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Final Environmental Impact Statement

Noxious Weed Management Project

Dakota Prairie Grasslands

**Billings, Slope, Golden Valley, Sioux, Grant,
McHenry, McKenzie, Ransom and Richland
Counties in North Dakota
Corson, Perkins and Ziebach Counties in South
Dakota**

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**Dakota Prairie Grasslands
Noxious Weed Management Project
Final Environmental Impact Statement**

**Billings, Slope, Golden Valley, Sioux, Grant, McHenry, Ransom
and Richland Counties, North Dakota; Corson, Perkins, and
Ziebach Counties, South Dakota**

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Abstract: In 2003, Forest Service Chief Dale Bosworth identified four interrelated threats to our ability to protect and restore our forests and grasslands to healthy conditions. One of the threats is noxious weeds. Approximately 57,234 acres, or four percent, of the 1.25-million acre Dakota Prairie Grasslands (DPG) are infested with a variety of noxious weeds. Currently there are 17 known noxious weed species on the unit. The DPG proposes to use an integrated adaptive approach to continue to treat existing and future infestations of noxious weeds. The FEIS analyzes two alternatives: No Action and the Proposed Action, which would use an integrated approach to treat and control up to 25,000 acres annually of existing infestation sites. The Proposed Action also includes an adaptive strategy for treating up to 13,900 acres of new or previously unknown noxious weed infestations over the next 10 to 15 years in a manner consistent with the DPG Land and Resource Management Plan direction and applicable laws.

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SUMMARY

CHANGES BETWEEN DRAFT AND FINAL

Some changes were incorporated into the proposed action in the FEIS based on public comments on the DEIS and some new information. While these changes have been determined to be within the analysis, and could have been published as an errata/change sheet to the DEIS, this document incorporates those changes in one place to help avoid any future confusion. Changes are described in Chapter 1. Other minor editorial corrections or clarifications account for slight differences between the draft and final EIS, but will not be described in detail.

INTRODUCTION

In 2003, Forest Service Chief Dale Bosworth identified four interrelated threats to our ability to protect and restore our forests and grasslands to healthy conditions. One of the threats is noxious weeds. Approximately 57,234 acres, or four percent, of the 1.25-million acre Dakota Prairie Grasslands (DPG) are infested with a variety of noxious weeds. Currently there are 17 known noxious weed species on the unit. The DPG proposes to use an integrated adaptive approach to continue to treat existing and future infestations of noxious weeds.

This Final Environmental Impact Statement (FEIS) documents the analysis of the potential environmental consequences of treating noxious weeds on the Dakota Prairie Grasslands. The FEIS has been prepared in compliance with the National Environmental Policy Act (NEPA) guidelines as set by the Council of Environmental Quality in 40 CFR 1500-1508 and Forest Service Handbook 1909.15. The FEIS describes the Proposed Action, purpose and need, significant issues, alternatives including the Proposed Action, affected environment, adaptive management as well as monitoring and a list of preparers. The appendix material includes such items as Best Management Practices and Special Management Zone Direction, and the USDA - Forest Service Guide to Noxious Weed Prevention Practices.

PROJECT AREA

The proposed project covers the DPG, which includes the Medora, McKenzie, Grand River, and Sheyenne Ranger Districts and the Denbigh and Souris Experimental Forests. The DPG is located in both North and South Dakota and encompasses portions of Billings, Slope, Golden Valley, McKenzie, Sioux, Grant, McHenry, Ransom and Richland Counties, North Dakota; and Corson, Perkins and Ziebach Counties, South Dakota. Portions of the project area are within the boundaries of the Standing Rock Indian Reservation. The project area consists of National Forest System (NFS) lands within the administrative boundaries of the DPG. Proposed treatments would occur throughout the project area.

PROPOSED ACTION

The Forest Service, through the application of an integrated noxious weed treatment strategy, proposes to treat all known acres of noxious weeds (57,234) on the DPG over the next 10-15 years. Annual programs would treat up to approximately 25,000 acres.

It is also reasonable to assume that new or unknown noxious weed populations will be discovered during the next 10 to 15 years and that new treatments may also become available. To accommodate these situations the Proposed Action includes an adaptive process, detailed in Chapter 2, for dealing with these eventualities. Therefore, included in the Proposed Action is up to 13,900 additional acres of new or previously unknown noxious weed infestations which would be treated, as they are discovered, over the next 10 to 15 years.

The proposed integrated treatment program would utilize a variety of tools, singularly or in combination, to treat noxious weeds. Proposed methods include the following:

- Mechanical methods, such as hand pulling, mowing, or cutting.
- Revegetation, where competitive vegetation is seeded to reduce noxious weed species, possibly after other treatments to remove the noxious weeds.
- Grazing with livestock such as goats or sheep.
- Biological control through the use of predators, parasites, and pathogens.
- Herbicide control using ground-based application methods.
- Herbicide control using aerial application methods.
- Prescribed fire in conjunction with other treatments.
- Education through the use of programs to inform people of noxious weed effects, methods of noxious weed spread and preventative management opportunities and practices.
- Prevention by using practices that reduce noxious weed spread, including a weed-free forage program and washing vehicles to remove weed seeds.

Actual acres treated, under the Proposed Action, are dependent on annual financing of the noxious weed program. The Proposed Action likely represents the upper limit of annual treatment. Due to the persistence of some noxious weeds, infested areas may be annually treated or receive more than one treatment over the next 10 to 15 years. A detailed description of the Proposed Action is contained in the Alternatives section in Chapter 2 of the FEIS.

PURPOSE and NEED

The purpose of this project is to economically implement those portions of the DPG Land and Resource Management Plan (Grasslands Plan) that call for implementation of a program to control and eradicate identified species of noxious weeds.

The eradication and control of noxious weeds will meet the need and requirement of the DPG to promote the ecosystem health of forested and rangeland habitats by maintaining or improving native forbs and grass species, ultimately preventing the loss of wildlife habitat. It is important to eradicate and control noxious weeds, with minimal disturbance to the soil and desired plants, to prevent damage to soils, to minimize erosion, and to maintain wildlife habitat.

Failure to control or eradicate infestation sites will mean the spread of weeds, which displace native plant material. Some may be toxic to animals and humans, and few are desirable forage species for livestock or wildlife. The spread of these species increases the adverse impacts to humans, animals both domestic and wild, and native plant communities. Without treatment, weeds increase about 14 percent a year under natural conditions. Historical information from the Medora Ranger District demonstrates that the size of leafy spurge infestations has expanded approximately 10 percent per year since 1969.

