alternative(s)**
Adjacent Land	
In cooperation with federal, state, and county agencies, Helena NF boundary land within 1/4-mile to intermingled ownership would be selectively treated to coincide with active weed management on adjacent land. Decisions regarding treatment methods and buffer width on land adjacent to privately owned land or land managed by other agencies would be negotiated between the Forest Service and the other owner/agency.	A, B
Historical Resources	
Historical sites that are eligible for the NRHP or sites with unknown or unresolved eligibility for NRHP, including historic mining resources that have not yet been recorded and evaluated, should not be subjected to handpulling, livestock grazing, and mechanical treatments such as cultivation.	A, B, C
Fragile ruins or other significant cultural sites that could be damaged by off-road travel would be indicated on maps by the Forest archeologist and provided to weed treatment project coordinators. Multiple-trip traffic across these sites would be avoided; all traffic with wheeled vehicles would be avoided if deemed necessary by the archeologist.	A, B, C
Aquatic	
In watersheds where picloram delivery modeling indicated possible exceedances for fall treatments (**Table 2-5**), one or more of the following strategies would be used to eliminate the possibility of an exceedance: Treat some infestations with another appropriate herbicide, if available; Postpone treatment of some infestations for at least 10 to 12 months; and/or Use biological control as appropriate.	A, B, C
Perennial seeps, springs, and wetlands would be marked on the ground and on maps before herbicide is applied. Only aquatic-label herbicides may be used in these areas.	A, B
INFISH standard FA-4 prohibits storage of fuels and other toxicants within Riparian Habitat Conservation Areas and refueling within Riparian Habitat Conservation Areas unless there are no other alternatives.	A, B
Within 300 to 100-foot aerial spray buffers, spot ground-application of herbicides may occur. Herbicide selection would be based on product label restriction and site characteristic evaluation. Providing site characteristics are favorable, persistent chemicals (i.e. picloram) could be used to within 50 feet of live water. Less persistent herbicides would be used within 50 feet, again, based on site characteristic evaluation and in accordance with herbicide label restrictions.	A
Wildlife	
Grazing of sheep/goats for primary purposes of controlling noxious weeds would not occur within the Northern Region Grizzly Bear Recovery Zone or newly occupied areas identified on distribution maps.	A, B
HNF would coordinate with USFWS and Montana Fish, Wildlife and Parks to identify wolf pack locations and determine if a short-duration, high-intensity grazing program for control of noxious weeds is appropriate at that time. If wolf sightings occur within or immediately adjacent to the area, or if predation occurs, grazing animals would be removed immediately; there would be no action taken to jeopardize wolf population.	A, B
Weed treatment operations on ungulate winter ranges would be during summer months. In addition, treatments on summer ranges would be in spring or fall when these ungulate populations are migrating to or from their winter range and are unlikely to have a sizeable presence.	A, B
Grazing by sheep for weed control would not occur in big horn sheep range to avoid the spread of disease.	A, B
Other Habitats	
Ground treatment with selective herbicide to minimize adverse effect may be used under the direction of the appropriate resource specialist.	A, B

HERBICIDE SELECTION

Herbicide selection would be based on environmental conditions such as depth to groundwater, soil type, associated non-target vegetation, and management objectives. The Site Evaluation Form (**Appendix D**) would be used to assess the site. **Table 2-6** displays examples of herbicides proposed for use and a range of application rates. **Table 2-7** indicates the weeds on which various herbicides are used. Herbicide selection considers the following criteria:

- Herbicide label considerations.
- Herbicide effectiveness on target weed species;
- Proximity to water, or other sensitive areas;
- Soil characteristics;
- Potential unintended impacts to non-target species such as conifers or shrubs;
- Application method (aerial, ground);
- Other weed species present at the site, and effectiveness of herbicides on those species (for example spotted knapweed infestations with inclusions of sulfur cinquefoil);
- Adjacent treatments (private land—cumulative effects);
- Timing of treatment (spring, fall); and,
- Priority weed—new invaders vs. existing.

