1998

Bighorn National Forest Draft Noxious Weed Management Environmental Assessment

United States Forest Service

Follow this and additional works at: https://digitalcommons.usu.edu/govdocs

Part of the Environmental Sciences Commons

Recommended Citation
https://digitalcommons.usu.edu/govdocs/384

This Report is brought to you for free and open access by the U.S. Government Documents (Utah Regional Depository) at DigitalCommons@USU. It has been accepted for inclusion in All U.S. Government Documents (Utah Regional Depository) by an authorized administrator of DigitalCommons@USU. For more information, please contact rebecca.nelson@usu.edu.
The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at (202) 720-2600 (voice or TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.
CHAPTER I: PURPOSE AND NEED FOR PROPOSED ACTION

The Forest Service proposes to implement a management plan to control noxious weeds on the Bighorn National Forest. This management plan would be in accordance with general direction in the Land and Resource Management Plan (LRMP) to treat noxious farm weeds (Bighorn National Forest LRMP, III-45) to improve range conditions and manage undesirable plant species. Five additional Federal Laws also address this action:


The proposed action would implement a comprehensive noxious weed control management plan following the guidelines in Forest Service Pesticide-use, Management and Coordination Handbook, FSH 2109.14. The management plan would include:

A. Priorities for Treatment

Based on LRMP direction, treatment of noxious farm weeds would be done in the following priority:

1. Leafy spurge, whitetop, Yellow Toadflax and Russian knapweed;
2. Invasion of new plant species classified as noxious farm weeds;
3. Infestation in new areas;
4. Expansion of existing infestations of Canada and musk thistle, and other noxious farm weeds; and
5. Reduce acreage of current infestation.

B. Prevention Program

The prevention program would incorporate the following:

1. Special Use Permit Clauses that minimize the introduction of non-native seed sources.
2. Seeding projects would require the use of certified weed free seed.
3. Timber Sale Contract Clauses would be incorporated to minimize or reduce the spread and initial infestation of noxious weeds.
4. Forest User restrictions would be developed to reduce the introduction of non-native seed and plant sources. As an example, on September 1, 1994 the Forest Service required all hay, straw, and mulch used on National Forest System lands in
Wyoming to be certified as noxious weed-free. This requirement affects all persons who use National Forest System lands in Wyoming, including but not limited to, users of pack and saddle stock, outfitters, ranchers with grazing permits, ski areas, and certain contractors.

5. Maintain a public education and information effort to keep the public informed of the economic and habitat impacts of noxious and invasive weeds.

C. Inventory

Initial mapping of infested sites on each ranger district has been completed on 1:24000 topographic maps. These maps show infestation levels and areas of infestation to help determine the approximate acreage affected by weeds and will be coordinated with County Weed and Pest Districts.

Noxious weeds are defined as plants that are especially undesirable, troublesome, and/or difficult to control. (All of the noxious weeds listed in Table 1 are "non-native" species, with the exception of skeleton leaf bursage which is a native of the plains region, and have been introduced to North America from other continents, primarily Europe, Asia, and the Middle East.

Table 1 lists noxious weeds that would be treated when found on National Forest System lands. As indicated, the list coincides with noxious weed species identified as priority weeds to control in Wyoming and will be updated as new species are listed. The table also indicates Forest priority weeds that pose the highest threat to natural ecosystems on the Bighorn National Forest because they are already established on or near the analysis area.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
<th>State Listed in Wyoming</th>
<th>Forest Priority</th>
<th>Est. Forest Acreage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field bindweed</td>
<td>Convolvulus arvensis</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada thistle</td>
<td>Cirsium arvense</td>
<td>Yes</td>
<td>Yes</td>
<td>10,953</td>
</tr>
<tr>
<td>Leafy spurge</td>
<td>Euphorbia esula</td>
<td>Yes</td>
<td>Yes</td>
<td>4.5</td>
</tr>
<tr>
<td>Perennial Sowthistle</td>
<td>Sonchus arvensis</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quickgrass</td>
<td>Agropyron repens</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hoary Cress</td>
<td>Cardaria spp</td>
<td>Yes</td>
<td>Yes</td>
<td>144</td>
</tr>
<tr>
<td>Perennial pepperweed</td>
<td>Lepidium latifolium</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ox-eye-daisy</td>
<td>Chrysanthemum leucanthemum</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skeleton leaf bursage</td>
<td>Ambrosia tomentosa</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russian knapweed</td>
<td>Centaurea repens</td>
<td>Yes</td>
<td>Yes</td>
<td>111</td>
</tr>
<tr>
<td>Yellow toadflax</td>
<td>Linaria vulgaris</td>
<td>Yes</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>Dalmatian toadflax</td>
<td>Linaria dalmatica</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Scotch thistle</td>
<td>Onopordum acanthium</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Musk thistle</td>
<td>Carduus nutans</td>
<td>Yes</td>
<td>Yes</td>
<td>29.05</td>
</tr>
<tr>
<td>Common burdock</td>
<td>Acanthus minus</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plumeless thistle</td>
<td>Carduus acanthoides</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyer's woad</td>
<td>Isatis tinctoria</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Houndstongue</td>
<td>Cynoglossum officinale</td>
<td>Yes</td>
<td>Yes</td>
<td>3379.5</td>
</tr>
<tr>
<td>Spotted knapweed</td>
<td>Centaurea maculosa</td>
<td>Yes</td>
<td>Yes</td>
<td>Suspected</td>
</tr>
<tr>
<td>Diffuse knapweed</td>
<td>Centaurea diffusa</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Johnswort</td>
<td>Hypericum perforatum</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horsenettle</td>
<td>Solanum carolinense</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purple loosestrife</td>
<td>Lythrum salicaria</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A determination of acreage by level of infestation would be based on the following criteria:

- Low - occasional plant per acre, less than 5 percent canopy cover.
- Moderate - widely scattered plants, 6-25 percent canopy cover.
- High - increased density, 26-100 percent canopy cover.

D. Plant Control Program

The proposed action includes an integrated approach to control of noxious weeds utilizing herbicide application, manual and mechanical means, and biological agents (such as insects and livestock) to annually treat an estimated 800-1000 acres of noxious weeds. The proposed action would allow for the selection of the method(s) of control that are best suited for achieving the specific control objectives for the various species of weeds. Implementation of the plan would begin in 1998 and proceed until additional site specific information warrants additional analysis. Herbicides, manual and mechanical control methods would be used to eradicate new infestations of noxious weeds such as knapweed and leafy spurge. Treatment would be initiated while the infestations are still small.

Biological control techniques would generally be used more frequently on noxious weeds that have already infested areas on a broader scale.
Treatment with herbicides would include using ground vehicles, backpack sprayers, mechanical and manual methods of application. The majority of ground vehicle use would require use of hand held spraying equipment (hoses and nozzles) to direct treatment to target vegetation. The use of truck mounted booms would be used only in areas where target vegetation is dense enough and the acreage is large enough to effectively use a boom without treatment of non-target vegetation. The use of booms would be minimized. Manual treatments would include hand picking and/or grubbing with hand tools. Mechanical treatments would include plowing, diskng, tilling, and burning. Biological treatment includes grazing, insects, and pathogens. The Allotment Management Plan (AMP's) or Annual Operating Instructions (AOI's) will be used to manage grazing use. Using sheep or goats could be applied to small areas for short periods. Areas where insects and pathogens naturally occur or are introduced would be managed to maintain the density of host plants upon which the relationship between host plant and controlling organism depends.

Seeding of native desirable plant species could be a practice used following actual control of undesirable plant species. Seeding is often required to establish a groundcover to prevent reestablishment of undesirable vegetation. Seeding of perennial grass species following herbicide control of leafy spurge has been recognized as a method to achieve long term control of leafy spurge. (Whitson, Bottoms, Feuz, Swearingen, and Koch. 1994).

Integrated Weed Management would allow the most effective control methods to be implemented against target plants. Various noxious weeds and undesirable plants respond differently to different control methods. See Appendix B for the effectiveness of the various control methods currently available.

2. PURPOSE AND NEED FOR ACTION

A key objective of the proposed action is to maintain native plant communities and their diversity through reducing the spread of noxious weeds, and to increase desired plant species to meet Forest Land and Resource Management Plan (LRMP) objectives.

Noxious weeds are a major concern over vast areas of the western United States and they are continuing to spread. Noxious weeds exist throughout the Bighorn National Forest. The trend of infestation continues to be upward, especially infestations of Canada thistle (Cirsium arvense), Musk thistle (Carduus nutans), Leafy spurge (Euphorbia esula), Yellow toadflax (Linaria vulgaris), Whitetop (Cardaria spp), Houndstongue (Cynoglossum officinale) and Russian knapweed (Centaurea repens). Many other noxious weeds exist on the National Forest as indicated in Table 1, however they have not increased in frequency as much as these particular species. Maps (1:24,000 scale) indicating the locations of undesirable plants can be found in the project file and clearly illustrate the wide spread infestation of weeds across the analysis area. Approximate acreage of weed species on each Ranger District can be found in Appendix F.

There is a need to control or eradicate undesirable plant species, designated noxious weeds and declared noxious weeds (see Glossary) on National Forest System (NFS) lands. The Wyoming Weed and Pest Control Act of 1973 (W.S. 11-5-101 - 11-5-119) and the Wyoming Weed and Pest Special Management Program (W.S. 11-5-301-11-5-303) requires all counties and municipal authorities to develop and follow a weed management plan. Through this act, the State designates priority lists of noxious weeds requiring treatment for control. These laws are consistent with the Carlson-Foley Act of 1968. As specified in this Law, the Forest Service is "authorized and directed to permit the Commissioner of Agriculture or other proper agency head of any State in which there is in effect a program for the control of noxious plants to enter upon any land under (the federal agency's) control or jurisdiction and destroy noxious plants growing on such land."

Noxious weeds can lead to establishment of an undesirable vegetation monotype in which plant species present can cause significant decline in watershed conditions, reduce valuable forage species needed for wildlife habitat and livestock grazing, and cause a decline in high forage and habitat values. Infestation will also replace native vegetation reducing natural diversity in plant species composition, and may limit recreation opportunities. Failure to control noxious weeds can significantly cut production of crops and desirable vegetation on adjacent private lands. Other needs associated with the proposed action are to maintain or improve the visual quality of the National Forest through maintenance of natural vegetation.

Complete elimination of noxious weeds is the desired condition on infested lands. While this is not possible on most areas, the goal will then be to prevent, control, and/or contain the spread of noxious weeds. Where possible sites currently infested with undesirable plants will have the undesirable plant's spread contained, decreased in size, and eventually eliminated. Native plant species would be reestablished on sites where weeds have been controlled or eliminated.

A. Background Information Tied to Purpose and Need

In the State of Wyoming the estimated gross acres of infestation are shown in Table 2. The purpose of this information is to demonstrate the high probability for noxious weeds to continue to spread onto National Forest System lands within the analysis area.
Table 2 - Estimated Gross Acres of Infestation in Wyoming (1996)

<table>
<thead>
<tr>
<th>Weed</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada thistle</td>
<td>112,200</td>
</tr>
<tr>
<td>Common Burdock</td>
<td>5,700</td>
</tr>
<tr>
<td>Dalmation Toadflax</td>
<td>4,500</td>
</tr>
<tr>
<td>Diffuse Knotweed</td>
<td>500</td>
</tr>
<tr>
<td>Houndstongue</td>
<td>31,800</td>
</tr>
<tr>
<td>Leafy Spurge</td>
<td>22,500</td>
</tr>
<tr>
<td>Musk thistle</td>
<td>54,300</td>
</tr>
<tr>
<td>Perennial Pepperweed</td>
<td>7,300</td>
</tr>
<tr>
<td>Purple Loosestrife</td>
<td>40</td>
</tr>
<tr>
<td>Russian Knotweed</td>
<td>44,600</td>
</tr>
<tr>
<td>Spotted Knotweed</td>
<td>3,400</td>
</tr>
<tr>
<td>White top</td>
<td>30,600</td>
</tr>
<tr>
<td>Yellow Toadflax</td>
<td>5,400</td>
</tr>
<tr>
<td>Scotch Thistle</td>
<td>1,200</td>
</tr>
<tr>
<td>Dyer's Woad</td>
<td>1,100</td>
</tr>
<tr>
<td>Quackgrass</td>
<td>1,000</td>
</tr>
<tr>
<td>Oxeye Daisy</td>
<td>500</td>
</tr>
<tr>
<td>Common St. Johnswort</td>
<td>50</td>
</tr>
<tr>
<td>Tansy Ragwort</td>
<td>5</td>
</tr>
</tbody>
</table>

Five separate Environmental Impact Statements (EIS's) are relevant to the needs discussed in this document and will be tiered to (40 CFR 1502.20) and incorporated by reference (40 CFR 1502.21) into this document. Tiering is done to eliminate duplication and reduce excessive paperwork. These documents include:

1. Bureau of Land Management Final EIS as supplemented for the Northwest Area Noxious Weed Control Program, December 1985;
2. Final EIS for Vegetation Treatment on BLM Lands in Thirteen Western States, May 1991;
3. Final EIS for the Noxious Weed and Poisonous Plant Control Program, October, 1986 (Intermountain Region, United States Forest Service);
4. Risk Assessment for Herbicide Use in Forest Service Regions 1,2,3,4 and 10 and on Bonneville Power Administration Sites, September 1992, USDA, Forest Service;

The location of these documents is indicated in Appendix C, References.