This action is needed because inventories on the DPG show that noxious weed populations have expanded from a few, small infestations to almost 58,000 acres. Studies completed in other parts of the country show that many noxious weeds have the ability to replace all native plants within a given area. These species pose a serious threat to ecosystem diversity and have a high potential to harm native plants and wildlife, especially threatened, endangered, and sensitive species. Leafy spurge is of particular concern on the DPG due to its invasiveness. This plant tends to form monocultures (areas dominated by a single plant species) and eventually eliminate all other native plants. In addition, black henbane, and other species produce toxic substances that can pose threats to humans, livestock, and wildlife.

The effects of noxious weed growth on native plants include: a decline in ecosystem diversity and health; an increase in bare soil resulting in declines in watershed condition; a decrease in the overall capacity of the land to support wild and domestic ungulates; and a reduction in the quality of habitat for many wildlife species. Another concern is the current infestation in and along riparian corridors. Water in these habitats transports seeds and spores, spreads the infestation, which further reduces riparian habitat structure, and leads to an increase in sedimentation and a reduction water holding capacity.

The DPG has been controlling noxious weeds on each Ranger District under previous NEPA decisions including the 1986 Custer National Forest Noxious Weed Environmental Impact Statement. However, an updated noxious weed control analysis is needed to address newly listed noxious weed species, to identify additional acres of noxious weed infestations, to ensure we are complying with the revised Grasslands Plan, and to incorporate the use of new, more effective herbicides, technologies, and biological controls as appropriate.

The purpose of this proposal is to:

- Prevent or reduce the loss of native plant communities associated with the spread of noxious weeds.
- Improve and protect the biodiversity and ecological integrity of the DPG by preventing or limiting the spread of weeds that could alter desired plant community composition and function.
- Eradicate new invaders (weed species not previously reported on the DPG) before they become established and become more difficult to control.
- Prevent or limit the spread of established weeds into areas with few or no infestations.
- Restore and protect wildlife and plant habitat.
- Restore availability and quality of forage for livestock.
- Improve the aesthetic quality of roadside and recreation areas.
- Reduce infestation and spread of noxious weeds associated with developed sites, including oil and gas facilities, campgrounds, trailheads, roads, trails and administrative sites.
- Improve the ability to control noxious weeds in areas occupied by threatened and sensitive species without significant impacts to those species.
- Protect sensitive and unique habitats (including research natural areas, wetlands, and sensitive plant populations) from invasion by weeds.

- Continued implementation of federal and state weed policies, executive orders, and other management plans.
- Continued cooperation with county, state and federal agencies and private landowners interested in managing weed invasions.
- Implement Grasslands Plan goals and objectives.

DECISIONS TO BE MADE

Based on the environmental analysis in the Final Environmental Impact Statement (FEIS), consideration of public comments, Grasslands Plan direction, Forest Service policy, and Federal and State laws, the Grasslands Supervisor of the DPG, who is the responsible official for this proposal, will decide:

- Whether to implement the Proposed Action as presented, modified, or not at all (No Action).
- Which treatment methods and herbicides will be available for control and eradication of noxious weeds.
- Which design criteria will be required to appropriately implement weed-control methods.
- What monitoring will be required to ensure that project objectives are being met.
- What, if any, Grasslands Plan amendments are required.

PUBLIC INVOLVEMENT

A scoping letter was sent out to 160 organizations, county, state and federal agencies, county commissioners, individuals, businesses, media, and organizations on March 31, 2004. News releases were sent to the DPG's paper of record, The Bismarck Tribune, and other daily and weekly newspapers and radio stations. The proposed project has been published in the DPG National Environmental Policy Act (NEPA) Quarterly Schedule of Proposed Actions since the First and Second Quarters, January-June 2003 edition. The Notice of Intent (NOI) for the Draft EIS (DEIS) was published in the Federal Register on June 14, 2005. The NOI notified the public that a DEIS would be prepared for this project. The comment period associated with the NOI was 45 days. Twelve responses were received from scoping and two from the NOI.

A Notice of Availability for the DEIS was published in the Federal Register on May 5, 2006, and copies of the DEIS were sent to 42 individuals, organizations, and county, state and federal agencies. The comment period was 45 days, and the Forest Service received 12 responses. In addition, an open house was held on May 3, 2006 in McLeod, ND. Twenty people attended.

ISSUES

The significant issues used in the development of the alternatives are identified below.

Issue 1. Noxious weed treatments may have adverse effects to soil and water quality.

Herbicide application by the Forest Service and adjoining landowners may have led to areas where there is a persistent amount of herbicides left in the soil, groundwater, or surface water. Some areas, which were suitable for herbicide application in the past, may no longer be, based on new label information, better knowledge of soil types, and 16 years of groundwater-quality groundwater data.

Issue 2. Noxious weed treatments may have adverse effects on the western prairie fringed orchid, which is a Threatened species located on the Sheyenne National Grassland.

Treatment of noxious weeds is a challenge in the management of this species. The western prairie fringed orchid is sensitive to herbicide treatment. Past application of the herbicide imazapic (Plateau), on the Sheyenne National Grassland, has caused mutations in the orchids. These mutations have been temporary in scope, i.e., one to two years and are associated with the persistence of imazapic (Plateau) in the soil. However, it is essential to limit the spread of leafy spurge in orchid habitat as this weed competes with the orchid for habitat. Other treatments such as sheep or goat grazing may impact individual orchid plants.

Issues 3. The use of herbicides for noxious weed control may cause acute (short-term) or chronic (long-term) health problems for people who come into contact with the herbicides and/or treated areas.

Concern was expressed that the use of herbicides for noxious weed control may cause health problems for people who are exposed to the herbicides and/or treated areas. Although federal and state licensing, certification requirements, and EPA herbicide labels require strict safety features before use, some people have reservations about the use of these products.

Issue 4. Aerial application of herbicides may have adverse effects on non-target species.

Aerial application can be beneficial because it allows coverage of greater areas of weed infestation in short amounts of time; however, it offers less specific control of where the herbicide is applied. Non-target broadleaf plants such as trees, shrubs, forbs and other resources may be adversely affected.

ALTERNATIVES

The Forest Service developed two alternatives: No Action and Proposed Action, in response to issues raised by the public and the ID team for this project.