TABLE 2-5
Picloram Treatment Acre Thresholds* in Sensitive Watersheds – Fall Treatments

Watershed	6th HUC**	Maximum Acres Within 300 Feet of Stream	Maximum Acres Outside 300 Feet of Stream
Cave Gulch and Others	10030101110050	37.9	303.3
Chicken Creek Area	17010203040110	47.8	382.1
Favorite Gulch	10030101160060	26.6	212.9
Grizzly-Orofino Gulch	10030101150030	42.6	341.0
Lower Beaver Creek	10030101170050	58.2	465.4
Lower Crow Creek	10030101090050	11.1	88.6
Lower Trout Creek	10030101160030	100.0	799.8
McClellan Creek	10030101120070	143.1	1,144.7
Middle Beaver Creek	10030101170030	14.6	117.0
Middle Crow Creek Tributary	10030101080040	35.8	286.6
Missouri River area	10030101160070	9.4	75.5
Moose Creek area	17010203030100	77.0	615.9
Ophir Creek	17010201070060	51.4	411.2
Oregon Gulch	10030101160040	31.0	248.0
Spokane Creek	10030101160050	28.8	230.2
Spotted Dog Creek East	17010201080020	53.2	425.6
U. Little Blackfoot River North	17010201060050	103.2	826.0
White Gulch	10030101110010	110.7	885.5

Notes:

* Delivery rates for acres within 300 feet of a stream are higher and faster than those for acres outside of 300 feet. The "threshold acreage" is based on use in one area or the other; however, it is most likely that treatment would be a combination of both. The actual threshold is a picloram concentration in the stream of less than .075 parts per million. The Helena NF has developed a spreadsheet to calculate the concentration that considers a combination of treatment areas.

** HUC = Hydrologic Unit Code.

TABLE 2-6
Herbicide Application Rates and Timing

Weed Species	Plant biology	Herbicide	Herbicide Rate	Herbicide Application Timing
Spotted knapweed Diffuse knapweed Yellow starthistle	Tap-rooted	Tordon 22K®	1 pint/ac	Active growth Bolt to early bud; fall
		Curtail®	2 quarts/ac	
		Transline®	2/3 pint/ac	
		2,4-D	1 quarts/ac	Rosette to early bolt
Sulfur cinquefoil	Tap-rooted	Tordon 22K®	1 pint/ac	Active growth
		2,4-D	1 quarts/ac	Rosette to bolt
St. Johnswort	Perennial/Deep-rooted Rhizominous	Tordon 22K®	1 pint/ac	Pre-bloom
		2,4-D	1 quarts/ac	Seedling/pre-bloom
Canada thistle	Perennial/Deep-rooted Rhizominous	Tordon 22K®	1 pint/ac	Late bolt to pre-bud
		Curtail®	2 quarts/ac	Bolt-early bud
		Transline®	2/3 pint/ac	Bolt to pre-bud
		2,4-D	1 quarts/ac	Bolt
Musk thistle	Tap-rooted	Tordon 22K®	1 pint/ac	Rosette to early bolt, fall rosettes
		Curtail®	2 quarts/ac	
		Transline®	2/3 pint/ac	
		2,4-D	1 quarts/ac	Rosette to early bolt
Leafy spurge	Perennial/Deep-rooted Rhizominous	Tordon 22K®	1 quart/ac	Full flower/fall
		Plateau®	8-12 oz/ac	Fall/ prior to first frost
		2,4-D	1 quart/ac	Full flower
Dalmatian toadflax Yellow toadflax	Perennial/ Rhizominous	Tordon 22K®	1to 2 pint/ac	Flower or fall
		Plateau®	8-10 oz/ac	fall
		Telar®	1.5 oz/ac	spring/fall
		2,4-D	1to 2 quarts/ac	flower
Houndstongue	Perennial/ Rhizominous	Escort®	0.25-0.5 oz/ac	Rosette to bolt
		Telar®	1 oz/ac	fall
		2,4-D	1 quarts/ac	Rosette
Common tansy	Perennial/Deep-rooted Rhizominous	Escort®	0.3 to 1.0 oz/ac	Full flower/fall
		2,4-D	1 quarts/ac	Full flower
Oxeye Daisy	Perennial/Shallow-rooted/ Rhizominous	Tordon 22K®	1 pint/ac	Late bud/early bloom
		Escort®	0.5 oz/ac	
		2,4-D	1 quart/ac	
Russian knapweed	Perennial/Deep-rooted Rhizominous	Tordon 22K®	1 pint/ac	Fall, early bud
		Curtail®	2 quarts/ac	Early bud
		Transline®	1 pint/ac	Early bud
		2,4-D	1 quarts/ac	Early bud
Hawkweeds	Perennial/Shallow-rooted/ Rhizominous	Curtail®	2 quarts/ac	Rosette to early bolt
Tansy ragwort	Perennial/ fibrous root	Transline®	1 pints/ac	Rosette to bud; fall
Whitetop	Perennial/ Rhizominous	Escort®	0.3-0.5 oz/ac	Rosette to pre-bud
		2,4-D	1 quarts/ac	Rosette
Cheatgrass	Annual/ fibrous root	Glyphosate	2-4 oz/ac	Early - pre root development
Tall buttercup	Fibrous/Tap-rooted	2,4-D	2 quarts/ac	Rosette to early bolt
		Clarity®	1 quart/acre	