B. Decision To Be Made

The Forest Supervisor will make the following decisions:

1. Whether to implement a management plan for control of undesirable plant species referred to as noxious weeds.

2. If a control program is implemented, which control methods and techniques are approved for use, over what period of time and what is the estimated acreage to be treated annually. Control methods and techniques could include biological control agents such as insects, herbicides,
3. ISSUES

An issue is defined as a point of discussion, debate or dispute concerning environmental effects. Scoping began in 1997. Articles were published in the local newspapers and letters sent to interested individuals and groups. Internal and external scoping revealed a number of issues related to treatment of undesirable plants. In addition, scoping was conducted for Environmental Impact Statements (EIS's) referenced in this document. For the purpose of this analysis these issues were divided into issues affecting alternative development and those that did not affect alternative development. Issues are used to formulate alternatives, prescribe mitigation measures and as a basis for analyzing effects. Issues were determined important enough to influence alternative development because of the geographic distribution of their effects, the intensity of interest, or potential resource conflicts.

The issues are described by three components: an issue statement, a brief background statement, and a list of indicators used to measure the effects of the proposed activities relative to the issue. The Issue and associated indicators can be tracked in Chapter 4 for each alternative.

A. Issues Affecting Alternative Development

1a. Issue - Noxious weed infestations located on National Forest System lands would provide a seed source for infestation downstream to neighboring private lands, and along streambanks. Water borne seeds are transmitted to farm fields by irrigation causing substantial degradation of croplands used for farming and grazing.

Failure to implement a noxious weed control program on National Forest System lands in Wyoming could result in a violation of state laws. Wyoming Weed and Pest Control Act of 1973 (W.S. 11-5-101 - 11-5-119) and Wyoming Weed and Pest Special Management Program (W.S. 11-5-301 - 11-5-303) require treatment and control of noxious weeds on lands in Wyoming. The intent of State weed laws is to develop a comprehensive weed control program involving State, Federal, County, and private landowners. Successful weed control programs require participation of all landowners within a watershed in order to control the spread of noxious weeds. Non-participation by even one landowner can negate the attempted control activities of those remaining.

1b. Indicator: Potential for spread of undesirable plants downstream onto private lands.

2a. Issue - Chemical (herbicide) use could present a health hazard to humans if not handled, applied, or stored properly. Improper use of herbicides could increase risks to workers and the public during treatment of undesirable vegetative species.

In estimating worker risk, information is used about application equipment employed by each worker, total amount of active ingredient applied on a daily basis, dermal penetration of each chemical, and the protective clothing worn during application.

A second part of this issue dealt with the option of using biological control agents in place of herbicides. The Forest Service is cooperating with local management agencies to further explore use of biological controls, particularly insect control, as a long-term and permanent solution to the problem of controlling undesirable vegetation.
2b. Indicator: Potential health risks to workers and the public through contact with herbicides

3a. Issue - Failure to implement an undesirable plant management and control program could cause resource damage. Noxious weed species are known to have low values for watershed protection, provide poor ground cover for soils, low forage values for wildlife and livestock, and can degrade wildlife habitats. (Kurz 1996).

Part of this issue is described in the Intermountain Region’s FEIS in the effectiveness of the various control methods and need for integrated control and control method research.

3b. Indicator: Resource conditions on National Forest System Lands

4a. Issue - Non-target vegetation and free flowing water valuable to wildlife and fish habitats could be adversely affected when using herbicides to control undesirable plant species. Some non-target wildlife, fish, and/or plant species could be listed as sensitive species by the Forest Service Rocky Mountain Region, or as threatened or endangered under the Endangered Species Act.

The public raised similar issues in its comment letters on the Final Northwest Area Noxious Weed Control Program Environmental Impact Statement (FEIS) developed by the Bureau of Land Management (BLM).

An issue described in the Supplement to the BLM FEIS concerned the appropriateness of using herbicides to control or eradicate noxious weeds. The issue dealt with the effects of the herbicides on ground water, streams, and soils? What effects on biological diversity may be caused by use of herbicides?

4b. Indicator:


2. Potential for treatment of non-target vegetation and potential for herbicide contamination of free flowing water.

5a. Issue - An issue described in the FEIS of the Intermountain Region on Noxious Weed and Poisonous Plant Control Program was the loss of investments on public and private lands from invasion of noxious weeds and poisonous plants.

5b. Indicator: Economic impacts of noxious weeds on public and private lands. The environmental consequences chapter of the EIS referenced in the issue statement would be tiered to for tracking of this issue.

B. Issues Not Affecting Alternative Development

The following were not considered to be major issues in this analysis. It is important to specify that there may be some cause and effect relationships associated between these issues and the proposed action, however, the intensity and context of the issue are not great enough to be used for development of alternatives.

1. Range forage production is decreasing on lands where undesirable plant species infestation is heavy. Although weed infestations are numerous across the project area they are not frequent or large enough to cause a measurable decline in forage for wildlife and livestock affecting the overall carrying capacity at this time. The Forest Service recognizes noxious weed infestations on some private lands have been substantial enough to adversely affect forage production. The potential for noxious weed seeds to move from National Forest System lands and adversely affect private lands is covered in Issue #1.

2. Management activities could cause disturbance and/or displacement of wildlife. Implementation of a noxious weed control program would require some activity, however it would be as incidental and infrequent as locations of the noxious weeds. Therefore, any actual disturbance and/or displacement of wildlife would be infrequent and of very short term. It is important to note that control activities would also occur temporarily during the vegetation-growing season, thus limiting potential disturbance to wildlife.

3. Grazing and other management activities designed to address noxious weeds could require additional fencing resulting in wildlife mortalities due to entanglement or collision. Fences might also affect wildlife distribution. Fencing is generally not an integral part of noxious weed management and it is not part of the proposed action. If fences were proposed as mitigation measures for an alternative, they would be constructed to Forest Service approved standards designed to meet wildlife needs. Existing fences on the National Forest are not known to have negative effects on wildlife distribution, thus limited additional fencing would not be expected to have negative effects.

4. Internally the issue was raised regarding aerial application of herbicides and the potential effects on natural resources, especially non-target vegetation. The proposed action does not include aerial application of herbicides. Aerial application of herbicides was an alternative considered, but not in detail. Aerial application of herbicides is not a control method included in any of the action alternatives considered in detail.
CHAPTER II: ALTERNATIVES

This chapter describes alternatives considered to the proposed action for implementation of an undesirable plant management plan. Alternatives are developed to address one or more issues by taking different approaches to controlling plants. This chapter also provides a comparison of alternatives describing basic outputs and differences between alternatives.

Three alternatives were developed based on the 5 issues described in Chapter I. The alternatives are:

1) Integrated Weed Management (IPM) - Proposed Action. This alternative would implement a Forest-wide Undesirable Plant Species and Noxious Weed Management Program.

2) Weed Management (No herbicides). This alternative would implement a Forest-wide Undesirable Plant Species and Noxious Weed management program; however, herbicides would not be included as a plant control method.

3) No Action. A management plan for the control of undesirable plants would not be implemented on the Bighorn National Forest.

I. Alternative A: Integrated Weed Management - IPM (The Proposed Action)

This alternative was developed to address Issues #1,3, and 5.

This alternative includes an integrated approach to undesirable plant species treatment utilizing herbicide application, manual and mechanical treatments, and biological agents (such as insects and livestock) to annually treat an estimated 800-1000 acres of noxious weeds. Project areas have been mapped on 1:24,000 scale topographic maps for each Ranger District. The maps indicate the primary noxious weeds that are present and their densities.

The use of herbicides, manual techniques, and mechanical techniques would be used primarily on new infestations of noxious weeds where complete eradication would be desired to prevent widespread infestations. The use of biological controls would be used on the more widespread infestations of weeds. The following chart shows the approximate amount of acres to be treated each year for each of the various control methods.

<table>
<thead>
<tr>
<th>Control Method</th>
<th>Acres to Be Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbicide</td>
<td>585</td>
</tr>
<tr>
<td>Manual</td>
<td>5</td>
</tr>
<tr>
<td>Mechanical</td>
<td>10</td>
</tr>
<tr>
<td>Biological:</td>
<td></td>
</tr>
<tr>
<td>Insects</td>
<td>375</td>
</tr>
<tr>
<td>Livestock</td>
<td>25</td>
</tr>
<tr>
<td>Total:</td>
<td>1000</td>
</tr>
</tbody>
</table>

The Forest Service would use, or allow cooperators to use only those herbicides registered by the Environmental Protection Agency (EPA) for the control of undesirable plant species. These herbicides may be premixed by the manufacturer or tank mixed by the applicator. The following is a brief, but not all inclusive, listing of those herbicides that may be used: Bromacil, Bromacil + Duron, Chlorosulfuron, Clopyralid, 2,4-D, Dicamba, Dicamba+2,4-D, Duron, Glyphosate, Glufosinate, Hexazinone, Imazaquin, Meflozin, Metribuzin, Methobizin, Methiocarb, Metribuzin + 2,4-D, Simazine, Sulfometuron Methyl, Tebumitan and Triadimefon. Each herbicide may also contain emulsifiers, solvents, preservatives, anti- volatilization agents, or other substances commonly referred to as inert. As additional herbicide formulations are developed and approved they would also be available for use where applicable.

It is important to note that a list of herbicides is included in the alternative due to the variability in characteristics specific to each chemical. For example, some herbicides have been developed to be selective for controlling only broadleaf plants and will not control grass species. In other cases, herbicides have characteristics that allow control of the mature plant as well as seedling emergence in the year following initial herbicide application. The ability to select proper herbicides for the identified target species allows the best control, minimizes secondary affects and minimizes treatment of non-target vegetation. Reference is made to the 1995-1996 Weed Management Handbook for Montana, Utah, and Wyoming, pages 196-227 for herbicide use on problem weeds.

Herbicides will be applied and monitored in accordance with direction in Forest Service Manual 2150 and 2200. Information concerning the safe and appropriate use of any of the herbicides approved can be found on herbicide labels found on the commercial product containers.

Additional sources are:

Risk Assessment For Herbicide Use in Forest Service Regions 1,2,3,4 and 10 and on Bonneville Power Administrative Sites, Chapter III (USDI, 1992).

Application of herbicides would be done at recommended label direction and at levels minimizing potential adverse health effects of human exposures to herbicides and carriers as described in the Risk Assessment For Herbicide Use, pages III-B-3 and III-B-4. Herbicide use would be conducted following State Herbicide Applicator Certification process for Wyoming.

Treatment with herbicides would include using ground vehicle, backpack, and manual methods of application. The majority of ground vehicle use would require the use of hand held spraying equipment (hoses and nozzles) for direct treatment of target vegetation. Use of truck mounted booms would be used only in areas where the target vegetation is dense enough and with a large enough acreage to effectively use a boom without impacting non-target vegetation. Use of booms would be minimal. Manual treatments would include hand picking and/or grubbing with hand tools. Mechanical treatments would include plowing, diskng, seeding and tillling.

Biological treatments would include grazing, insects, and pathogens. Allotment Management Plans or Annual Operating Instructions will control grazing use. Biological control using sheep or goats could be applied to small areas for short periods. Areas where insects and pathogens naturally occur or are introduced should be managed to maintain the relationship of host plants and controlling organism. Biological controls may also be used in combination with other techniques. For example, in some
instances, fall application of Tordon herbicide in combination with insect control is most effective in controlling leafy spurge.

Table 4: Biological Control Agents Currently Available for Use

<table>
<thead>
<tr>
<th>Noxious Weed</th>
<th>Insects</th>
<th>Type of Insect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spotted and diffuse knapweed</td>
<td>Urophora affinis</td>
<td>Seed head gall fly</td>
</tr>
<tr>
<td></td>
<td>Urophora quadrifasciata</td>
<td>Seed head fly</td>
</tr>
<tr>
<td></td>
<td>Cypholeonous achatas</td>
<td>Root weevil</td>
</tr>
<tr>
<td></td>
<td>Metzneria paucipunctella</td>
<td>Seed head moth</td>
</tr>
<tr>
<td></td>
<td>Pterolochne impersa</td>
<td>Root moth</td>
</tr>
<tr>
<td></td>
<td>Sphenoptera jugulavica</td>
<td>Root-borer</td>
</tr>
<tr>
<td></td>
<td>Terella virens</td>
<td>Verdan seed fly</td>
</tr>
<tr>
<td>Yellow Starthistle</td>
<td>Bangasterus orientalis</td>
<td>Bud weevil</td>
</tr>
<tr>
<td></td>
<td>Chaetorellia australis</td>
<td>Seed head fly</td>
</tr>
<tr>
<td></td>
<td>Eustenopus villonius</td>
<td>Weevil</td>
</tr>
<tr>
<td></td>
<td>Urophora siriusave</td>
<td>Gall fly</td>
</tr>
<tr>
<td></td>
<td>Larinus curtus</td>
<td>Weevil</td>
</tr>
<tr>
<td>Leafy spurge</td>
<td>Aphytoma grwalinae</td>
<td>Flea beetle</td>
</tr>
<tr>
<td></td>
<td>Urophora quadrifasciata</td>
<td>Seed head gall fly</td>
</tr>
<tr>
<td></td>
<td>Aphytoma nigriascutis</td>
<td>Flea beetle</td>
</tr>
<tr>
<td></td>
<td>Aphytoma flav</td>
<td>Flea beetle</td>
</tr>
<tr>
<td></td>
<td>Aphytoma lacertosa</td>
<td>Flea beetle</td>
</tr>
<tr>
<td></td>
<td>Aphytoma cyprisias</td>
<td>Flea beetle</td>
</tr>
<tr>
<td></td>
<td>Hyles euphorbiae</td>
<td>Hawkmoth</td>
</tr>
<tr>
<td></td>
<td>Oberlea erythrocophala</td>
<td>Stem borer</td>
</tr>
<tr>
<td></td>
<td>Spargis enslae</td>
<td>Gall midge</td>
</tr>
<tr>
<td>Musk thistle</td>
<td>Rhinocyllus conicus</td>
<td>Seed head weevil</td>
</tr>
<tr>
<td></td>
<td>Trichosirocalus horridus</td>
<td>Weevil</td>
</tr>
<tr>
<td>Canada thistle</td>
<td>Larinus planus</td>
<td>Seed head weevil</td>
</tr>
<tr>
<td></td>
<td>Cestorrhyncha litura</td>
<td>Stem mining weevil</td>
</tr>
<tr>
<td></td>
<td>Urophora cardui</td>
<td>Stem and shoot gall fly</td>
</tr>
<tr>
<td>Dalmation toadflax &amp;</td>
<td>Calophasia lunula</td>
<td>Defoliating moth</td>
</tr>
<tr>
<td>Yellow toadflax</td>
<td>Gymnetron antirrini</td>
<td>Seed head weevil</td>
</tr>
<tr>
<td></td>
<td>Brachyperous pulciarius</td>
<td>Flower feeding beetle</td>
</tr>
</tbody>
</table>

* Limited availability or collectable only in Washington and Oregon at this time.