Alternative 1 – No Action

This alternative would call for no weed management treatments applied to any National Forest System (NFS) lands, except for those NFS lands under road right-of-way (ROW) agreements with the different counties within the DPG. In these situations, the authority to undertake treatments is vested within those agencies. This alternative provides a baseline for comparison of effects and analysis of effects.

There would be no herbicide application (ground based or aerial application), mechanical methods (hand or tool grubbing, mowing), revegetation, goat or sheep grazing, use of fire or biological control. Existing biological controls would be allowed to progress naturally, but no supplementation would occur. Ongoing weed prevention and education would still continue, but additional measures would not.

When this project was scoped with the public, the No Action alternative was presented as no change from the current weed treatment program. Since that time, the alternative has been modified to that stated above. The No Change alternative is discussed in the "Alternatives Considered But Eliminated From Detailed Analysis" section of this chapter.

Alternative 2 - Proposed Action

The Forest Service, through the application of an integrated noxious weed treatment strategy, proposes to treat all known acres of noxious weeds (57,234) on the DPG over the next 10 to 15 years. Annual programs will treat up to 25,000 acres.

It is reasonable to assume that new or unknown noxious weed populations will be discovered during the next 10 to 15 years and that new treatments may become available. To accommodate these situations the Proposed Action includes an adaptive process, detailed in Chapter 2, for dealing with these eventualities. Therefore, included in the Proposed Action is up to 13,900 additional acres of new or previously unknown noxious weed infestations, which would be treated, as they are discovered, over the next 10 to 15 years.

The proposed integrated treatment program would utilize a variety of tools, singularly or in combination, to treat noxious weeds. A detailed description of the Proposed Action is located in Chapter 2 of the FEIS.

AGENCY PREFERRED ALTERNATIVE

The agency preferred action is Alternative 2.

SUMMARY OF POTENTIAL ENVIRONMENTAL EFFECTS

Major conclusions of effects relative to the purpose and need and issues are summarized below.

Summary of Effects of Alternative 1 – No Weed Treatment

- Noxious weeds will spread. Noxious weeds spread at a rate of 1 to 35 percent per year. Untreated areas and travel ways would serve as sources for re-infestation of treated and non-infested sites. Weeds may spread from NFS land onto adjacent private and state lands
- New noxious weed invasions would not be treated and existing weeds would continue to infest new sites.
- While some wildlife species would be affected more than others, most would experience negative effects through loss of habitat and competition for remaining habitat, particularly on the Sheyenne National Grassland (SNG). Population viability of some sensitive butterfly species on the SNG would be impacted because of the high impacts to habitat, small home ranges and low species vagility.

- Noxious weeds may be poisonous or unpalatable to livestock. The forage value, if any, is minimal. The loss of native or desired non-native vegetation would be substantial. The livestock carrying capacity of the Grasslands would decrease.
- Cooperation would be limited to county agencies treating right-of-way on roads passing through National Forest System lands.
- Weed policies and orders would not be implemented and would thereby violate executive orders, state and county laws. State and county weed treatment programs would continue.
- The noxious weed direction in the Grasslands Plan would not be implemented.
- There would be no check on the spread or introduction of noxious weeds. The opportunity to spread weeds via livestock, recreationists, and motorized vehicles would increase.
- Roadsides and recreation areas would provide opportunities for the continued spread or introduction of existing or new noxious weeds. In some areas visitors may see fewer native species and diversity, and more monocultures of noxious weed species.
- The risk to Threatened and Sensitive plant species would significantly increase if treatment of noxious weeds were discontinued.
- Sensitive and unique habitat may be lost or suffer severe impacts due to the displacement of native vegetation by noxious weeds.
- There would be no risk to groundwater quality on the DPG from the Proposed Action. Water quality may improve on the Sheyenne Ranger District where picloram has been detected in test wells.
- Noxious weeds would continue to spread in affected areas, likely resulting in increased bare ground and corresponding increases in runoff, erosion, and sedimentation, which would adversely affect quality of surface waters.
- The continued spread and increase in the density of existing noxious weeds on the Sheyenne National Grassland may result in the federally threatened western prairie fringed orchid losing habitat.
- There would be no herbicide effects to human health from the Proposed Action.
- There would be no potential effects from aerial application of herbicide.

Summary of Effects of Alternative 2 – Proposed Action

- The Proposed Action would contain and control infestations. Treatments would control, reduce and, in some instances, eliminate noxious weeds, improving biodiversity and ecological integrity.
- The Proposed Action includes an adaptive strategy to treat new noxious weeds or previously unknown infestations of existing noxious weeds.
- For fish and wildlife, there may be some short-term negative effects to individuals or habitats in localized areas as non-target vegetation is affected, but these impacts will not affect population or species viability. In the long-term, there will be beneficial impacts

for fish and wildlife as habitats are improved through the reduction of noxious weeds and increase in native vegetation.

- Noxious weed infestations would be contained to their present level and within the next ten years would become less dense, smaller in patch size, and possibly even eliminated in some situations. Native plants would return to these sites and would increase the amount and quality of available forage.
- Under the Proposed Action, the DPG would continue to work with state and county agencies, and cooperators, such as grazing associations and oil and gas companies, as part of an integrated noxious weed treatment program.
- The Proposed Action would implement the Grasslands Plan direction for treatment of noxious weeds.
- Treatment of noxious weeds along roads and recreation facilities provides for a better recreational experience. Treatment of these areas minimizes potential spread of noxious weeds by recreationists and others using the road systems.
- There would be no effect on Threatened and Endangered wildlife.
- For sensitive wildlife species there may be a short-term impacts to individuals or habitat, but they will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Long-term, there is a beneficial impact associated with noxious weed treatment.
- The Proposed Action identifies design criteria that would allow treatment of noxious weeds in special areas and provide for protection and habitat improvement in those areas.
- Design criteria should decrease the frequency and magnitude of ground-water contamination. However, because of ongoing herbicide application surrounding the SNG, herbicide contamination of groundwater may not be completely eliminated. Eradication of weeds and restoration of desired native plants should decrease bare ground as well as decrease runoff, erosion and sedimentation in surface waters.
- Overall, the Biological Assessment determination for the federally threatened western prairie fringed orchid is “may effect, not likely to adversely affect” the species. Some treatments may impact individual plants; other treatments will not impact orchids at all. Long-term, there is a beneficial impact to orchid habitat as noxious weeds are controlled.
- The human health analysis reveals that the proposed herbicides will have neither acute nor chronic health effects if 1) EPA herbicide label directions are followed, 2) personal protective equipment is used, and 3) the appropriate design criteria (identified in Chapter 2) are implemented.
- Design criteria identified in Chapter 2 mitigate potential impacts from herbicide drift during aerial application.