Note: These are the most commonly used herbicides and rates are examples. In all cases, application rates would be those indicated on herbicide labels or less. Ongoing testing may result in new instructions on rate and target species.

TABLE 2-7
Herbicide and Target Weed Species

Chemical Name	Trade Name(s)* for pasture & rangeland herbicides (examples)	Target Weed Species (general)
Chlorsulfuron	Telar®	Dyer's woad, thistles, common tansy, houndstongue, whitetop, tall buttercup,
Clopyralid	Stinger®, Transline®, Curtail®,	Thistles, yellow starthistle, orange hawkweed, yellow hawkweed, diffuse knapweed, Russian knapweed, rush skeletonweed, spotted knapweed, oxeye daisy
Dicamba	Clarity®, Banvel®, others	Houndstongue, yellow starthistle, common crupina, orange hawkweed, yellow hawkweed, diffuse knapweed, spotted knapweed, oxeye daisy, tall buttercup, Canada thistle, blueweed, leafy spurge, tansy ragwort
Glyphosate	Round-up Ultra RT®, Round-up Original®, Rodeo®, Accord®, others	Purple loosestrife, field bindweed, yellow starthistle, Canada thistle, cheatgrass, common crupina, yellow toadflax,
Hexazinone	Velpar®, Velpar L®	Cheatgrass, oxeye daisy, yellow starthistle, Canada thistle
Imazapic	Plateau®	Cheatgrass, leafy spurge
Imazapyr	Arsenal®, Chopper®	Dyers woad, field bindweed
Metsulfuron	Ally®, Escort®	Houndstongue, thistles, sulfur cinquefoil, common crupina, dyers woad, purple loosestrife, common tansy, whitetop, blueweed
Picloram	Tordon 22K®, Tordon RTU®	Houndstongue, thistles, yellow starthistle, sulfur cinquefoil, common crupina, orange hawkweed, yellow hawkweed, diffuse knapweed, Russian knapweed, spotted knapweed, rush skeletonweed, common tansy, Dalmatian toadflax, yellow toadflax, leafy spurge
Sulfometuron	Oust®	Cheatgrass, whitetop, oxeye daisy, tansy ragwort, musk thistle
Triclopyr	Garlon 3A®, Garlon 4®, Redeem®, Remedy®	Yellow hawkweed, orange hawkweed, sulfur cinquefoil, purple loosestrife, diffuse knapweed, spotted knapweed, oxeye daisy, thistles, Russian knapweed
2,4-D	numerous	Musk thistle, sulfur cinquefoil, common crupina, dyers woad, Russian knapweed, purple loosestrife, tall buttercup, whitetop, spotted knapweed