This list includes biological control agents available for use at this time. As other biological control agents are approved and become available they may be used on targeted noxious weed infestations.

Public education will be emphasized to help the public recognize the noxious weed species within or threatening the project area, understand the economic and ecological threats associated with the introduction of noxious or invasive plants and how to avoid unintentional introductions.

Mitigation Measures:

1. Guidelines provided in Forest Service Manual 2080 and mitigation/stipulation measures described on FS pesticide use proposals and safety hazard analysis documents would be implemented annually. Further guidelines are presented in detail in the Final Environmental Impact Statements (FEIS) referenced in Appendix C.

2. On-site field surveys will be conducted to determine the presence and/or proximity of resources that may be at risk from treatments, including human habitations, aquatic resources, threatened, endangered or sensitive species and cultural resources.

3. Forest Service policies and guidance would be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site drift or runoff, limiting use of herbicides that pose human health risks, and providing buffer zones around specially identified resources. The use of specific herbicides must be approved annually by the Forest Supervisor on NFS lands and the Regional Forester for all wilderness areas.

4. Domestic animals used to control an undesirable plant species would not be grazed in an infested area during the period of plant seed production and then moved to another vegetative community. This is intended to limit the spread of plant species through animal fecal material.

5. In wilderness areas, only non-mechanical methods such as grazing, pulling, cutting, grubbing, herbicides, insects, and seedling of native species would be available to control noxious weeds.

6. A pre-treatment cultural resource survey will be conducted on all sites identified for control through methods requiring ground disturbance.

7. Manual and mechanical control techniques requiring ground disturbance, other than through manual hand control methods, would not be done in riparian or wetland areas.

8. In selecting a competitive plant species or insect agent for biological control, criteria would be based upon specific site restrictions such as slope, soil type, and existing species composition.

**Mitigation Measures 10-24 pertain to the use of herbicides:**

9. Use a spot treatment strategy to the extent possible and practical.

10. Use minimum rate known to be effective for control of noxious weeds within label restrictions specific to each herbicide.

11. All spraying within riparian and wetland areas will be with a hand-held wand rather than a boom-type sprayer.

12. No spraying will occur when wind velocity is more than 6 miles per hour.

13. No spraying will occur when air temperatures exceed a temperature where the herbicide being applied begins to volatilize.
14. When granules are applied on hard packed soils, especially in windy areas, they will be incorporated into the soil.

15. When required by the herbicide label, livestock will be held off treated areas for the specified time following application.

16. Selective herbicides that will not damage trees, shrubs and other non-target species will be utilized if effective on the noxious weeds being treated. If selective herbicides are not available application techniques (wick applicators, directed sprays) will be used to minimize impacts on the associated non-target vegetation.

17. Use a coarse spray and low pressure (less than 30 psi) to minimize drift.

18. Pre-treatment surveys will be required anytime planned control activities are in a proposed or listed threatened and endangered (T&E) plant's known or suspected habitat. This would also be true for Forest Service sensitive plant species. If any such species are identified during these surveys, control options would be limited to those methods, which would not adversely affect listed plants. In most instances, manual control techniques would be used in areas where threatened and endangered species and/or sensitive species have been identified.

19. When practical, concentrated human use areas would be treated when they are closed to human use. Areas such as trailheads, where it is not possible to close to human use, would be posted for 72 hours following spraying. Signs would include information on target species and herbicide used.

20. Herbicide containers will be emptied thoroughly and rinsed three times and punctured to prevent re-use, before disposal.

21. To avoid accidental exposures to workers, all workers would read and heed label precautions for all herbicides and be involved in safety meetings for proper use of herbicides prior to control activities taking place.

22. Workers would wear protective clothing at all times when handling herbicides. Appendix D lists protective clothing to be worn.

23. Maximum safe application amounts for workers using herbicides will be determined prior to project implementation. Reference is made to the Risk Assessment for Herbicide Use In Forest Service, pages III-E-44 through 51 (USDA, 1992). Factors used to determine the maximum safe application amounts are potential exposure, control methods, application rates, and types of chemicals used.

24. The Regional Forester would approve pesticide use proposals for control of Noxious weeds within the Cloud Peak Wilderness.

Monitoring

1. A majority of treated areas would be monitored to determine effectiveness of control, type of method used, level of infestation of target species, and cost.

2. In areas of high noxious weed densities and acreage, permanent long-term effectiveness monitoring techniques would be implemented. Photo trend studies would be applicable.

3. Monitoring of herbicide use would be completed on an annual and daily basis. Herbicide Use Proposals for each chemical proposed for use would be completed each year. Herbicide Use Reports would be completed at the end of the treatment season (generally in the fall) to record types and amount of herbicides applied. Herbicide Use Proposals and Reports require approval by the Forest Supervisor.

4. Undesirable plant surveys would be kept on each Ranger District showing locations of undesirable plants and where treatment activities have occurred. Surveys would be updated on an annual basis to monitor the effectiveness of control techniques and new infestations. Survey maps would be done on 1:24,000 scale orthoquads.

2. Alternative B: Weed Management (No herbicides).

This alternative would implement a Forest-wide Undesirable Species and Noxious Weed management program however, herbicides would not be included as a plant control method. This alternative was developed to address issues #2, 4, and 5.

Under this alternative, herbicides would not be used under any circumstances, and the use of manual, mechanical, and biological measures would be increased in an attempt to meet control objectives. The manual, mechanical, and biological controls would be the same as those described in Alternative A. Since manual and mechanical measures require more manpower and time, it is anticipated that fewer acres would be treated annually. Approximately 400 acres would be treated annually.

<table>
<thead>
<tr>
<th>Table 4: Acres treated by control method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Method</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Herbicide</td>
</tr>
<tr>
<td>Manual</td>
</tr>
<tr>
<td>Mechanical</td>
</tr>
<tr>
<td>Biological</td>
</tr>
<tr>
<td>Livestock</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

Mitigation Measures:

Mitigation measures described for Alternative A would be the same as those for this alternative with the exception of those measures that deal directly with use of herbicides.

Monitoring

The monitoring measures described for Alternative A would be the same as those for this alternative with the exception of those measures that deal directly with the use of herbicides.
3. Alternative C: No Action

Under this alternative there would be no development or implementation of an undesirable plant management plant. The objectives of the Proposed Action and Federal and State laws would not be met.

Comparison of Alternatives

<table>
<thead>
<tr>
<th>Table 5: Comparison of Alternatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components</td>
</tr>
<tr>
<td>Herbicide Use</td>
</tr>
<tr>
<td>Manual Control</td>
</tr>
<tr>
<td>Mechanical Control</td>
</tr>
<tr>
<td>Biological Control</td>
</tr>
<tr>
<td>Insects</td>
</tr>
<tr>
<td>Livestock</td>
</tr>
<tr>
<td>Totals:</td>
</tr>
</tbody>
</table>

Alternatives Considered But Not In Detail

1. Integrated Weed Management without Biological Controls. An integrated Weed management program without biological controls was considered due to the limited applicability of some of the biological techniques. Biological controls, especially insects, can be a slow process, and efficacy is highly variable. However, biological control agents impact weeds in two ways: directly and indirectly. Direct impacts destroy vital plant tissues and functions. Indirect impacts increase stress on the weeds, which may reduce their ability to compete with desirable plants. Biological control is a method that can be integrated with other practices to reduce weed populations (1995-96 Weed Management Handbook). For these reasons, an action alternative without biological controls was not considered.

2. Integrated Weed Management Including Aerial Application of Herbicides. Aerial application of herbicides was not considered in detail due to the issues associated with treatment of non-target vegetation. In addition, the mapped project areas are not large enough in size with consistent high densities of weeds to warrant aerial application techniques. The high cost per acre of aerial application on scattered acreage’s also contributed to this alternative being eliminated from detailed study.

3. Prescribed Fire Control Methods. The use of prescribed fire to control noxious weeds was not considered in detail due to its limited effectiveness as a single tool for weed control. Fire can be used to complement other methods such as herbicide treatment. Under the right moisture conditions fire can destroy the seed viability of some weed species. In some instances, fire could increase the opportunities for noxious weeds to spread into areas of bareground left after a fire.

4. Herbicide Control. The use of herbicides without any other control methods was not considered in detail due to the wide spread and scattered infestations presently found within the project area. Many of the areas have poor access and herbicide application would have logistical limitations. The use of herbicides are known to be effective in control of many noxious weed species but they are most effective and applicable when used on small acreage’s where total eradication of the noxious weed is attainable, and when used with other control methods.

CHAPTER III: AFFECTED ENVIRONMENT

This chapter describes the environment affected by the proposed action. The affected environment includes all National Forest System Lands administered by the Bighorn National Forest. In order to eliminate repetitive discussions of the same affected environment, this document speaks to the description of the affected environment described in the FEIS for the Bighorn National Forest Land and Resource Management Plan; Chapter III, 1985 previously completed. The description of those environments is applicable to this proposed action. In addition, this chapter also describes the affected environment commonly found with weed infestations within the analysis area.

The EIS is available for review in the Supervisors Office of the Bighorn National Forest, Sheridan, Wyoming.

Description of Affected Environment Associated with Noxious Weed Infestations

It is estimated based on site specific mapping of noxious weed locations within the analysis area that 95% of the sites occur where human activity has caused some form of soil disturbance. Soil disturbance creates an opening or "open niche" for new plant establishment. Noxious weeds have the capability to be prolific seed producers as well as disperse seeds, in addition to being extremely competitive in establishing new infestations in these areas. The following describes specific types of areas within the affected analysis area where noxious weeds are known to have established and are likely to establish in the future. Site specific noxious weed maps (1:24,000 scale) for each ranger district indicate the type of affected environment associated with weed infestations.

Transportation Systems: Roadides along major highways, general forest roads, gravel roads, and two-track non-maintained roads are one of the main sources of noxious weed establishment within the analysis area. The combination of frequent soil disturbance along road systems with a high frequency of human travel provides frequent opening for noxious weed establishment.

Livestock Impacted Areas: There are generally some areas on range allotments, or trailing routes leading to range allotments, where soil disturbance from livestock grazing and hoof action create openings for noxious weed infestation. Livestock can also transport noxious weed seeds onto National Forest System lands in their fur/wool and/or manure. Areas having the highest potential for such infestations are around range improvements such as water developments, fences and corrals. Livestock driveways, such as those historically used by many bands of trailing sheep, are likely to have weed infestations.

Noxious weeds can establish on non-imparted rangelands, this being most common on range sites having naturally high amounts of bareground.

Timber Harvest Activities: The areas associated with timber harvest activities that have potential for noxious weed infestation are skid trails, log landings, and parking areas for logging equipment. Noxious weed infestations often occur within the actual timber sale areas as well. Infestations of noxious weeds within harvest areas can be minimized with the establishment of native vegetation such as perennial grasses, forbs, and/or shrubs. The seeding of native species can also minimize the establishment of noxious weeds. It should be noted though that if care isn’t taken in selecting the proper grass species, competition between seeded species and tree seedlings could
jeopardize the success of the reforestation effort. Some noxious weed species such as bull thistle and Canada thistle often establish after timber harvesting. However, bull thistle is short lived and eventually excluded by native vegetation, where Canada thistle is more persistent. Logging equipment moved onto the Forest from other parts of the country (especially out of state) often has a high potential for spreading of noxious weed seed.

Recreation Use Sites: Recreation use sites have a high potential for noxious weed establishment due to the combination of soil impacts and high human activity. Areas such as recreation trailheads, recreation trails, campgrounds, and dispersed camping areas commonly have noxious weeds. Recreation horse and packstock users have commonly brought in noxious weed seeds with hay and feeds for their animals. Trailheads and dispersed camping sites have the highest potential for new weed infestations.

Utility Corridors: Utility corridors are similar to road systems because of the high amount of bareground commonly found after construction. Utility corridors that also have an adjacent road system provide a higher potential for dispersal of noxious weed seeds.

Water Transportation Ditches: There are many ditches located within the analysis area that have high potential for weed infestation. The combination of soil disturbance from eroding banks and weed seed transportation through the water creates a high potential for weed infestations.

Riparian Areas/Stream Systems: Noxious weed infestations are commonly found in riparian systems due to the high level of activity that occurs within those sites and the high potential for weed seed transportation. Many noxious weeds are adapted to riparian areas and are quick to establish on sites where soil disturbance has occurred such as streambanks, blown-out beaver dams, livestock bedding areas, undeveloped recreation trails, etc. Canada thistle is one of the most common weeds found in riparian areas within the analysis area.

CHAPTER IV: ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter describes the consequences or environmental impacts of implementing each alternative. Alternatives were designed to address one or more issues by taking different approaches to control of undesirable vegetation. Environmental consequences are tied to the significant issues described in Chapter I. Direct, indirect, and cumulative effects (see definitions below) are described for each alternative. The issues from Chapter I of this analysis are used as the organizational basis of this chapter.

Definitions:

Direct Effects are caused by the action and occur at the same time and place.