INTRODUCTION

The Forest Service has prepared this Environmental Impact Statement in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This Final Environmental Impact Statement (FEIS) discloses the direct, indirect, and cumulative environmental impacts that would result from the Proposed Action and alternatives. The document is organized into four chapters:

Chapter 1. Purpose and Need for Action: The chapter includes information on the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need.

Chapter 2. Alternatives, including the Proposed Action: This chapter provides a more detailed description of the agency's Proposed Action and alternative methods for achieving the stated purpose. This section also details how the Forest Service informed the public of the proposal and how the public responded. Alternatives were developed based on significant issues raised by the public, other agencies and the Interdisciplinary Team (IDT). This chapter also includes design criteria and a summary of the environmental consequences associated with each alternative.

Chapter 3. Affected Environment and Environmental Consequences: This chapter summarizes the physical, biological, social, and economic environments of the project area and describes the environmental effects of implementing the Proposed Action and the other alternatives. The disclosure of environmental impacts covers items about purpose and need, issues identified as significant, and specific resource areas that are required to be disclosed in an environmental analysis.

Chapter 4. Consultation and Coordination: This chapter provides a list of preparers and agencies consulted during the development of the environmental impact statement.

Index: The index provides page numbers by document topic.

Literature Cited

Appendices: The appendices provide more detailed information to support the analyses presented in the environmental impact statement.

Additional documentation, including more detailed analyses of project-area resources, may be found in the Project Record located at the Dakota Prairie Grasslands Supervisor's Office, 240 W. Century Ave., Bismarck, ND 58503.

CHANGES BETWEEN DRAFT AND FINAL

Input received during the 45-day comment period on the Draft EIS resulted in some changes to the EIS. Those changes are incorporated into this Final EIS. Substantive changes include:

- Design criteria added or revised:

ADDED in Design Criteria, Registered Herbicides: Tank mixes of herbicides (sometimes called "cocktails") can be considered if all herbicides in the mix were analyzed and approved in this EIS, or all of the herbicides in the mix meet the criteria for adding a new herbicide (See Adaptive Management Strategy). The most restrictive herbicide will be used to determine where and how the mix can be used.

ADDED in Design Criteria, Registered Herbicides: To provide protection of natural resources, the use of 2,4-D anywhere on the Dakota Prairie Grasslands in Management Zones as described in Appendix B will be limited to those formulations designed and approved for use in or near water.

REVISED in Design Criteria, Sensitive Plant Species: Glyphosate would only be applied within the 50-foot buffer if the sensitive plant species is dormant and known not to be affected by the glyphosate.

REVISED in Design Criteria, Aerial Application: Either helicopter or fixed-wing aircraft may be used to apply herbicide as long as all applicable design criteria are met. (References to aerial application throughout the EIS were modified to reflect this change.)

ADDED in Design Criteria the following process for possible exemptions:

The Line Officer may allow herbicide to be used in wooded areas where it has been determined that the wooded species are to be removed. This variance in the criteria will be allowed if the full intent of this analysis and resulting Record of Decision are still met. This decision shall be in a dated, written and signed document in advance of the treatment. This document and all analysis included in the variance will be filed in the appropriate 2080/2240 file, and shall be made on a site-specific basis.

- Table 2 in the DEIS identified 200-500 acres as an estimate of the amount of noxious weeds that would be treated through aerial application of herbicides. This estimate was based on the best information available at the time, and was meant to be an estimate, not necessarily a limitation. Table 2 has been updated to reflect the fact that weeds may be treated through aerial or ground application as long as design criteria are followed.
- Timeframes were clarified for effects analysis in Chapter 3 that did not already identify them.

For botany, vegetation, soils and hydrology, short-term refers to one growing season after treatment; long-term would be beyond that time. For human health, short-term (acute) effects generally occur immediately or within 14 days, and long-term (chronic) effects can occur over a person's lifetime.

- Requirements for the use of 2,4-D have been changed to reflect the fact that there are formulations of 2,4-D that are approved and safe for use on or near water (see Design Criteria above). As a consequence, the setback distances for spraying are lifted for the Streamside Management Zone and Wetland Management Zone. In addition, the restrictions governing depth to groundwater in a Groundwater Vulnerable Zone are lifted. These changes appear in Appendices B and C of the FEIS.

CHAPTER 1. PURPOSE OF AND NEED FOR ACTION

BACKGROUND

In 2003, Forest Service Chief, Dale Bosworth, identified four interrelated threats to our ability to protect and restore our forests and grasslands to healthy conditions. The major threats identified are: fuels and fires, invasive species, loss of open space, and unmanaged recreation. This project addresses noxious weeds, which are usually invasive species, and therefore directly responds to this threat.

Millions of acres of public lands are rapidly undergoing degradation because of the spread of noxious weeds. Nationwide, the invasion of noxious weeds into forest and rangeland threatens ecosystem health by displacing native species. The spread of noxious weeds reduces biological diversity, impacts threatened and endangered species, degrades wildlife habitat, modifies vegetative structure and species composition, changes fire and nutrient cycles, and degrades soil structure.

There are 23 plant species currently listed as noxious weeds on North Dakota and South Dakota state and county noxious weed lists. Of these 23 plant species, 17 are known to occur on the Dakota Prairie Grasslands (DPG). Several Montana and Minnesota noxious weeds are also included in this analysis because they are potential threats.

Currently approximately 57,234 acres or four percent of the 1.25-million acre Dakota Prairie Grasslands (DPG) are infested with a variety of noxious weeds. Many noxious weed infestations on the McKenzie, Medora, and Grand River Ranger Districts (western North Dakota and northwestern South Dakota) are concentrated in woody draws and riparian areas. However, on the Sheyenne Ranger District, in eastern North Dakota, noxious weeds are spread across at least half of the district. The most prevalent noxious weed on the DPG is leafy spurge, which currently infests approximately 53,315 acres followed by Canada thistle and buckthorn at 1,551, and 202 acres respectively. Smaller amounts (50 acres or less) of Russian or spotted Knapweed, absinth wormwood, black henbane, bull thistle, and hoary cress have also been identified.