TABLE 2-8
Biological Control Agents

Target Weed	Agent	General Mode of Action
Knapweeds	*Agapeta zoegana* (moth)	Root miner
	Bangasternus fausti (weevil)	Seed head feeder
	Chaetorellia acrolophi (fly)	Seed head feeder
	Cyphocleonus achates (weevil)	Root miner
	Larinus minutus (weevil)	Seed head feeder
	Larinus obtusus (weevil)	Seed head feeder
	Metzneria paucipunctella (moth)	Seed head feeder
	Pelochrista medullana (moth)	Root miner
	Pterolonche inspera (moth)	Root miner
	Sphenoptera jugoslavica (beetle)	Defoliator, root miner
	Terellia virens (fly)	Seed head feeder
	Urophora affinis (fly)	Seed head feeder
	Urophora quadrifasciata (fly)	Seed head feeder
Yellow starthistle	*Bangasternus orientalis* (weevil)	Seed head feeder
	Chaetorellia austalis (fly)	Seed head feeder
	Eustenopus villosus (weevil)	Seed head feeder
	Larinus curtus (weevil)	Seed head feeder
	Urophora sirunaseva (fly)	Seed head feeder
Purple loosestrife	*Galerucella calmariensis* (beetle)	Defoliator
	Galerucella pusilla (beetle)	Defoliator
	Hylobius transversovittatus (weevil)	Root miner, defoliator
	Nanophyes brevis (weevil)	Seed head feeder
	Nanophytes marmoratus (weevil)	Seed head feeder
Rush skeletonweed	*Cystiphora schmidti* (gall midge)	Galls leaves/stem
	Eriophytes chondrillae (gall mite)	Galls terminal buds
	Puccinia chondrillina (rust fungus)	Rusts foliage/flowers
Leafy spurge	*Apthona abdominalis* (flea beetle)	Defoliator, root miner
	A.cyparissiae (flea beetle)	Defoliator, root miner
	A.czwalinae (flea beetle)	Defoliator, root miner
	A.flava (flea beetle)	Defoliator, root miner
	A.lacertosa (flea beetle)	Defoliator, root miner
	A nigriscutis (flea beetle)	Defoliator, root miner
	Chamaesphecia empiformis (moth)	Root miner
	C.hungarica (moth)	Root miner
	C.tenthrediniformis (moth)	Root miner
	Dasineura sp. nr. Capsulae (gall midge)	Galls growing tips
	Hyles euphorbiae (hawkmoth)	Defoliator
	Oberea erythrocephala (beetle)	Feeds on crown/root
	Spurgia esula (gall midge)	Galls growing points
St. Johnswort	*Agrilus hyperici* (beetle)	Feeds on stem/roots
	Aplocera plagiata (moth)	Feeds on foliage
	Chrysolina hyperici (beetle)	Feeds on leaves/flowers
	C.quadrigemina (beetle)	Feeds on leaves/flowers
	Zeuxidiplosis giardi (gall midge)	Galls leaves
Tansy ragwort	*Longitarsus jacobaeae* (flea beetle)	Root miner
	Pegohylemyia seneciella (fly)	Feeds on flower
	Tyria jacobaeae (tiger moth)	Feeds on terminal buds
Canada thistle	*Ceutorrhynchus litura* (weevil)	Defoliator
	Larinus planus (weevil)	Seed head feeder
	Urophora cardui (fly)	Creates galls in stem
Dalmatian toadflax Yellow toadflax	*Brachypterolus pulicarius* (beetle)	Flower feeder
	Calophasia lunula (moth)	Foliage feeder
	Gymnetron antirrhini (weevil)	Seed head feeder

MONITORING

Monitoring is part of the *Alternatives Considered in Detail*. The monitoring described below applies to Alternatives A and B unless otherwise noted.

WEEDS

The current monitoring effort (see *Ongoing Weed Treatment, Prevention, and Education Program*) would be expanded by placing greater emphasis on leafy spurge, spotted knapweed, Canada thistle, and musk thistle. Monitoring of these species would be in addition to species already monitored.