Indirect Effects are caused by the action and occur later in time or farther removed in distance.

Cumulative Effects are effects on the environment which result from incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

The following information displays consequences that would help determine if an EIS is needed or to provide a basis for decisions.

1. CONSEQUENCES

ISSUE 1: Noxious weed infestations located on National Forest System lands could provide a seed source for infestation downstream to neighboring private lands, especially along streambanks and irrigation waterways.

Indicator: Potential for spread of undesirable plants downstream onto non-National Forest System lands.

Alternative A: (Integrated Weed Management-IPM)

Direct/Indirect Effects - Implementation of IPM would limit introductions of new species of noxious weeds onto the Forest. Control actions on 800 to 1,000 acres annually would also be successful in limiting the spread of new weed infestations and possibly eradicating new noxious weed starts if found within the first or second year of establishment. The combination of: 1) limiting new introductions, and 2) successful control of noxious weeds that do get started, would be effective in limiting the spread of seeds to private lands downstream. Even with implementation of a fully funded IPM, the continuation of noxious weed seeds spreading downstream would be expected. However, it is important to note that plant species currently infesting National Forest System lands are also found on downstream lands, therefore additional impacts above current levels are not expected. The greatest benefit, or direct effect, of implementing an IPM would be the effective prevention and/or control of "new" noxious weed type plants onto the Forest and prevention of their potential spread downstream. Noxious weed species such as "knapweed and leafy spurge" are good examples of these types of plants.
Cumulative Effects - The cumulative effect of implementing an IPM on National Forest System lands would be to negate control activities on other land ownership's within the watershed. It is important to note that noxious weeds are known to be very prolific seed producers and are adapted to very efficient seed dispersal. Because of this, any non-treated infestations within a watershed are likely to spread within the entire area, thereby negating other control work.

ISSUE 2: Chemical (herbicide) use could present a health hazard to humans if not handled, applied, or stored properly. Improper use of herbicides could increase risks to workers and the public during treatment of noxious weeds.

Indicator: Potential health risks to workers and the public through contact with herbicides.

Alternative A (Integrated Weed Management - IPM)

Direct/Indirect Effects - Full implementation of IPM would require the use of herbicides. Herbicides are known to be effective control agents for many of the noxious weeds, and in some cases, the only feasible control agent. See Appendix B for effectiveness of herbicides on weed control. Herbicides are expected to be one of the primary control methods used under this alternative. It is important to note that by and large, the effects associated with the use and application of herbicides are indirect (long-term) effects to the worker.

The Risk Assessment previously referenced in this document thoroughly describes direct and indirect effects of herbicide use. The potentially exposed human population is divided into two groups. The first group - the public includes passersby or nearby residents. The second group - workers includes personnel directly involved in applying herbicides.

The risk assessment includes an analysis of a range of possible exposures to herbicides. The range of exposures includes those exposures most likely to occur to those that are extremely unlikely to occur. Assumptions about characteristics of typical herbicide applications ("routine-typical") are used to estimate doses to nearby members of the public and workers that may occur as a result of routine operations.

In the Risk Assessment refer to Pages III-E-1 through III-E-44 for direct effects of herbicides on human health risk analysis. As an example, Table III-E-3 on page III-E-7 shows there are "no" moderate or high risks to the public from herbicide use on rangeland sites for any chemicals proposed for action in this alternative. The same is true for herbicide use on forest land sites as shown in Table III-E-6, page III-E-10. The Risk Assessment does indicate which herbicides could cause moderate to high risks for workers applying herbicides. However, it is important to note that for workers using appropriate protective clothing (as required as mitigation in this alternative), the risks would be lower than those shown in the tables. It is also important to note that following mitigation measures for safe application for workers, page III-E-44 (see mitigation #26 under alternative A) would keep risk below the moderate to high rating.

Cumulative - Cumulative effects to members of the public resulting from herbicides applied through Forest Service programs are not likely to occur. There is a very low probability that the public would be in a treatment area and an even lower probability that a person would be exposed more than once annually to those herbicide treatments.
In the case of workers, however, there are instances when it is possible for cumulative doses to occur. Although a single site would not be retreated in close succession to previous treatments, workers may move from site to site and apply herbicides on a daily basis.

Refer to page III-E-41 through 42 in the Risk Assessment for Herbicide Use.

Alternative B: (Weed Management, No Herbicides)

Direct/Indirect- Alternative B does not include the use of herbicides, as a control method therefore, there would be no direct or indirect effects associated with herbicides. Alternative B does include more use of manual labor methods such as grubbing, tilling, and cutting as control methods. There are some direct effects to the worker with these methods that would be infrequent. Risks to human health would include factors such as physical stress to the back, tripping and falling hazards, insect stings and eye particulate hazards. These direct effects would be very minimal.

Alternative C: (No Action, Integrated Weed Management would not be implemented).

There would be no cumulative effects under this alternative.

With no control activity occurring on Forest System Lands there would not be any direct, indirect, or cumulative effects under this alternative.

ISSUE 3: Failure to implement an undesirable plant management and control program could cause resource damage.

Indicator: Resource conditions on National Forest System lands.

Alternative A: (Integrated Weed Management, IWM)

Direct/Indirect Effects - The direct effect of implementing an undesirable plant management program would be on the vegetative resource. Undesirable plants are known to be very competitive in terms of having the ability to displace native vegetative species. Many times this displacement occurs when native vegetative is stressed through many activities, however, undesirable plant are also known to displace healthy native vegetation communities.

Undesirable plants are adapted through various biological and physical means to survive and spread. Seed shapes are adapted for easy spread through wind, soil, water, and animal transport. Root systems are often heavily developed with underground systems, thus have the capability to survive removal of above ground vegetation. (Parker-Dewey, 1992).

The forage value of undesirable vegetation is in most cases low to very low due to low palatability or undesirable texture of the leaves and flowers. For this reason, the plants are seldom under any grazing pressure from livestock and or wildlife. This enhances their competitiveness. Herbicide control techniques are often the primary means to control plants such as noxious weeds that have root characteristics as described above.

Alternative A would provide the best combination of control methods to manage undesirable plants. In areas where noxious weeds are known to establish, sites are often classified as "unsatisfactory" in terms of range conditions. Sites are unsatisfactory because existing vegetation, composed primarily of noxious weeds, provides little resource value to the site and may lack ecological diversity and sustainability. The areas currently invaded with undesirable vegetation on the Forest would not increase in acreage under Alternative. In some areas there may be up to a 10%–25% decrease in acreage of noxious weeds. Most importantly, the establishment of new noxious weeds would be limited. Therefore, the overall direct effect of Alternative A would be a status quo of acres considered to be in "unsatisfactory" condition.

Indirect effects associated with infestations of undesirable vegetation, primarily noxious weeds, are on resources such as wildlife habitat, fish habitat, and soils.

Undesirable vegetative species seldom provide litter accumulations capable of protecting soil surfaces from natural forces of rain and snow runoff. The indirect effect of poor litter accumulations is higher amounts of bareground, especially during spring and fall periods of the year. This can result in rilling surface erosion and eventual lower soil productivity with loss of topsoil.

Native grass and forb vegetative species provide valuable habitat requirements for various wildlife species. The forage value of native vegetation on various habitat types is consistently higher than those values provided by undesirable plants. Other habitat requirements for various wildlife species are also best provided by native vegetation. As an example, areas heavily infested with Russian Knipweed have been found to displace species of wildlife and vegetation, which constitutes a loss of rangeland biodiversity. (Kurz, 1996).

Noxious weeds that infest streambanks areas indirectly contribute towards unstable streambanks. Noxious weeds do not have root systems adapted to withstand erosion forces of flowing water, especially during high water runoff. Unstable streambanks decrease the ability of stream systems to provide fish habitat.

Alternative A would be successful in limiting the indirect effects as described above to at least the current level of infestation. In some areas, up to a 25% decrease in infested areas would be expected, thus the negative indirect effects of undesirable plant infestations would decrease.

Cumulative Effects - there are many other activities on National Forest lands that affect resource conditions. Activities such as livestock and wildlife grazing, timber harvesting, recreation, transportation systems all have interrelated effects on the ability of undesirable plants to establish and spread on National Forest System lands. Direct and indirect effects discussed above consider various multiple uses that occur on National Forest System lands. Currently, there are no other proposed actions that would affect undesirable plants on the Bighorn National Forest.

Alternative B (Weed Management, No herbicides)

Direct/Indirect Effects - Implementation of Alternative B would allow for an increase in "unsatisfactory" acreage on National Forest System Lands. Control methods available under this alternative are capable of controlling some species of undesirable plants over time, however, the alternative is limited in its ability to control new infestations of noxious weeds during the first year or two of establishment. Hand control techniques often are unsuccessful in achieving good control or
eradication of plant species that have expansive, perennial root systems and are very costly. See Appendix B for effectiveness of alternatives. Use of biological controls may be effective over time on some species; however, they are not a suitable control method for new small acreage infestations of new plants. For these reasons, the number of acres of National Forest System lands in "unsatisfactory" condition would be expected to increase by at least 25% to 40% over existing levels, within a 10 year period.

The indirect effects of noxious weed establishment would be the same types of indirect effects as described under Alternative A. The difference simply being that those indirect effects would be occurring on many more acres under Alternative B.

Cumulative Effects - the cumulative effects for Alternative B would be the same as those described for Alternative A.

Alternative C: No Action (IPM would not be implemented)

The current infestations of undesirable plants, especially noxious weeds, found on National Forest System lands would increase substantially over a period of 5 to 10 years. It would be highly likely that new noxious weeds such as knapweed and leafy spurge would establish. The expected spread of existing undesirable plants and establishment of new noxious weeds would have the same negative indirect effects as described for alternative A, except that those negative indirect effects would be occurring on many more acres than currently infested. This substantial increase in undesirable plants would be due to the total absence of control activities and increasing use of National Forest System lands which continues to bring in new noxious weed seeds.

ISSUE 4: Non-target vegetation and free flowing water valuable to wildlife and fish habitats could be adversely affected when using herbicides to control undesirable plant species. Some of the non-target wildlife, fish, and/or plant species could be listed as sensitive species by the Forest Service Rocky Mountain Region, or as Threatened or Endangered under the Endangered Species Act of 1973.

Indicator: (1) Compliance with the Clean Water Act and Endangered Species Act, and Forest Service Sensitive Species Policy (2) Potential for treatment of non-target vegetation and wildlife habitats, and potential for herbicide contamination of free flowing water.

Alternative A: (Integrated Weed Management, IPM)

Direct/Indirect Effects - The potential effect on non-target vegetation and wildlife species, and potentially on water quality is based on the use of herbicides as a control method under this alternative. The potential of having a negative effect is low. This determination is based on the fact that a majority of herbicide use would be applied using hand applications. Hand application techniques have low potential for treating other than target vegetation. It is important to note that part of this determination is based on mitigation measures tied to herbicide use such as herbicides would not be applied if wind speeds exceed 6 mph, and less than 30 psi pressure.

The Risk Assessment for Herbicide Use also includes a complete analysis on risks associated with non-target species. See Section III-H of the Assessment. The Risk analysis considers the potential risk to wildlife and aquatic species from the use of herbicides included in the proposed action of this analysis. Risk to wildlife and aquatic species is a function of the inherent toxicity (hazard) of each herbicide to different organisms and amount of each chemical (exposure) those organisms may take in as a result of a vegetation management operation.

It is important to note that the wildlife risk assessment tends to overstate potential risks from herbicide exposure because many assumptions are quite conservative. However, the Risk Analysis concludes that for the typical herbicide operation (which falls under Alternative A), for all herbicides and carriers/additives, the typical dose estimates are below EPA risk criterion of 1/5 LD50 (Lethal Dose to half of the sample population) and are far below laboratory species LD50s. The risk assessment concludes that for typical water concentrations there are no risks from any of the herbicides to aquatic species under a stream scenario. This is due to the dilution of the solutions applied and additional dilution in the aquatic environments.

Potential for herbicide to drift into free flowing water such as stream and or lakes is very low. This determination is based on nearly all applications of herbicides near water sources would be done with hand held wands. The Risk Assessment, page III-D-2, analyzed spray drift and determined that spray drift from hand application equipment was considered to be negligible.

The above discussion on direct and indirect effects is basis for determining that Alternative A would be in compliance with the Clean Water Act and Endangered Species Act. The Biological Evaluation for Threatened and Endangered Species (TES) is in the project record for this analysis. The determination in the Biological Evaluation was that the proposed action, which includes use of herbicides, would not adversely affect any threatened or endangered species or lead to the listing of any Forest Service sensitive species as threatened or endangered.

The invasion of undesirable plant species and resulting loss of habitat would be a greater risk to TES species than the risk from herbicides.

Other control methods included in this alternative, other than herbicide use, would not pose any risk to non-target vegetation and/or wildlife species.

The public raised several issues in its comment letters on the Final Northwest Area Noxious Weed Control Program Environmental Impact Statement (FEIS). The issues and consequences dealt with use of herbicides on non-target species, and water which is applicable to Issue #4 of this assessment.

The environmental consequences tied to the issues raised by the public are covered in the EIS, Chapter 3, for the Northwest Area Noxious Weed Control Program, 1985. The consequences described in Chapter 3 are applicable to the alternatives for this analysis.

In summary, the consequences described in Chapter 3 of the EIS are consistent with consequences and effects described for this analysis. Generally, the EIS identifies some short term effects but concludes that effects of herbicides applied at the described rates, as allowed under Alternative A of this document, would have low potential for risk to non-target wildlife and vegetation, and to water sources.

Some of the basic conclusions described in the EIS are:

- No irreversible or irretrievable commitments of resources would be involved in implementing the proposed actions (which included use of herbicides).
• The amount of herbicide drift that reaches water is expected to be greater with aerial applications and proportionately less with vehicle and hand applications.