In 2003, a few plants of salt cedar were found on the DPG. This species of noxious weed is of particular concern because of its ability to colonize water sources, which are scarce in western North and South Dakota. This species' thirst for water is such that it can "dry up" water sources it colonizes. The DPG, in collaboration with state and county governments and grazing associations, has actively inventoried and treated all known occurrences of this species.

The Dakota Prairie Grasslands has been actively treating weeds since the early 1960s with a combination of herbicides. The late 1980s and 1990s, saw the introduction of biological control agents (insects), sheep and goat grazing, revegetation, and mechanical treatment. In the western parts of the DPG, biological control (i.e., flea beetles), has been particularly effective in reducing the size and density of large leafy spurge patches; however, they are showing a limited effectiveness with small patches because there aren't enough spurge plants to sustain ongoing populations of beetles. Treatment with herbicides has been the primary treatment method over the years. This approach has been effective in treating small infestations and serves as a holding action for larger populations.

Treating noxious weeds on the DPG is a collaborative effort involving state and county governments and grazing associations in both North and South Dakota.

The DPG is a relatively new unit in the USDA Forest Service. It was formerly a part of the Custer National Forest until 1998 when it was designated by the Chief of the Forest Service as a separate unit in the National Forest System. In the FEIS you will see dates associated with the DPG that predate 1998 without reference to the Custer National Forest. This was done for consistency and to minimize reader confusion.

Project Location

The proposed project covers the DPG, which includes the Medora, McKenzie, Grand River, and Shyenenne Ranger Districts and the Denbigh and Souris Experimental Forests. The DPG is located in both North and South Dakota and includes portions of Billings, Slope, Golden Valley, McKenzie, Sioux, Grant, McHenry, Ransom and Richland Counties, North Dakota; Corson, Perkins and Ziebach Counties, South Dakota (see Figure 1). Portions of the project area are within the boundaries of the Standing Rock Indian Reservation. The project area consists of National Forest System (NFS) lands within the administrative boundaries of the DPG. Proposed treatments would occur throughout the project area.

Noxious Weeds Defined

A weed is designated noxious when it is considered by a governmental agency to be injurious to public health, agriculture, recreation, wildlife, or property. Some general characteristics of noxious weeds are their ability to spread rapidly, reproduce in high numbers, and crowd out native plants. Noxious weeds also tend to be very difficult to control. The estimated annual loss of productivity caused by noxious weeds in sixty-four crops grown in the United States is \$7.4 billion.

Noxious weeds can be annuals, completing their life cycle in one growing season, or perennials, having a life cycle spanning more than one growing season. Most noxious weeds were originally from other countries. Many arrived in shipments of desirable seeds, in the ballast of sailing ships, or were introduced intentionally as garden plants. Noxious weeds thrive in disturbed areas like roadsides, building sites, maintenance areas, irrigation ditches, dirt parking areas, trails, and campgrounds. Once noxious weeds gain a foothold, they can increase water and wind erosion, alter nutrient cycling, destroy wildlife habitat, reduce the usefulness of recreation areas, and decrease agricultural productivity.

The Forest Service Manual 2080.5 defines weeds as:

“...plants designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being native or new to or not common to the United States or parts thereof.”

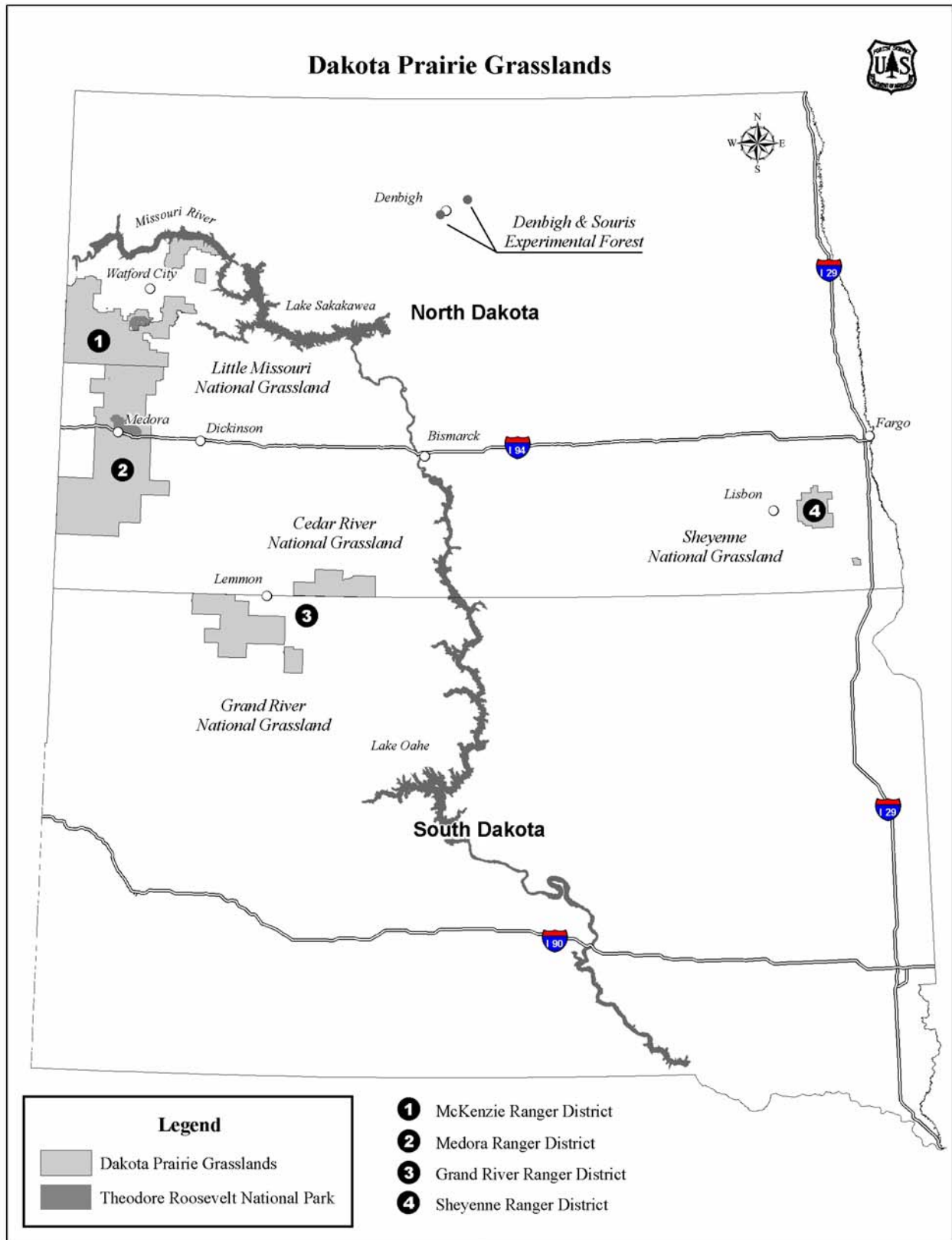
Noxious weeds are also defined by:

The Federal Noxious Weed Act of 1974 which defines a noxious weed as “a plant which is of foreign origin, is new to, or is not widely prevalent in the United States, and can directly or indirectly injure crops or other useful plants, livestock or the fish and wildlife resources of the United States, or the public health” (P.L. 93-629).

North Dakota Noxious Weed Law and Regulations defines noxious weeds as “weeds that are difficult to control, easily spread, and injurious to public health, crops, livestock, land, or other property” (North Dakota Century Code 7-06-01-02).

For the purposes of this document, the term “noxious weeds” (weed) will refer to plants in the project area whose presence does or is likely to cause economic or environmental harm or harm to human health.

Figure 1. Dakota Prairie Grasslands



Grasslands Plan Direction

The Dakota Prairie Grasslands Land and Resource Management Plan (Grasslands Plan) guides natural resource management activities and establishes goals, objectives, standards, and guidelines for the Grasslands. The Grasslands-wide management goal for noxious weeds falls under Goal 1.c: “Increase the amount of forests and grasslands restored to or maintained in a healthy condition with reduced risk and damage from disturbance processes, both natural and human controlled”.

The Grasslands Plan lists two objectives for noxious weeds:

- “Within 10 years limit further expansion of areas affected by noxious weeds”
- “Within 10 years implement an integrated prevention and pest control management program for noxious weeds and invasive plants”.

Resource standards and guidelines for noxious weeds state:

- Manage invasive plant species using integrated management techniques, including mechanical, chemical, and biological control methods. *Guideline*
- To prevent the spread of noxious weeds and invasive plant species, include necessary provisions in contracts and permits for use of the National Grasslands and its resources. *Standard*
- Contain and control infestations based on the following:
 - Rate of species spread.
 - Invasions within special management areas, such as Research Natural Areas (RNAs) and Wilderness, activity corridors, and high use areas.
 - Probability of successful treatment(s) in meeting desired conditions.
 - Prevent the introduction of new invasive species.
 - Conduct early treatment of new infestations. *Guideline*
- Where technically and economically feasible, use genetically local (at the ecological subsection level) native plant species in revegetation efforts. To prevent soil erosion, non-native annuals or sterile perennial species may be used while native perennials are becoming established. *Guideline*
- Prohibit pesticide use where it would have adverse effects on species at risk. *Guideline*
- Allow haying only where noxious weeds are not present or are pre-treated to prevent seed set unless haying is needed as a method of noxious weed control. If used as such a control, ensure proper disposal of hay. *Guideline*
- Once appropriate consultation with state agencies has taken place, allow only certified noxious weed seed-free products for recreational animal feed or revegetation projects. This includes use of certified hay or straw, and heat-treated, or other appropriately processed products. *Standard*

Laws, Regulations and Policies

Other laws, regulations, and policy related to noxious weed management addressed by this project include, but are not limited to:

- Executive Order 13112 of 1999 states federal agency duties are as follows:
 - Identify actions that may affect the status of invasive species.
 - Use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations in a cost-effective and environmentally sound manner; (iii) monitor; (iv) restore; (v) research; (vi) promote public education on invasive species.
 - Not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species.
 - Coordinate these duties with the National Invasive Species Council that coordinates Federal strategies to address the problem of noxious weeds.
- Plant Protection Act of June 20, 2000, Public Law 106-224, and the 1990 Farm Bill, Public Law 101-624, which directed the Forest Service to develop and coordinate management programs for controlling undesirable plants.
- USDA Policy 9500-10 directs the agency to integrate noxious weed management into all programs and activities and to develop, demonstrate, and apply the essential science, technology, and stewardship to effectively manage and prevent the spread of these plants.
- National Prevention Strategy for Invasive Plant Management.
- The Noxious Weed Management Act of 1974, as amended (7 U.S.C. 2801), contains provisions to prevent the dissemination of noxious weeds and requires cooperation of federal agencies with agencies of the state, districts, farmers' associations, and similar organizations or individuals in carrying out operations and measures to eradicate, suppress, control or retard the spread of any noxious weed. In addition, 36 CFR 222.8 acknowledges the agency's obligation to work cooperatively in identifying noxious weed problems and developing control programs in areas where National Forest System lands are located.
- The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) and the regulations established by the Environmental Protection Agency (40 Code of Federal Regulations (CFR) 116-117, 165, 170-172) are the primary guidance governing pesticide registration, pesticide usage, the training and certification of pesticide applicators, and the criminal and civil penalties associated with the misuse of pesticides. FIFRA also delegates the enforcement of FIFRA to the individual states.
- Forest Service "Pulling Together Initiative" for Noxious Weed and Nonnative Invasive Plant Management that directed the Agency to set goals of education, implement integrated weed management as a high priority, include management of noxious weeds in all planning processes, and develop partnerships.
- Forest Service Manuals 2080 and 2150 and Regional Supplement No. 2100-98-1 that establish policy and implement programs for noxious weed management.

Status of Noxious Weeds on the Dakota Prairie Grasslands

The DPG has been mapping the occurrence of noxious weeds since the 1960s. The latest noxious weed mapping information is from 2004. Mapped noxious weed information was incorporated into GIS layers for this analysis. Due to a lack of resources, it has not been possible to survey every acre of the DPG for possible weed populations. As a check, the weed coordinators from each of the ranger districts reviewed the GIS layers and refined the information based on knowledge of their respective districts. This review resulted in a general increase in the number of acres infested by noxious weeds. Table 1 identifies estimated acres by weed species. Figures 2, 3, 4, and 5 show the general distribution of noxious weeds across the DPG.