- Density and rate of spread of invasive exotic plant species and the effect these aggressive plants have on natural resources;
- Effects of treatment on non-target plants;
- Effectiveness of biological control agents; and
- Effects of cultural weed management activities.

WATER

Water quality monitoring of herbicide would focus on nine representative watersheds. These nine watersheds represent various geo-climatic conditions throughout the Helena NF. Monitoring may include groundwater monitoring in selected wells in close proximity to application sites. Potential herbicide movement, effects of noxious weeds on soil erosion, and stability that coincides with infiltration and runoff from designated areas within the watersheds will be measured. Monitoring involves collection of data to determine effectiveness of management actions in meeting prescribed objectives. Monitoring would focus on:

- Effects of herbicides and other treatment methods on surface water and groundwater quality.

SOIL

Monitoring potential weed treatment effects on soil quality parameters would be accomplished through a soil-monitoring program. This program would include periodic sampling and evaluation of the resultant plant community following weed control as an indicator of overall soil production and quality. Soil erosion would be monitored by collecting runoff from treated areas and measuring sedimentation rates. The soil microbial population would be monitored by performing microbiologic assays on soil samples collected from various depths throughout the soil profile. Herbicide mobility in treatment areas would be evaluated by collecting soil samples from various depths for analysis of herbicide concentrations using appropriate analytical methods for the applied herbicide.

ADAPTIVE MANAGEMENT STRATEGY

The adaptive management strategy applies to Alternatives A and B and is made up of two principle components:

1. To quickly and effectively treat newly discovered weed infestations, a decision tree based on site characteristics, weed species, and location would be used to select treatment methods.

While initial treatments of noxious weeds are expected to be effective in reducing existing weed infestations, all infestations cannot be treated immediately due to budgetary and logistical constraints. Seven years may be required to accomplish initial treatments. In addition, every acre of the Helena NF has not been inventoried for noxious weeds. Existing infestations will expand before they can be initially treated, and new areas would be identified, possibly including locating weed species that were previously not known to occur on the Forest. New species may be added to the Montana state and county and the North American weed lists. Some of these weeds may currently exist on the Forest.

For analysis purposes, the adaptive management strategy in Alternatives A and B assumed up to 25 percent more acres may be identified as needing treatment within the 12-year time frame of the EIS. It is possible that treatment success would offset new acres, resulting in little overall change in treatment acres. The strategy includes:

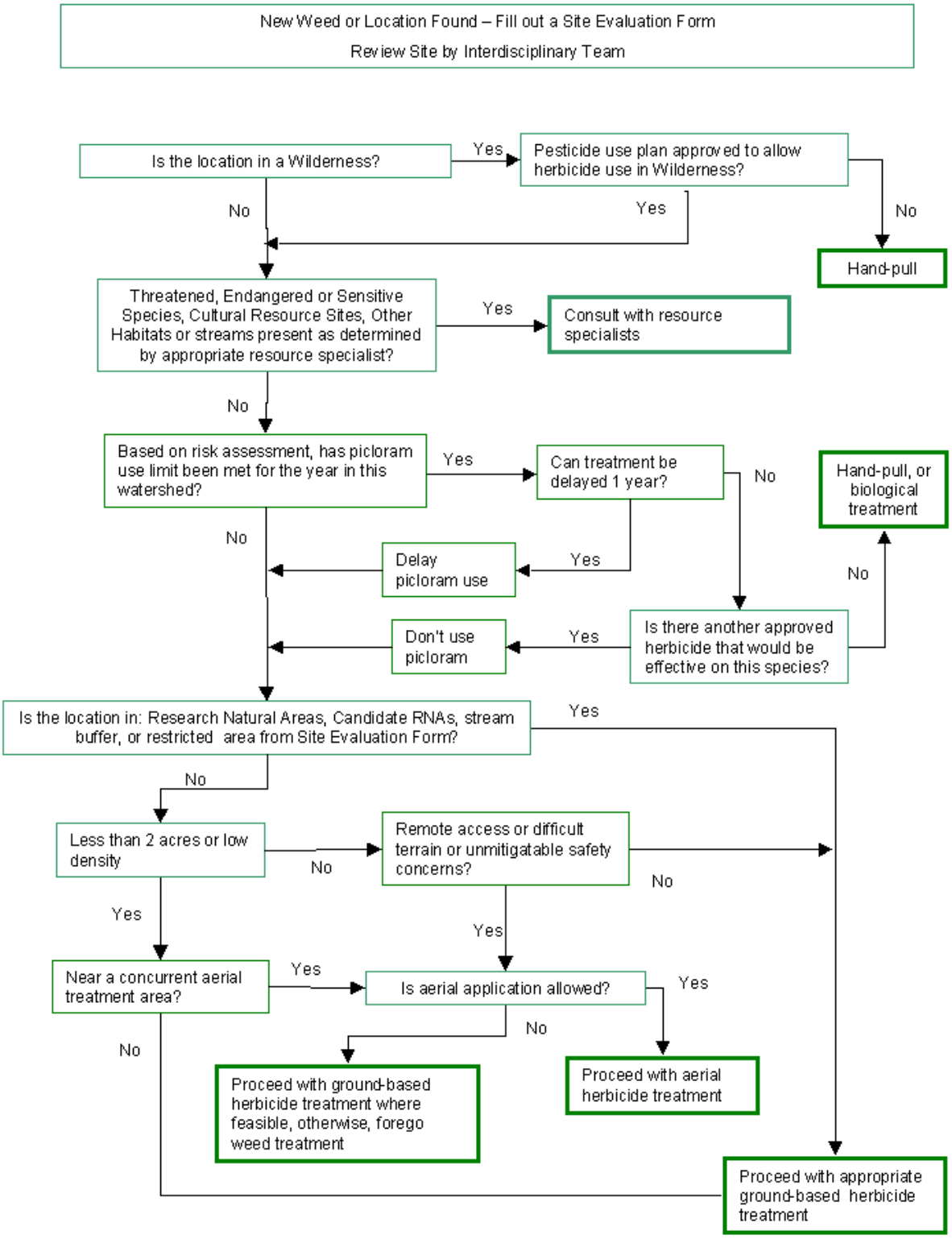
- The decision (if and how) to treat newly discovered infestations would be driven by a site characteristic evaluation. The Site Evaluation Form (Appendix D) would be used in the decision tree (Diagram 2-1).
- New invaders, as identified by local and State agencies, would be given high priority for eradication, if feasible.
- New infestations may be treated with herbicide as long as the acres treated remain within the limits described above. If new infestations result in treatment beyond identified acres, further NEPA analysis would be required.
- Appropriate methods and environmental protection measures described above would be used.

2. To improve effectiveness and reduce impacts, new technologies, biocontrols, or herbicides would be evaluated for use.

New technology, biocontrols, herbicide formulations, and supplemental labels are likely to be developed within the next 12 years. These new treatments would be considered when there are indications that they would be more weed-specific than methods analyzed here, less toxic to non-target vegetation, or less persistent and less mobile in the soil. Newly registered, water-soluble herbicides that display toxicity, leaching, and persistence characteristics less than or equal to picloram (which is considered in the effects analysis in Chapter 4) may be used. The Adaptive Management Strategy would allow incorporation of these new treatment methods:

- New herbicides or formulations registered and approved by the USEPA would be applied according to label specifications;
- Application methods and environmental protection measures described above would be used;
- The decision by the line officer to use a new treatment method would be driven by effectiveness monitoring, water quality monitoring, an interdisciplinary review to confirm that the new treatment is within the scope of the analysis in this EIS, and a site characteristic evaluation (see Diagram 2-1);
- New biocontrols are approved and certified by the Animal Plant Health Inspection Service; and
- Cost effective mechanical methods of treatment are developed. These methods would be reviewed before use to determine if soil and water quality standards can be maintained.