• Vehicle application produces much less drift than aerial application, and hand application would produce little or no drift. Therefore, if herbicides originating from hand application reach stream channels, it is usually through surface runoff.

• The most effective and efficient control of noxious weeds would be provided by the alternative, which included use of herbicides. Implementing that alternative would improve rangeland ecological condition by reducing or eliminating competition from weed species.

• Most impacts on birds and mammals would result from destruction of non-target vegetation. Losses would be insignificant in the short term over the entire area because of the small areas treated (usually less than 10 acres) as compared to the large analysis area.

• Under routine circumstances, no animals are likely to receive highly toxic or fatal doses of any proposed herbicides.

• Under routine case operations, no impact to slight impacts could occur to fisheries as a result of proposed herbicide use.

• In the short term, the loss of target and non-target vegetation would cause temporary loss of food, cover, and other habitat requirements for wildlife and livestock in the treatment areas. Over the long term, increased vegetation productivity of grasses and forbs would increase the productivity of the land for livestock and wildlife. Failure to control or limit the spread of such noxious weeds as knapweed and leafy spurge would reduce the long-term productivity of palatable native plants.

Cumulative Effects - Herbicide use is the primary part of this alternative associated with a cumulative effect. There are no other present or future proposed actions dealing with herbicide use in areas where noxious weeds would be treated. Any unknown projects that could possibly be proposed in the future would be required to follow the same mitigation measures and guidelines currently placed on herbicide use on National Forest System lands. Overall cumulative effects would be expected to be very low due to the minimal treatment of land over a large analysis area. The scope of the project involves many small acreage sites spread across the entire Bighorn National Forest. Treatment of 1,000 acres per year, of which only 585 would be treated with herbicides, would minimize any cumulative effects recognizing that the total National Forest System acreage is approximately 1,107,670.

Cumulative effects of herbicide use on water quality is expected to be very minimal considering only two chemicals formulated and labeled for aquatic use at this time. Those chemicals are 2,4-D and Glyphosate. The leaching potential for both of those chemicals is rated as "small" and they have short half-life in soil. The half-life of 2,4-D is 10 days and 30 days for Glyphosate. The half-life refers to chemical or microbiological degradation in the soil. (Fay, Whitson, Dewey, and Shelley 1995-1996 Weed Management Handbook).

Herbicide use does occur on private lands that adjoin National Forest System lands. The majority of herbicide use on private lands is for treatment of noxious weeds within and adjacent to agricultural crop fields, hay fields, and native pasturelands. County extension and Weed & Pest Control agencies indicate that a majority of the herbicide treatments are done using truck mounted equipment for spot treatment of weeds. However, aerial application of herbicides is occurring on farmlands a long distance from the National Forest System lands. Based on this information, the cumulative effect of spot treatment of herbicides on 585 acres spread across the entire 1,107,670 acres analysis is not expected to be measurable.

Other activities on National Forest System lands do occur that could affect non-target plant and animal species and water quality associated with this issue. Those activities are generally multiple use activities common to National Forest System lands, such as timber harvesting, livestock grazing, recreation uses, minerals activities, and transportation systems. However, it is important to note that there are long term benefits to all resources with implementation of a noxious weed control program. Those benefits are discussed in the effect section for Issue #3 in this section of this analysis. Control of noxious weed and the establishment of native vegetation is expected to decrease negative cumulative effects on non-target species and in some cases would be considered a mitigating action.

Alternative B: (Weed Management, no herbicide use)

Direct/Indirect- Implementation of an integrated weed management program that does not include use of herbicides relies primarily on the use of manual, mechanical, and biological control methods. These methods have very low potential for treatment of non-target vegetation and pose little to no threat to non-target wildlife and/or fish habitats. The biological control agents included in Alternatives A and B have been thoroughly tested to ensure they are host-specific (Fay, Whitson, Dewey, Shelley, 1995). Manual and mechanical control techniques are easily directed at the specific target species with little to no potential for off-site treatment. Use of biological control agents such, as insects have no potential for affecting non-target vegetation because their survival is based on a specific host noxious weed species. Those insects and host plants were identified in Chapter II, Alternative A of this analysis. Biological control using insects have been used on National Forests in Wyoming for many years and no adverse direct, indirect, or cumulative effects have been identified. The effects of biological control as described for Alternative B would also apply to Alternative A.

Cumulative Effect - There would be no cumulative effects associated with Alternative B.

Alternative C: (No Action)

There would be no direct, indirect, or cumulative effects under Alternative C.

ISSUE 3 An issue described in the FEIS of the Intermountain Region on Noxious Weed and Poisonous Plant Control Program were the loss of investments on public and private lands from invasion of noxious weeds and poisonous plants.

Environmental consequences for alternatives described in the FEIS are applicable to alternatives for this analysis. A summary of some basic findings in the FEIS is as follows:

• Considering the potential for noxious weeds to spread onto previously uninfested acreage, it is likely that left uncontrolled, noxious weeds could result in an irreversible economic loss of productive acreage.
• Several benefits cannot easily be assigned a dollar value under the Integrated Weed Management alternative that included the use of herbicides. Treatment under that alternative provides compliance with state and federal laws and prevents the following:
  - Reduction in crop yields on adjacent private lands.
  - Increased operating cost for noxious weed control on adjacent private lands.
  - Reduction of desirable vegetation.
  - Reduced recreation values.
  - Infestation and subsequent degredation of big game ranges.
  - Infestation of road rights of way.
  - Degradation of upland game bird cover.
  - Reduction of livestock loss through control of poisonous plants.
  - Infestation and subsequent reduction in capacity of ranges grazed by livestock.

Maintaining native vegetation within designated Wilderness Areas and special areas is a benefit to existing and potential users of the resource. Keeping "clean land clean" in terms of noxious weed expansion and maintaining a balance of desirable vegetation are benefits to Forest users and society as a whole.

REQUIRED DISCLOSURES FOR ALL ALTERNATIVES

Irreversible and Irretrievable Commitment of Resources

There is no irreversible or irreversible commitment of resources associated with the two action alternatives (A & B). This determination is based on the highly controlled activities allowed under each alternative. Mitigation measures minimize potential direct and indirect efforts. In the long term, it is possible to have some irreversible and irreversible effects if the no action alternative (C) were to be implemented. Failure to take any action on the control of highly aggressive noxious weeds could allow for a major infestation across thousands of acres of National Forest System lands. Examples of this have been wide spread infestation of leafy spurge throughout Montana and leafy spurge infestations in the Boise River system in Idaho. Although control efforts have also been aggressive, the spread of this particular noxious weed can and has reached irreversible proportions. Other aggressive noxious weeds, such as spotted knapweed, would have that same potential within this analysis area.

Forest Plan Consistency

All action alternatives (A & B) meet or exceed Forest Plan objectives. Alternative C does not meet Forest Plan objectives. Implementation of the following standards and guidelines, mitigation measures, and/or management direction ensures that action alternatives are consistent with the Forest Plan.

The following Forest goals and standards and guidelines would be met:

  • Forest Plan Goal for Range: Plan, develop, protect and manage the range resource (as authorized by the basic laws, Secretary's regulations, Forest Service policy, and the Chief's and Regional Forester's goals and objectives) to maintain it in satisfactory or better condition.

• Treat designated and declared noxious weeds in the following priority:
  a. Leafy spurge and Russian and spotted knapweed;
  b. Invasion of new plant species classified as noxious farm weeds
  c. Infestation in new areas;
  d. Expansion of existing infestations of Canada and musk thistle and other noxious weeds and
  e. Reduce acreage of current infestation.

Public Health and Safety

No alternative poses any risk to public safety. Potential effects of herbicide use were part of Issue #2 and were fully addressed in the direct and indirect effects for Alternative A. It was determined that use of herbicides posed no threat to public safety. Potential risk to workers who apply herbicides was low and mitigated extensively through use of protective equipment.

Unique Characteristics

No action alternative would effect the unique characteristics of such things as historic or cultural resources, parklands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas. As described in the purpose and need for action and in the direct and indirect environmental consequences, the action alternatives were developed to protect and maintain unique characteristics found within the analysis area. The no action alternative could have an adverse impact on private lands adjacent to National Forest System lands if noxious weed seeds are transported downstream onto farmlands. This topic was covered in Issue #1 and the effects disclosed for each alternative.

Cultural resource surveys would precede management actions that could damage cultural resources. Under the action alternatives (A & B) which include some ground disturbing activities, sites found during these surveys would be protected as required by current laws and regulations. (National Historic Preservation Act of 1966 PL 89-665 and Executive Order 11593, as stated in the Code of Federal Regulations 36 CFR 800).

Effects on the Human Environment

Effects on the human environment are documented throughout Chapter 4 of this analysis. The civil rights of any American citizen would not be differently affected by implementation of any alternative. Effects of all alternatives on the human environment are well known since actual activity of controlling undesirable plants, especially noxious weeds, contributes to a natural and diverse forest ecosystem. The project is not highly controversial based on the scoping and actual proposed action which requires the maintenance of native vegetation and control of undesirable non-native plants.

Unique or Unknown Risks

The risks associated with the action alternatives are well known and have been analyzed in depth to determine their significance. This document ties to the Risk Assessment for Herbicide Use in Forest Service Regions 1, 2, 3, 4 and 10, Sept. 1992. The Risk Assessment clarifies and quantifies the potential risks associated with use of herbicides, which is part of Alternative A.
Precedent Setting Decision

The decision to be made is like one of many that have previously been made and would continue to be made by Forest Service line officers regarding control of undesirable plants on National Forest System lands. The decision to be made is within the scope of many other decisions and therefore is not expected to establish a precedent for future actions with significant effects. The decision to be made does not represent a decision in principle about a future consideration.

Threatened, Endangered and Sensitive Species

Threatened and endangered species would not be adversely affected by any alternative except possibly Alternative C. Invasive plant species could potentially out compete native TES plants and negatively impact the native species. In regards to Sensitive species, the action alternatives (A & B) may adversely impact individuals, but are not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability across their range. A biological evaluation for the proposed action (Alt.A), which also includes the activities of Alt.B, has been completed for the Threatened, Endangered, and Sensitive Species within the analysis area. The biological evaluation is part of the project record.

Management Indicator Species

The National Forest Management Act required that Forest Plans develop management indicator species for wildlife and fish to be used as a tool in developing site specific analysis. Forest Plans tied to in Chapter III of this document have wildlife and fish management indicator species identified. They can be found on pages III-15-37 in the Bighorn National Forest LRMP.

Management indicator species are indicators of overall health of Forest ecosystems. The Bighorn National Forest Plan describes the following standard and guideline for management indicator species: “Habitat for each species on the Forest will be maintained at least at 40 percent or more of potential.” Undesirable plants, especially noxious weeds, are indicators of poor ecosystem health wherever they are found. Noxious weeds, mostly being non-indigenous (non-native) species do not contribute to habitat requirements of management indicator species. For this basic reason, the purpose and need have this analysis is consistent with the habitat requirements of MIS and Forest Plan standards and guidelines. As stated in the purpose and need section (Chapter I), a key objective of the proposed action is to maintain native plant communities and their diversity. This will be accomplished by reducing the spread of undesirable plant species, including noxious weeds, and increasing desired plant species to meet objectives of the Forest Land and Resource Management Plan.

Major Issues #3 and #5 discussed in detail the effects of alternatives on resource conditions, which included wildlife and water, and the effects on non-target vegetation, which also included wildlife, fish, and water. In disclosing those effects, the effects on management indicator species were covered. In addition, the Risk Assessment for herbicide use in Region 1,2,3,4, and 10 also described effects of herbicide use on Management Indicator Species for the Forest Service in Region 2. Page III-H-15 and 18 of the Risk Assessment discloses those effects.

Economic Analysis

The economical analysis is based on both qualitative and quantitative factors. There is expected to be some difference between alternatives, however, economies was not a major driving issue in the analysis. The long-term economic considerations are difficult to quantitively discuss because the action alternatives deal with prevention programs. Therefore, if successful, negative economic impacts of noxious weeds would not occur. An assessment of the direct cost for implementing each alternative is displayed below.

It is important to note that economic considerations are a secondary part of Issue #1 and #3 and a primary consideration in Issue #5. Issue #1 deals with the potential for spread of noxious weeds onto non-National Forest System lands from untreated sources on the Forest. The economic consideration is the potential impact of noxious weeds on agricultural lands, especially lands used for hay production. Recent literature indicates that Russian knapweed has had a $2,868,066 negative economic impact in Fremont County, WY. The impacts occurred on hay lands degraded by high infestations of Russian knapweed. In addition, the literature indicates that overall land values are regularly discounted by $75. To $150 per acre if infested with noxious weeds (Feutz, 1996). Based on these considerations, Alternative A (Integrated Weed Management) would be most successful in minimizing the potential economic impacts on private lands adjacent to the Forest. Some economic impacts would still be expected, however, infestations of new noxious weed species would be minimized. Alternative B (Integrated Weed Management, without herbicides) would allow infestations of new noxious weeds to establish on the Forest and spread to private lands. Thus, the negative economic impacts would be high. Alternative C (No Action) would have a very high potential for noxious weed spread onto private lands and very high potential for negative impacts to agricultural lands.

Issue #3 deals with the effects of noxious weeds on resource conditions. There are secondary economic considerations associated with this issue that are not measurable. Those considerations are tied to the effect of noxious weeds on recreation visitor days (RVD) associated with hunting, fishing, and hiking in weed infested areas. Secondary effects of degraded downstream water quality caused by poor watershed conditions on weed infested lands can also have negative economic effects. These secondary considerations are not measurable, but their negative impacts are known to occur. The potential for negative economic effects would be consistent with resource degradation described for each alternative. The environmental consequences dealing with resource degradation are described in the consequence section for Issue #4 described the potential loss of investments on public and private lands from the invasion of noxious weeds. The consequences, as referenced to in the Intermountain Region on Noxious Weed and Poisonous Plant Control Program FEIS, describe many economic benefits of integrated Weed management that cannot easily be assigned a dollar value. See the description of economic benefits under Issue #5 of the environmental consequences in this chapter.