Diagram 2-1 Decision Tree for New Weed Locations



SUMMARY COMPARISON OF ALTERNATIVES

Tables 2-9 through **2-11** provide a summary comparison of the three alternatives analyzed in relation to their relationship to the Purpose and Need, the extent to which they address significant issues, and the extent to which they address public concerns.

Agency's Preferred Alternative

After reviewing the environmental effects, Alternative A – Proposed Action is the preferred alternative.

TABLE 2-9
Meeting the Purpose and Need

Purpose and Need Statement	Alt. A	Alt. B	Alt. C
Control Noxious Weeds (acres)	22,668	18,913	15,871

TABLE 2-10
Addressing Significant Issues

Issue	Alt. A	Alt. B	Alt. C
1. Potential effects on human health, non-target vegetation, and wildlife from aerial application.			
Issue Indicator: Acres of **aerial** herbicide application (total).	11,086	0	0

TABLE 2-11
Addressing Public Concerns

Concern	Alt. A	Alt. B	Alt. C
Effects of weed treatment on water quality, groundwater, and fisheries			
	Low risk with environmental protection measures in place	Low risk with environmental protection measures in place.	Low risk with environmental protection measures in place.
Effects of weed treatment on native grasses, forbs, shrubs, and trees			
	1-3 year reduction in growth for individual plants from herbicides on 22,668 acres. More selective herbicides can be used.	1-3 year reduction in growth for individual plants from herbicides on 18,913 acres. More selective herbicides can be used.	1-3 year reduction in growth for individual plants from herbicides on 15,871 acres. Herbicide selection limited.
Effects of weed treatment on wildlife			
	No effects from herbicides. Short-term disturbance (between alternatives considered) from application, handpulling.	No effects from herbicides. Short-term disturbance (highest of alternatives considered) from application, handpulling.	No effects from herbicides. Short-term disturbance (lowest of alternatives considered) from application, handpulling.
Cost of proposed treatments for the initial treatments			
Per Acre Total	$44.23 to $48.84 $1,002,510 to $1,106,994	$66.51 to $68.52 $1,257,974 to 1,295,942	$62.00 $987,350
Effects on human health from herbicide use			
	No health effects or risks to worker or general public.	No health effects or risks to worker or general public.	No health effects or risks to worker or general public.
Effects of weed treatment on insects			
	No effect	No effect	No effect
Effects of weed treatment on recreationists and adjacent landowners			
	Short-term disturbance (middle)	Short-term disturbance (highest)	Short-term disturbance (lowest)
Effects of weed treatment on wilderness, inventoried roadless areas, research natural areas, unroaded areas			
Acres Treated Wilderness IRA RNA	 68 2,399 5	 68 1,418 5	 <3 1,038 5
Effects on apparent naturalness and natural integrity	Improved through reduction of weed invasion.	Improved through reduction of weed invasion on 60% of infested acres. Long-term reduction as remaining weeds spread.	Improved through reduction of weed invasion on 43% of infested acres. Long-term reduction as remaining weeds spread.
Effects of weed treatment on sensitive areas and important ecological communities			
	No effects with environmental protection measures.	No effects with environmental protection measures.	No effects with environmental protection measures.
Effects of herbicide use on soil			
	Slight, temporary reduction in productivity, long-term improvement on 100% of infested area.	Slight, temporary reduction in productivity, long-term improvement on acres treated (83% of infested area). Decrease on areas not treated.	Slight, temporary reduction in productivity, long-term improvement on acres treated (70% of infested area). Decrease on areas not treated.
Weed treatment effectiveness			
	High on 100% of infested areas.	High on 83% of infested area, ineffective on 17%.	High on 70% of infested area, ineffective on 30%.
Effects of noxious weeds			
Noxious weeds have negative impacts on wildlife habitat, water quality, recreational values, soil productivity, wilderness and IRAs.	100% of infested areas treated with provisions for new infestations to be treated, reducing effects of noxious weeds.	83% of infested areas treated with provisions for new infestations to be treated in most areas, reducing effects of noxious weeds.	70% of infested areas treated with no provisions for new infestations to be treated without further NEPA decisions. Effects of noxious weeds likely to increase.