The potential loss of forage for livestock-grazing use is likely to occur on small highly infested acres. However, this was not considered to be a major issue or driver of alternative development because a reduction in the permitted grazing use would not be expected at this time. It is recognized that noxious weed infestations cause a decline in grass and forb species. The economic loss of AUM’s is expected to be minimal even though the estimated value of an AUM on National Forest System lands is currently $9.92. An increase in forage is expected where noxious weeds are controlled and grass and forb reestablish. The increase in forage is based on the assumption that livestock do not graze in
areas heavily infested with weeds. In addition, an assumption was made that an increase of .25 AUM’s would be expected on each acre treated. Based on this assumption, Alternative A would have an increase of 250 AUM’s beginning the third year after treatment. Alternative B would have an increase of 100 AUM’s the third year after treatment. There would be no increase in AUM’s under Alternative C. The potential increase in AUM’s is considered to be non-significant as an economic issue because of the large size of the analysis area. The increase in AUM’s would be spread over many range allotments and there would be no expected increase in permitted grazing use.

Table 6: Alternative A-Integrated Weed Management Implementation Costs

<table>
<thead>
<tr>
<th>Control Method</th>
<th>Costs</th>
<th>Acres to be Treated</th>
<th>Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbicide</td>
<td>40,950</td>
<td>585</td>
<td>$70</td>
</tr>
<tr>
<td>Manual</td>
<td>1,200</td>
<td>5</td>
<td>$240</td>
</tr>
<tr>
<td>Mechanical</td>
<td>1,200</td>
<td>10</td>
<td>$120</td>
</tr>
<tr>
<td>Biological:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insects</td>
<td>37,500</td>
<td>375</td>
<td>$100</td>
</tr>
<tr>
<td>Livestock</td>
<td>0</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>$80,850</td>
<td>1000 acres</td>
<td>Average $81</td>
</tr>
</tbody>
</table>

* It is assumed that livestock already permitted on the National Forest System lands would be used for control work.

Alternative B-Integrated Weed Management (No Herbicides)

Table 7: Alternative A-Integrated Weed Management Implementation Costs

<table>
<thead>
<tr>
<th>Control Method</th>
<th>Costs</th>
<th>Acres to be Treated</th>
<th>Cost/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbicide</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Manual</td>
<td>12,000</td>
<td>50</td>
<td>$240</td>
</tr>
<tr>
<td>Mechanical</td>
<td>6,000</td>
<td>50</td>
<td>$120</td>
</tr>
<tr>
<td>Biological:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insects</td>
<td>37,500</td>
<td>375</td>
<td>$100</td>
</tr>
<tr>
<td>Livestock</td>
<td>0</td>
<td>25</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>$55,500</td>
<td>500 acres</td>
<td>Average $111</td>
</tr>
</tbody>
</table>

Alternative C-No Action - There are no implementation costs for Alternative C, No Action.

CHAPTER V: "CONSULTATION AND COORDINATION"

U.S. FOREST SERVICE

Interdisciplinary Team

Ron Stellingwerf, Range, Wildlife and Fisheries Staff, Team Leader
Dave Morris, Rangeland Management Specialist, Paintrock Ranger District
David Beard, Rangeland Management Specialist, Medicine Wheel Ranger District
Beth Bischoff, Rangeland Management Specialist, Medicine Wheel Ranger District
Kay Medders, Rangeland Management Specialist, Tongue Ranger District
Scott Gall, Rangeland Management Specialist, Buffalo-Tensleep Ranger District
Dean Curtis, Rangeland Management Specialist, Buffalo-Tensleep Ranger District
Charles Marsh, Forest Hydrologist
Chris Thomas, Forest Silviculturist
Rick Laurent, Forest Archeologist
Harold Golden, Wildlife Biologist
Joel Strong, Recreation Staff

PRELIMINARY PUBLIC SCOPING

"Agencies and Organizations Consulted"

USDA, Animal Plant Health Inspection Service, PPQ
Bureau of Land Management, Casper Office
Bureau of Land Management, Worland Office
Bureau of Land Management, Buffalo Office
Wyoming Department of Highways
Nature Conservancy
Wyoming Outdoor Council
Powder River Basin Resource Council
Sierra Club
Dave Garber, President, Bighorn Forest Grazing Permittees Association
Dave Fuller, Executive Secretary, Bighorn Forest Grazing Permittees Association
Natural Resource Conservation Service
Wyoming Game and Fish Department
Medicine Wheel Alliance
Wyoming Department of Environmental Quality
Wyoming Clearing House Coordinator, Office of Federal Land Policy
Mike Willie, Washakie Weed and Pest District
Rod Little, Johnson County Weed and Pest District
Earl Luktes, Bighorn County Weed and Pest District
Alan Pomeroy, Bighorn County Weed and Pest District
Bob Benjamin, Sheridan County Weed and Pest District
Chief Washakie Chapter, Trout Unlimited
Little Bighorn Chapter, Trout Unlimited
Washakie County Conservation District
South Bighorn Conservation District
APPENDICES

APPENDIX A

GLOSSARY

ACTIVE INGREDIENT (a.i.): The chemical in a herbicide that is primarily responsible for the desired effects.

ACUTE TOXICITY: The quality or potential of a substance to cause injury or illness shortly after exposure to a relatively large dose.

ALLOTMENT (GRAZING): An area designated for use of a prescribed number and kind of livestock under one management plan.

ANIMAL UNIT MONTH (AUM): As used in this document, the AUM equates to 780 pounds of air-dry forage made available for a 30-day period. Considered the equivalent of the requirement of a single 1,000-pound cow or another class of herbivore based on 26 pounds of forage per day for 30 days. This allowance may serve several sheep or deer.

ANNUAL PLANT: A plant that completes its life cycle within 1 year.

BIOACCUMULATION: The process of a plant or animal selectively taking in or storing a persistent substance. Over time, a higher concentration of the substance is found in the organism than in the organism's environment.

BENIGN: Of no danger to life or health.

BIENNIAL PLANT: A plant that normally completes its life cycle in two years.

BIOLOGICAL AGENTS: The use of natural enemies (insects, parasites) to attack, retard growth, prevent re-growth, or prevent seed formation of a target plant.

BROADCAST APPLICATION: The applying of herbicide over an entire area or field rather than only to rows, beds or individual plants.

BUFFER STRIP/ZONE: A strip of vegetation that is left or managed to reduce the impact that a treatment or action on one area might have on another area.

CARRIER: Material added to an active ingredient to facilitate its preparation, storage, shipment, or use.

CONTROL: Reduction of a Weed problem to a point where it causes no significant economic damage.

CULTURAL RESOURCES: Remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, building, objects, artifacts, ruins, works of art, architecture, and natural features that were of importance in past human events. Consist of (1) physical remains, (2) areas
where significant human events occurred, even though evidence of the events no longer remains and (3) the environment immediately surrounding the actual resource.

DECLARED NOXIOUS WEED: Any plant the Wyoming Weed and Pest Board of Certification and the Wyoming Weed and Pest Council have found to be detrimental to the general welfare of persons residing within a district. This can be either by virtue of its direct effect or as a carrier of disease or parasites.

DESIGNATED NOXIOUS WEED: Means the weeds, seeds or other plant parts that are considered detrimental, destructive, injurious or poisonous, either by virtue of their direct effect or as carriers of disease or parasites that exist within the state of Wyoming, and are on the designated list.

DRIFT: The movement of airborne particles (herbicides) by air motion or wind away from an intended target area.

ENVIRONMENTAL ANALYSIS: A systematic environmental analysis of site-specific activities used to determine whether such activities would significantly affect the human environment and whether an environmental impact statement is required.

ENVIRONMENTAL ASSESSMENT (EA): A concise public document for which a Federal agency is responsible. It briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.

EXOTIC PLANTS: Plants that are not native to the region in which they occur.

FORAGE: All browse and herbaceous foods available to grazing animals. Forage may be grazed or harvested for feeding.

FORB: A herbaceous plant that is not a grass, sedge, or rush.

FOREST LAND AND RESOURCE MANAGEMENT PLAN: Plans, which direct the management of National Forest System lands. Normally referred to as "Forest Plan".

HERBICIDE: A chemical used to control, suppress, kill plants, or severely interrupt their normal growth processes.

INTEGRATED WEED MANAGEMENT (IPM): A systematic decision-making process and the resultant management actions, which derive from consideration of Weed-host systems and evaluation of alternatives for managing Weed populations at levels consistent with resource management objectives. IPM in this EA refers primarily to use of biological agents, herbicides, and manual treatments along with prevention.

INFESTATION LEVEL: Infestation levels of noxious weeds are defined as follows: low (5 percent or less canopy cover); moderate (6-25 percent canopy cover); and high (over 25 percent canopy cover).

LABEL: A printed material on or attached to a Herbicide container as required by law.

MECHANICAL CONTROL: Use of plows and other mechanical devices to manipulate vegetation.

MICROORGANISMS: An organism of microscopic size.

MITIGATING MEASURES: Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.

NON-TARGET VEGETATION: Vegetation that is not planned to be affected by treatment.

NOXIOUS WEED: A plant species that is highly injurious or destructive and has the greatest potential for economic impact on forage and crop production. "Designated noxious weeds" are weeds that are designated statewide. "Declared noxious weeds" are those that have been declared on a county by county basis.

PERSISTENCE: The resistance of a Herbicide to metabolism and environmental degradation.

PESTICIDE: Any substance or mixture of substances intended for controlling insects, rodents, fungi, weeds, or other plants and animals that are considered Weeds.

POISONOUS PLANT: A plant species that contains or produces substances that cause sickness, death, or a deviation from normal state of health of humans and animals.

PRESCRIBED BURNING: The planned application of fire to wildland fuels in their natural or modified state, under specified conditions of fuels, weather, and other variables, to allow the fire to remain in a predetermined area and achieve site-specific fire and resource management objectives.

TOXICITY: A characteristic of a substance that makes it poisonous.

UNDESIRABLE PLANT: Plant species that are classified as undesirable, noxious, harmful, exotic, injurious, or poisonous, pursuant to State or Federal laws, including those designated by the Secretaries of Agriculture or the Interior. Not included are species listed as endangered by the Endangered Species Act or plants indigenous to an area where control measures are to be taken.

VISUAL QUALITY OBJECTIVE (VQO): A set of measurable goals for the management of forest visual resources. The stated goals of this visual management system are (1) preservation, (2) retention, (3) partial retention, (4) modification, and (5) maximum modification. Except for preservation each goal describes a difference degree of acceptable alteration of the natural landscape based upon the importance of aesthetics.
APPENDIX B

CONTROL-EFFECTIVENESS OF ALTERNATIVES:

Preface
This information was compiled from (a) research references, (b) weed specialists, and (c) general knowledge of plant phenology.

**Leafy Spurge**
Description: Aggressive, difficult to control perennial, easily displaces desirable vegetation.

Control:

- a. Removal of top growth alone is ineffective. Mowing or grazing before seed set followed by a full chemical treatment has shown some results.
- b. Soil Disturbance - Not effective.
- c. Biological Control – moderate effectiveness. Two flea beetles (Aphthona nigriscutis and A. flava) defoliate the plants while the larvae feed on the roots.

Research has shown 95% control of leafy spurge with allelopathic perennial grasses (Whitson, 1992).

- d. Chemical control - the most effective control at this time. Tordon 22K provides the best control. Multiple treatments may be necessary.

**Russian Knapweed**
Description: Difficult to control perennial. Poisonous to horses.

Control:

- a. Removal of top growth not effective.
- b. Soil Disturbance - continuous tillage is somewhat effective.
- c. Biological -controls somewhat effective. Two seed bead flies (Uropbora affinis and U. Quadrifasciata) are available. They reduce seed production. A root-boring moth (Agapeta zoegana) causes considerable damage to roots.

- d. Chemical controls - Good to Excellent control with Tordon or 2,4-D plus Banvel.

**Diffuse Knapweed**
Description: Highly competitive, difficult to control biennial.

Control:

- a. Same as spotted with additional biological agent, a Knapweed metallic wood boring beetle (Sphenotera jugoslavica) feeds within the root crown.

**Field Bindweed**
Description: Very aggressive perennial. Difficult to control.

Control:

- a. Removal of Top Growth Somewhat effective. Repeated mowing would be necessary to slow spread and reduce seed production.
- b. Soil Disturbance - somewhat effective. Repeated cultivation would be necessary to slow the spread and reduce seed production.
- c. Biological - some effective control available.

- d. Chemical - effective controls. Good control results with applications of 2,4-D, Tordon or Banvel plus 2,4-D, or Banvel.

**Perennial Sowthistle**
Description: Perennial in low wet areas. Difficult to control.

Control:

- b. Soil Disturbance - effective but not feasible if located next to water.
- c. Biological - None available.

- d. Chemical - effective controls. Good control results with applications of Tordon 22K.
**Purple Loosestrife**
Description: Aggressive perennial in aquatic sites. Difficult to control.
Control:
a. Removal of Top Growth Effective control. Mowing or cutting in spring before seeding is effective.
b. Soil Disturbance - somewhat effective control dependent on location to water.
c. Biological - new process with research still continuing.
d. Chemical - very effective. Control with Rodeo in the fall has best results.

**Canada Thistle**
Description: Perennial. Difficult to control.
Control:
a. Removal of Top Growth Not effective.
b. Soil Disturbance - Not effective.
c. Biological - Ongoing research indicates effective control with biological agents. A beetle (Ceutorhyncus litura) can stress plants. A stem and shoot gall flies (Urophora carduii) and (Larinus planus) are other biological insect options. The leaf beetle (Cassia rubiginosa), released on Musk thistle, has shown promise for Canada thistle, as well.
d. Chemical - effective controls. Excellent control with Tordon, Curtail, Transline, or Roundup. Requires multiple treatments.

**Musk Thistle**
Description: Biennial or sometimes a winter annual.
Control:
a. Removal of Top Growth Somewhat effective. Mowing in late flowering stage can greatly reduce seed production and limit spread.
b. Soil Disturbance - effective control. Severing root below ground will destroy the plant.
c. Biological - very effective. There are 3 control agents available: 1. A seed head weevil (Rhinocyllus conicus) reduces seed production. Must be used with other control methods to provide effective control. 2. A rosette-feeding weevil (Trichosirocalus horidus) feeds on the basal plant tissue destroying the plants ability to grow upright. The use of this weevil is yet in the experimental stages and its effectiveness is not fully known. If transplanted, should be taken from a plumeless thistle host plant.
d. Chemical - effective controls. Good control with Tordon, Curtail, Transline, or 2,4-D plus Banvel.

**Scotch Thistle**
Description: Biennial
Control:
a. Removal of Top Growth Somewhat effective. Mowing can greatly reduce seed production.
b. Soil Disturbance - effective control by pulling or grubbing plants below surface of ground.
c. Biological - No effective control.
d. Chemical - effective control with Tordon, Curtail, Transline, or 2,4-D plus Banvel.

**Plumeless Thistle**
Description: Can be either an annual or biennial.
Control:
a. Removal of Top Growth Somewhat effective. Mowing can greatly reduce seed production.
b. Soil Disturbance - effective control by pulling or grubbing plants below surface of ground.
c. Biological - somewhat effective. The same seed head weevil that attacks Musk Thistle, (Rhinocyllus conicus), feeds on Plumeless Thistle seeds. Must be combined with other control methods to provide effective control. A rosette-feeding weevil (Trichosirocalus horidus) feeds on the basal plant tissue destroying the plants ability to grow upright. The use of this weevil is yet in the experimental stages and its effectiveness is not fully known. If transplanted, should be taken from a plumeless thistle host plant.
d. Chemical - effective control with Tordon or 2,4-D plus Banvel.

**Whitetop**
Description: Very competitive perennial.
Control:
a. Removal of Top Growth Somewhat effective. Repeated treatments may reduce seed production and limit spread.
b. Soil Disturbance - same as above.
c. Biological - no effective control.
d. Chemical - effective controls. 2,4-D plus Banvel provides effective control. Escort provides most effective control.
**Barrock**
Description: Non-native biennial.
Control:
- a. Removal of Top Growth Very effective control through pulling, and mowing.
- b. Soil Disturbance - partial control through repetitive tilling.
- c. Biological - no control available.
- d. Chemical - effective controls using 2,4-D, Tordon, or Banvel.

**St. Johnswort**
Description Non-native perennial.
Control:
- b. Soil Disturbance - no information available.
- c. Biological - somewhat effective. The Chrysolina quadrigemina is a known insect providing partial control.
- d. Chemical - effective control with Tordon.

**Horsenettle**
Description: Native perennial. Poisonous to livestock. Difficult to control.
Control:
- b. Soil Disturbance - very effective control in summer and fall if done on a continuous basis.
- c. Biological - no control available.
- d. Chemical - effective controls using Tordon.

**REFERENCES**
USDA Forest Service. Manuals and Handbooks-all references are located in the Supervisor’s Office, Sheridan, Wyoming


APPENDIX D

Protective Clothing

* Long -sleeved shirt
* Long pants
* Boots (Rubber or wear rubber boot cover)
* Hard hat
* Gloves (Rubber, plastic, or neoprene) when measuring and/or mixing concentrated liquids.
* Goggles or eye shield
* Coveralls, rain chaps.
* Breathing filters

Pants, shirt, and coveralls are to changed if they become noticeably wet and after each day's use. They would be washed separate from other clothes in a strong liquid detergent.

Goggles and eye shields would be worn whenever measuring and/or mixing concentrated herbicides.

Eyewash equipment would be available on site where herbicides are mixed and used.

Other Personal Protection Requirements

Hands or clothing with Herbicide on them would be kept away from eyes. If solution or dust enters the eyes, flush immediately with clean water for several minutes. Contact a doctor immediately.

Hands and face would be washed thoroughly with soap and warm water immediately after work or at earliest opportunity if Herbicide contact base skin.

Hands and face would be washed thoroughly with soap and warm water before eating.
### APPENDIX E

**APPROXIMATE ACREAGE OF NOXIOUS WEEDS ON THE BIGHORN NATIONAL FOREST**

<table>
<thead>
<tr>
<th>Weed Type</th>
<th>Buffalo/Tensleep</th>
<th>Tongue</th>
<th>Paintrock</th>
<th>Medicine Wheel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada thistle</td>
<td>1,841</td>
<td>7,623</td>
<td>411</td>
<td>1,078</td>
</tr>
<tr>
<td>Houndstongue</td>
<td>3,347</td>
<td>4.5</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Musk thistle</td>
<td>0.05</td>
<td>1</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Russian knapweed</td>
<td>Suspected</td>
<td>7</td>
<td>103</td>
<td>1</td>
</tr>
<tr>
<td>Whitetop</td>
<td></td>
<td></td>
<td></td>
<td>144</td>
</tr>
<tr>
<td>Leafy spurge</td>
<td></td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yellow toadflax</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spotted knapweed</td>
<td>Suspected</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russian olive</td>
<td></td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>District Total’s</td>
<td>5,288.05 Acres</td>
<td>7,639</td>
<td>699 Acres</td>
<td>1,135 Acres</td>
</tr>
<tr>
<td><strong>Forest Total</strong></td>
<td><strong>14,761.05 Acres</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### APPENDIX F

**WYOMING NON-POINT SOURCE MANAGEMENT PLAN, FINAL MARCH 1997, PRACTICE #7 - WEED AND PEST MANAGEMENT**
PRACTICE: # 7
Weed and Pest Management

OBJECTIVE: To minimize water quality impairment while controlling weeds and pests.

CONDITIONS WHERE PRACTICE APPLIES: Wherever measures are being used to control weeds and pests.

EXPLANATION: Chemical methods - Read and follow label directions; observe safety precautions such as use of rubber gloves and other safety equipment. Often, the most common method of controlling small nongame animals is poisoning. Poisons should only be used in accordance with label directions and with input from appropriate state and federal management agencies to ensure only the target species are being affected and that there are no potential impacts to surface or groundwater.

Mechanical methods - Should be performed when soil conditions are optimum (saves fuel and wear and tear on equipment). Use the proper equipment for the job.

Biological methods - Consider insects and multiple species grazing to control undesirable vegetation and noxious weeds. Balanced predator prey relationships may be beneficial in controlling animal pests.

CONCERNS: Failure to follow label instructions could result in excessive levels of chemicals in the soil and water. Improper storage, handling, or application could result in surface or ground water quality impairment. Improper equipment could result in unnecessary displacement of topsoil, thus causing loss of cover and increased runoff and erosion.

TECHNICAL SUPPORT: County Weed and Pest Districts, WDA

REFERENCES:


APPENDIX G

Certified Noxious Weed-Free Hay and Straw Requirement, Order No. 02-97-02

ORDER

ORDER NO. 02-97-02

CERTIFIED NOXIOUS WEED-FREE HAY AND STRAW REQUIREMENT

ALL NATIONAL FOREST SYSTEM LANDS AND NATIONAL GRASSLANDS WITHIN THE STATE OF WYOMING

Pursuant to 36 CFR 241.50(a) and/or (b), the following is prohibited on all National Forests, Thunder Basin National Grassland, Forest Development Roads, and Forest Development Trails, within the State of Wyoming until further notice:

1. Possessing, storing, or transporting any hay, straw, mulch or forage product which has not been certified as free of noxious weeds and seeds by a certified State or County Agriculture officer, 36 CFR 241.56 (t)

Pursuant to 36 CFR 241.50 (e), the following persons are exempt from this order:

1. Persons with a permit specifically authorizing the otherwise prohibited act or omission.
2. Any Federal, State, or local officer, or member of an organized rescue or firefighting force in the performance of an official duty.
3. Persons possessing or using pelletized feed or grain products.
4. Persons transporting hay, straw, mulch or forage product on Federal, State, and County roads that are not National Forest System roads and trails.

Done at Lakewood, Colorado, this 18th day of April 1997.

ELIZABETH ESSTLE
Regional Forester
Rocky Mountain Region

Done at Ogden, Utah, this 29th day of April 1997.

DALE M. ROSENTHAL
Regional Forester
Intermountain Region

Violation of this prohibition is punishable as a class B misdemeanor, by a fine of not more than $5,000 for an individual and $10,000 for an organization, or imprisonment for not more than six months or both.

Title 16 USC 551 and 18 USC 3571 (b)(4).
TERMINATION OF ORDER

ALL NATIONAL FOREST SYSTEM LANDS AND NATIONAL GRASSLANDS WITHIN THE STATE OF WYOMING

Pursuant to Title 36 CFR 261.50(a) and/or (b), the prohibitions listed in Order number 02-96-02 and 04-00-056, applicable to the National Forest and National Grasslands within the State of Wyoming, dated April 4, 1996, and signed by J. C. Whitekiend, acting for Elizabeth Estill, Regional Forester, and dated April 18, 1996, and signed by Clair C. Beasley, acting for Dale N. Bosworth, Regional Forester, are hereby terminated.

DALE N. BOSWORTH
Regional Forester
Intermountain Region

ELIZABETH ESTILL
Regional Forester
Rocky Mountain Region

APPENDIX H

Biological Evaluation
The Forest or it's cooperators would follow label directions on Environmental Protection Agency (EPA) registered herbicides to control undesirable plant species. Each of the registered herbicides used may also contain emulsifiers; solvents, preservatives, anti-volatility agents and other substances commonly referred to as inert. Herbicides will be selected that are best suited to meet the individual objectives established for each control location. The selected herbicide, method of application and target weed species will be identified in a pesticide use proposal approved by the Forest Supervisor. The ability to select the proper herbicide for an identified noxious weed species allows for the best control and eliminates or minimizes treatment of non-target vegetation.

Herbicides will be applied and monitored in accordance with direction in the Forest Service Manual 2150 and 2200. Information concerning the herbicides proposed for use is provided in the following documents:
2. Herbicide labels found on commercial product containers.
5. Risk Assessment For Herbicide Use in Forest Service Regions 1, 2, 3, 4 and 10 and on Bonneville Power Administrative Sites, Chapter III (USDA, 1992).

Herbicides would be applied according to the label directions and at levels that minimize the potential adverse health effects of human exposures to the herbicides and carriers as described in the Risk Assessment For Herbicide Use, Pages III-B-3 and III-B-4. Herbicide applicator certification would be conducted according to the State Pesticide Applicator Certification processes for Wyoming.

Herbicide treatment methods could include the use of ground spray vehicles, backpack and manual applications. The majority of ground vehicle use would require the use of hand held spraying equipment (hoses and nozzles) to direct spray to target vegetation. Use of truck mounted booms would be used only in areas where the target vegetation is dense enough and in great enough acreage to effectively use a boom without substantial impact to non-target vegetation. The use of backpack applicators would be minimized. Manual treatments would include hand picking and/or grubbing with hand tools. Mechanical treatments would include plowing, disking and tilling.

Biological treatments would include grazing, insects and pathogens. The Allotment Management Plan or Annual Operating Instructions would control grazing use. Biological control using sheep or goats could be applied to small areas for short periods. Areas where insects and pathogens naturally occur or are introduced would be managed carefully to maintain the density of host plants upon which the relationship between host plant and the controlling organism depends.

For more detailed information, refer to the Noxious Weed Environmental Assessment. This document is on file at the Forest Supervisor's Office, Bighorn National Forest, 1969 South Sheridan Avenue, Sheridan Wyoming 82801.

The occurrence and status of all species listed are based on examination of the Wyoming Game and Fish Department's Wildlife Observation System (WOS), the Nature Conservancy's Wyoming Natural
Diversity Database (WNDD), Forest Service files, personal communications with WYG&F and Forest Service personnel, and review of the scientific literature.

Mitigation Measures Specific to Minimize Impacts to Resources

1. An on-site survey will be conducted by Forest Service personnel to determine the presence and proximity of resources that may be at risk from treatments, including human habitation, aquatic resources, special status species, and cultural resources.

2. Forest Service policies and guidance would be followed in implementing all treatment methods. This includes suspending herbicide applications whenever weather conditions may cause off-site wind drift or surface runoff, limiting use of herbicides that pose human health risks, and providing buffer zones around specially identified resources. The use of specific herbicides will be approved annually by the Forest Supervisor on National Forest lands and the Regional Forester for all designated wilderness areas.

3. Domestic animals used to control an undesirable plant species would not be grazed in an infested area during the period of plant seed production and then moved to another vegetative community. This is intended to limit the spread of undesirable plant species from animal fecal material.

4. In wilderness areas, only non-mechanical methods such as grazing, pulling, cutting, grubbing, herbicides, insects, and seeding of native species would be available to control invasive or noxious weeds.

5. Manual and mechanical control techniques requiring ground disturbance; other than through manual hand control methods would not normally be conducted in riparian or wetland areas.

Mitigation Measures 6 - 14 apply to the use of herbicides:

6. Use a spot treatment strategy to the extent possible and practical.

7. Use minimum application rates known to be effective for control of noxious weeds within label restrictions specific to each herbicide.

8. All spraying within riparian and wetland areas will be with a hand-held wand rather than a boom-type sprayer.

9. Only herbicides registered for aquatic use may be used in riparian and wetland areas.

10. No spraying will occur when wind velocity is more than 6 miles per hour.

11. No spraying will occur when air temperatures exceed a temperature where the herbicide being applied begins to volatilize.

12. Only selective herbicides that will not damage trees and shrubs and other non-target species; and application techniques (wick applicators, directed sprays) will be used in areas where non-target trees and shrubs are present.

13. Use a coarse spray and low pressure (less than 30 psi) to minimize drift.

14. Pre-treatment surveys will be required anytime planned control activities are in a proposed or listed threatened and endangered (T&E) plant's known or suspected habitat. This would also be true for Forest Service sensitive plant species. If any species were identified during these surveys, control options would be limited to those methods that would not adversely affect listed plants. In most instances, manual control techniques would be used in areas where threatened and endangered and/or sensitive species have been identified.

Effects of Implementing Integrated Pest Management

Direct and indirect Effects - The potential effect on non-target vegetation and wildlife species and on water quality is tied to the use of herbicides as a control method under this alternative. The potential for having a negative effect is low. This determination is based on the fact that a majority of herbicide use would be applied using hand applications. Hand applications techniques have a low potential for treating other than target vegetation. This determination is based on mitigation measures that prohibit the use of herbicides if wind speeds exceed 6 mph or at pressures that would be exceed 30-psi pressure. Required pre-treatment surveys anytime control activities are planned in a proposed or listed threatened, endangered or sensitive (TES) plant's known or suspected habitat also substantially minimizes the direct and indirect effects on TES plants.

It is important to recognize that the direct and indirect effects of IPM on TES species may be primarily beneficial. The key objective of the proposed action is to maintain native plant communities through reducing the spread of invasive plants and noxious weeds. Review of the basic habitat requirements for the TES plant and animal species listed in the latter part of this evaluation shows that the target plant species would not contribute to the habitat requirements for any of the species listed. Thus the key objective of the proposed action is consistent with the habitat requirement for TES species.

The Risk Assessment for Herbicide Use also includes a complete analysis on risks associated with non-target species and to Threatened and Endangered Species. See Section III-H and III-H-26 through 28 of the Assessment. The risk analysis considers the potential risk to wildlife and aquatic species from the use of the herbicides included in the proposed action of this analysis. Risk to wildlife and aquatic species is a function of the inherent toxicity (hazard) of each herbicide to different organisms and of the amount of each chemical (exposure) those organisms may take in as a result of a vegetation management operation.

It is also important to note that the wildlife risk assessment tends to overstate the potential risks from herbicide exposure due to the conservative nature of the assumptions. The Risk Assessment assumes that a broadcast aerial application technique would be used for herbicides. The proposed herbicide application technique using ground and hand methods as described in the proposed action would have a much lower exposure area and amount than that estimated for aerial application. The Risk Analysis concludes that for the typical herbicide operation (which falls under Alternative A) for all herbicides and carriers/additives, the typical dose estimates are below the EPA risk criterion of 1/5 LD50 (Lethal Dose to half of the sample population) and are far below the laboratory species LD50's. The risk assessment concludes that for typical water concentration there are no risks from any of the herbicides to aquatic
species under a stream scenario. This is very likely due to the dilution in the mixed solutions applied and additional dilution in the aquatic environment.

The potential for a herbicide applied according to EPA approved label directions to reach free flowing water such as a stream and/or a lake is very low. This determination is based on the fact that nearly all applications of herbicides near water sources would be done with hand held wands. The Risk Assessment, page III-D-2, analyzed spray drift and determined that the spray drift from hand application equipment was considered to be negligible.

Other control methods included in this alternative, other than herbicide use, would not pose any risk to treatment of non-target vegetation and/or wildlife species.

Cumulative Effects - Use of herbicides is the primary activity that is part of this alternative that is associated with a cumulative effect. There are no other present or future proposed actions dealing with herbicide use in the areas where undesirable plants would be treated. However, any unknown projects that could possibly be proposed in the future would be required to follow the same mitigation measures and guidelines currently placed on herbicide use. Therefore, cumulative effects from herbicide use would be expected to be very low, or none at all.

It is important to acknowledge that the scope of the project involves many small acreage sites spread across the entire Bighorn National Forest. Treatment of 1,000 acres per year using various control methods would substantially minimize any cumulative effects recognizing that the total National Forest System acreage within those boundaries is approximately 1,107,000 acres. Thus, treatment of many scattered areas totaling 1,000 acres is not expected to have any cumulative effect. For the most part, it will not be noticeable.

It is acknowledged that other activities on the National Forest System lands do occur that could affect the non-target plant and animal species and water quality associated with this issue. Those activities are generally multiple use activities common to National Forest System lands and include timber harvesting, livestock grazing, recreation uses, mineral activities and transportation systems. However, it is important to note that there are long term benefits to all resources with implementation of an undesirable plant control program.

SUMMARY OF FINDINGS

There would be no adverse effects to listed or candidate species or habitat as a result of management activities permitted in the Bighorn National Forest Integrated Pest Management Plan.

It was also determined that implementation of this proposal may adversely impact individuals or small groups of sensitive species or species of concern, but would not result in a loss of species viability or create trends toward federal listing.

In general it is expected that the overall program will be beneficial to these species and their habitats.

Table 1: 1997 R2 THREATENED, ENDANGERED & SENSITIVE SPECIES FOR THE BIGHORN N.F.

<table>
<thead>
<tr>
<th>WILDLIFE AND FISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Threatened, Endangered, or Candidate Species</td>
</tr>
<tr>
<td>1. North American Lynx - candidate</td>
</tr>
<tr>
<td>2. Peregrine Falcon - Threatened</td>
</tr>
<tr>
<td>3. Sturgeon Chaub - candidate</td>
</tr>
<tr>
<td>4. Bald Eagle - Threatened</td>
</tr>
<tr>
<td>5. Boreal Western Toad - candidate</td>
</tr>
<tr>
<td>6. Columbia Spotted Frog - candidate</td>
</tr>
<tr>
<td>7. Mountain Plover - candidate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Forest Service Region 2 Sensitive Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Townsend's big-eared bat</td>
</tr>
<tr>
<td>2. Fisher</td>
</tr>
<tr>
<td>3. Least Weasel</td>
</tr>
<tr>
<td>4. Water vole</td>
</tr>
<tr>
<td>5. Pine Marten</td>
</tr>
<tr>
<td>6. Fringe-tailed myotis</td>
</tr>
<tr>
<td>7. Spotted bat</td>
</tr>
<tr>
<td>8. Allen's thirteen-lined ground squirrel</td>
</tr>
<tr>
<td>9. North American wolverine</td>
</tr>
<tr>
<td>10. Golden-crowned Kinglet</td>
</tr>
<tr>
<td>11. Western Yellow-billed Cuckoo</td>
</tr>
<tr>
<td>12. Loggerhead Shrike</td>
</tr>
<tr>
<td>13. White-faced ibis</td>
</tr>
<tr>
<td>14. Olive-sided flycatcher</td>
</tr>
<tr>
<td>15. Pygmy Nuthatch</td>
</tr>
<tr>
<td>16. Common Loon</td>
</tr>
<tr>
<td>17. Boreal Owl</td>
</tr>
<tr>
<td>18. Harlequin Duck</td>
</tr>
<tr>
<td>19. Merlin</td>
</tr>
<tr>
<td>20. Osprey</td>
</tr>
<tr>
<td>21. Long-billed Curlew</td>
</tr>
<tr>
<td>22. Greater Sandhill Crane</td>
</tr>
<tr>
<td>23. Upland Sandpiper</td>
</tr>
<tr>
<td>24. Western Burrowing Owl</td>
</tr>
<tr>
<td>25. Lewis' Woodpecker</td>
</tr>
<tr>
<td>26. Northern three-toed woodpecker</td>
</tr>
<tr>
<td>27. Fox Sparrow</td>
</tr>
<tr>
<td>28. Ferruginous Hawk</td>
</tr>
<tr>
<td>29. Northern Goshawk</td>
</tr>
<tr>
<td>30. Black Tern</td>
</tr>
<tr>
<td>31. Baird's Sparrow</td>
</tr>
<tr>
<td>32. Northern Leopard Frog</td>
</tr>
<tr>
<td>33. Tiger Salamander</td>
</tr>
</tbody>
</table>
34. Wood Frog
35. Yellowstone Cutthroat Trout

PLANTS
1. Ageratina altissima - Pink ageratum
2. Arnica montana - Northern Arnica
3. Aster novae-angliae - Soft aster
4. Epilobium angustifolium - Giant hellebore
5. Festuca hallii - Hall's fescue
6. Penstemon caryi - Cary beardless
7. Rubus acuminatus - Northern blackberry
8. Sullivania apennina - Sullivania's nivalis
9. Menyanthes trifoliata - Mountain mallow - This one is questionable. Ferrig doesn't show it on the Bighorn. Narrative in the occurrence book says it is probable. Michele Gerard said not likely.

SPECIES OF CONCERN
1. Adoxa moschatellina - Moschatel
2. Anemone narcissiflora - Zephyr flower
3. Antennaria montana - Single-headed pussytoes
4. Asplenium trichomanes - Green spleenwort
5. Botrychium manganense - Manganese moonwort
6. Botrychium vigilans - Rattlesnake fern
7. Carex limosa - Mud sedge
8. Celtis occidentalis - Common hackberry
9. Cirsium leucanthemum - Leafy thistle
10. Cominisetella williamsonii - Willims' cominisetella
11. Cryptogramma stelleri - Fragile rockbrake
12. Cymopterus williamsonii - William's waferparsnip
13. Cypripedium calceolus var. pubescens - Large yellow lady's slipper
14. Cypripedium montanum - Mountain lady's slipper
15. Draba fladnizensis var. pattersonii - White arctic whistling grass
16. Equisetum sylvaticum - Woodland horsetail
17. Erigeron allococcus - Branched fleabane
18. Erigeron hulimus - Low fleabane
19. Eriophorum chenopodioides - Russet cotton-grass
20. Eriophorum vaginatum - Arctic willowherb
21. Juncus triglumis var. triglumis - Three flower rush
22. Listera ovata - Broad-leafed twayblade
23. Papaver rhoeas - Alpine poppy
24. Pedicularis parryi ssp. megoblonica - Mogollon lousewort
25. Pedicularis pulchella - Mountain lousewort
26. Physaria lanata - Woolly twinopod
27. Pyrethrum clementis - Tranquil goldenweed
28. Stanleya tomentosa var. tomentosa - Hairless plume
29. Triodanis leptocarpa - Slim-pod Venus-looking-grass
30. Utricularia minor - Lesser bladderwort

WATCH LIST
1. Antennaria aromatica - Aromatic pussytoes
2. Polemonium brandegei - Brandegee's Jacob's-ladder

CONSULTATION WITH THE U.S. FISH AND WILDLIFE SERVICE (USFWS)
Interagency cooperation between the Forest Service (or other federal agency) and the USFWS, regarding proposed, threatened, or endangered species, is described in Section 7 of the Endangered Species Act. Definitions relating to "consultation" and "conference" are given in FSM Supplement 2600-94-2.

This project is expected to have "no effect" on any federally threatened, endangered or candidate species (or critical habitat). The proposed project would not affect the population viability and distribution of sensitive species. Therefore, formal consultation with the USFWS is not required.

BIOLOGICAL EVALUATION FOR FISH, WILDLIFE AND PLANTS

PRE-FIELD (OFFICE) REVIEW OF EXISTING INFORMATION
The occurrence and status of endangered, threatened, and candidate species of fish, wildlife and plants within the project area are based on previous site visits, examination of the Wyoming Game and Fish Department Wildlife Observation System, The Nature Conservancy Wyoming Natural Diversity Database, Forest Service files, and review of the scientific literature.

FIELD SURVEY AND RISK ASSESSMENT FOR FISH WILDLIFE AND PLANT SPECIES
Survey techniques and results of surveys, previously documented sightings, mitigation, and risk assessment are offered below on a species by species basis.

Peregrine falcons (Falco peregrinus) and Bald eagles (Haliaeetus leucocephalus) are the only threatened or endangered species known to occur within the project area. Peregrine falcons have been known within the project area and no sightings of returning birds have been recorded. Bald eagles are usually winter migrants and have been known to use these lands during the winter for hunting and scavenging. No summer use has been recorded.

The Wyoming Game and Fish Department is currently conducting a study of bats and cave habitats, which includes the Bighorn Mountains. Preliminary results from their study indicated that no bat habitat would be affected by the proposed project.

Snow track surveys for lynx, marten and fisher are being conducted by Forest Service biologists.

Calling surveys have been started for Boreal Owl on the Forest. Surveys are planned in spring of 1998. No Boreal owls have been located within the Bighorn National Forest.

The Nature Conservancy has surveyed some aquatic resources on the Bighorns for amphibians and further research is currently being conducted by Forest Service biologists.
There are no known threatened or endangered plants known to occur within the project area. Sensitive, species of concern and watch list species will not be impacted by any of the Alternatives proposed with the identified mitigation measures in place.

**Risk Level**

It is the determination of this Biological Evaluation that there would be no adverse effects to listed or candidate species or habitat as a result of management activities permitted in the Bighorn National Forest Integrated Pest Management Plan.

It is also the determination of this Biological Evaluation that implementation of this proposal may adversely impact individuals or small groups of sensitive species or species of concern, but would not result in a loss of species viability or create trends toward federal listing.

In general, effects are expected to be beneficial to these species and their habitats.

Therefore, the overall risk to any of the above listed species due to project activities is None.

**CONSULTATION WITH THE U.S. FISH AND WILDLIFE SERVICE**

This project is expected to have "No adverse effects" on federally threatened, endangered, or candidate species (or critical habitat), so consultation with the USFWS was not necessary.

**INFORMATION SOURCES:**