TABLE 1. ESTIMATED ACRES OF NOXIOUS WEEDS ON THE DPG BY WEED SPECIES

NOXIOUS WEED	DPG RANGER DISTRICTS/EXP FORESTS – ACRES OF WEED SPECIES						
	SHEYENNE	GRAND RIVER	MEDORA	MCKENZIE	DENBIGH EXP. FOREST	SOURIS EXP. FOREST	TOTAL
LEAFY SPURGE	35,000	550	16,940	500	320	5	53,315
CANADA THISTLE	200	25	1,076	250			1,551
RUSSIAN OR SPOTTED Knapweed		30	14	10			54
ABSINTH WORMWOOD	Trace		2	30			32
SALT CEDAR			3	1			4
BLACK HENBANE			21	20			41
BULL THISTLE	200		2				202
BUCKTHORN	30						30
HOARY CRESS			5				5
FIELD BINDWEED, HOUNDSTONGUE, HEMP, BURDOCK, PERENNIAL SOW THISTLE, MUSK AND PLUMELESS THISTLES							Trace
WEED INFESTATIONS ON OIL AND GAS PADS			1,000	1,000			2,000
TOTAL WEED INFESTED ACRES	35,430	605	19,063	1,811	320	5	57,234

Figure 2. McKenzie Ranger District Noxious Weed Map

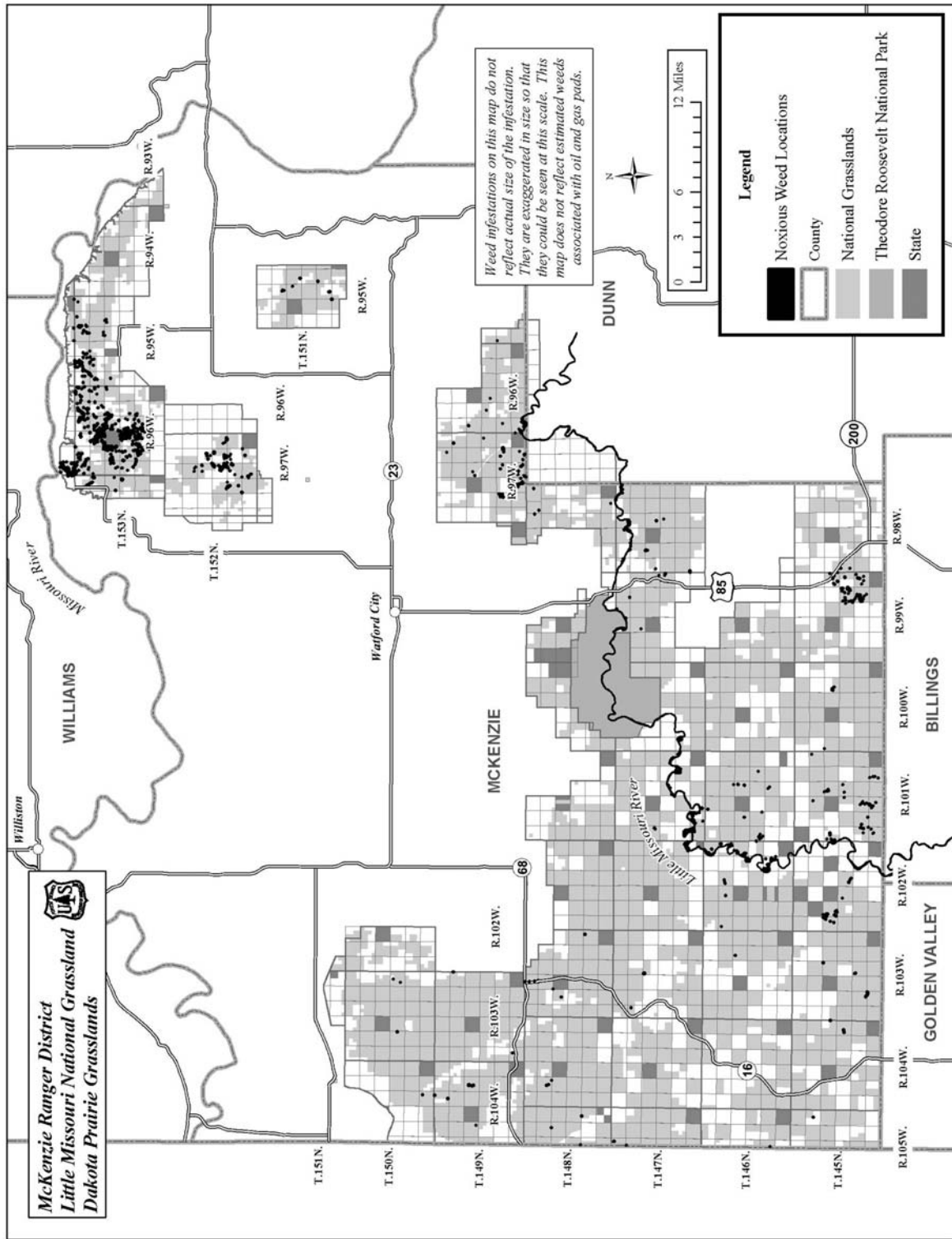


Figure 3. Medora Ranger District Noxious Weed Map

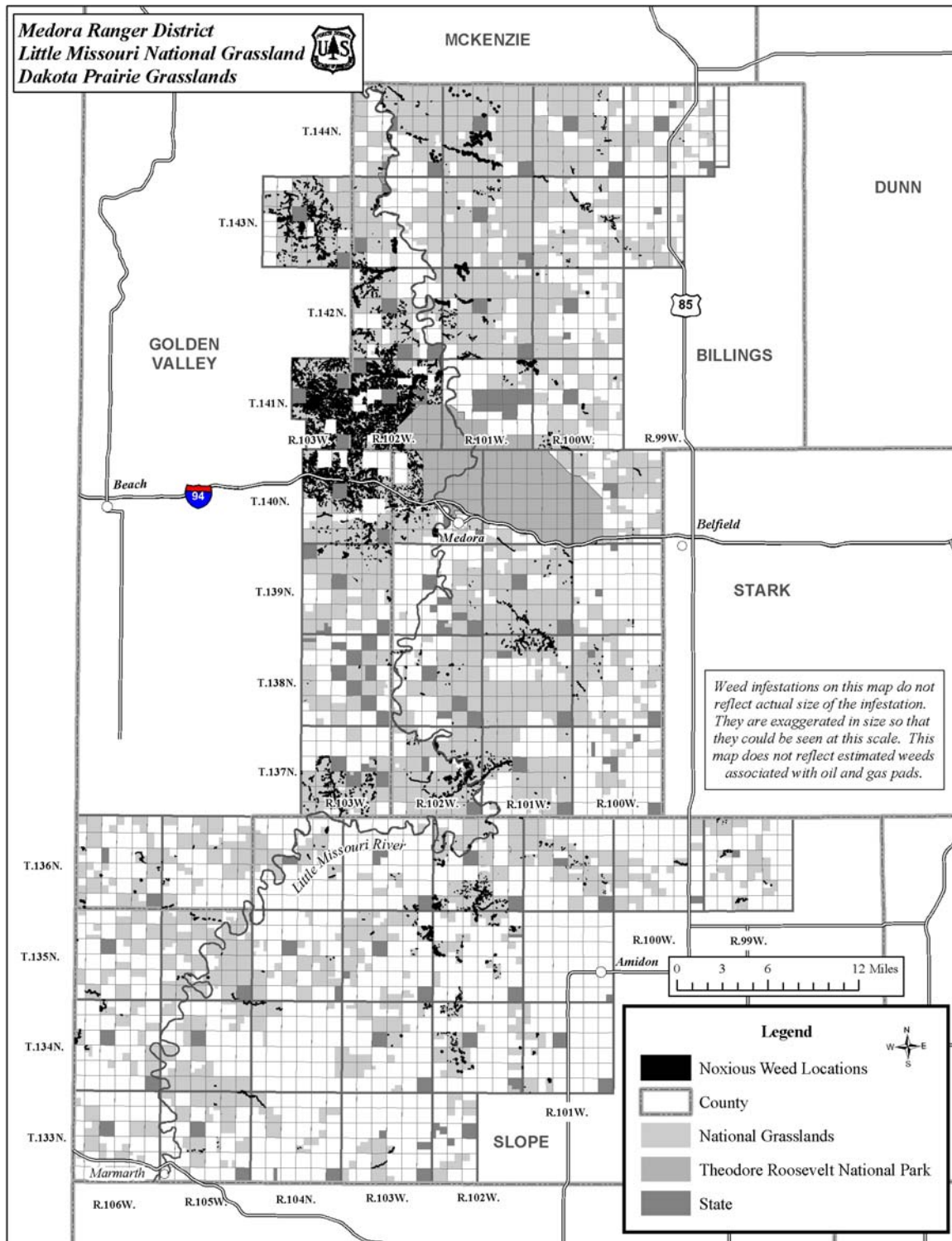


Figure 4. Grand River Ranger District Noxious Weed Map

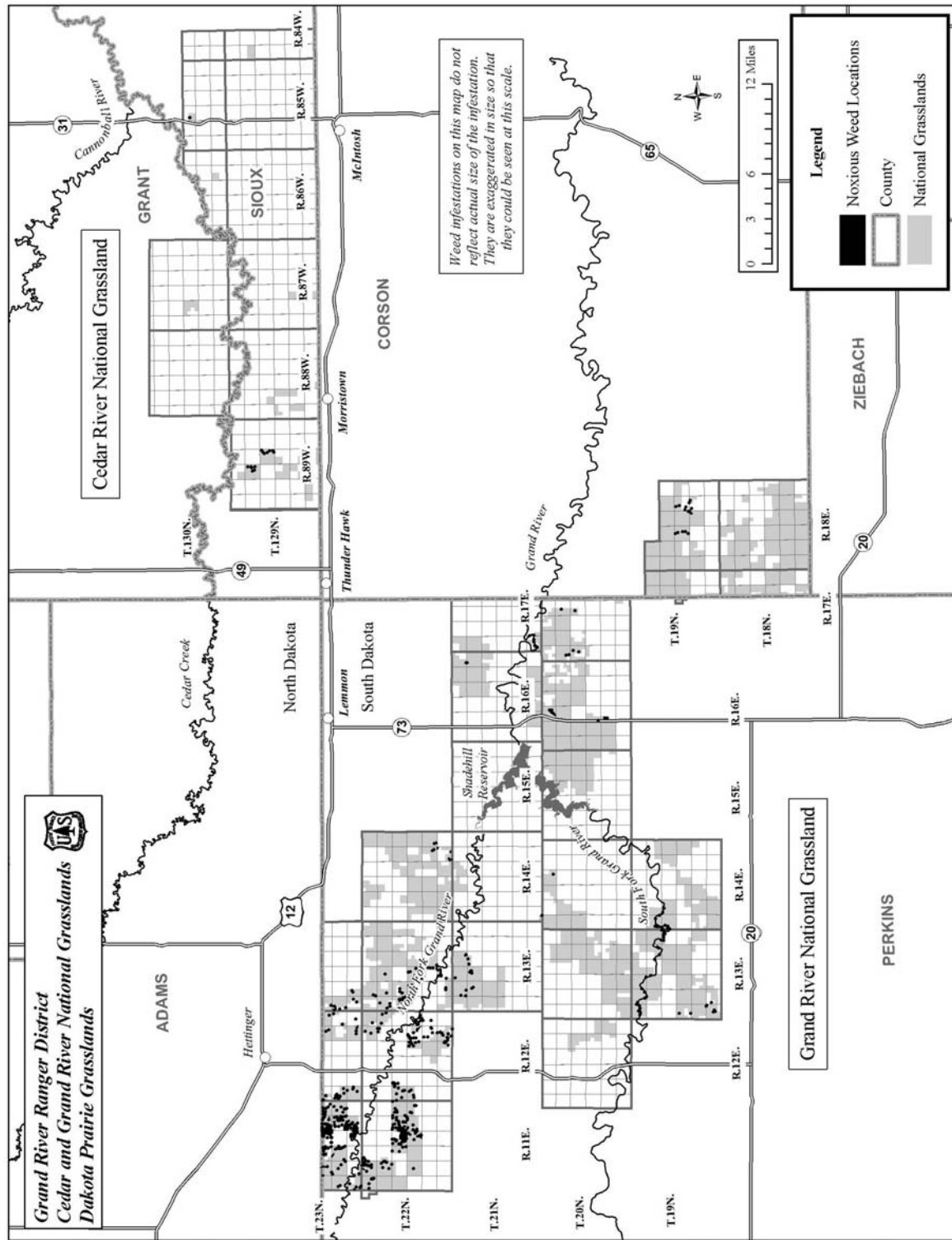
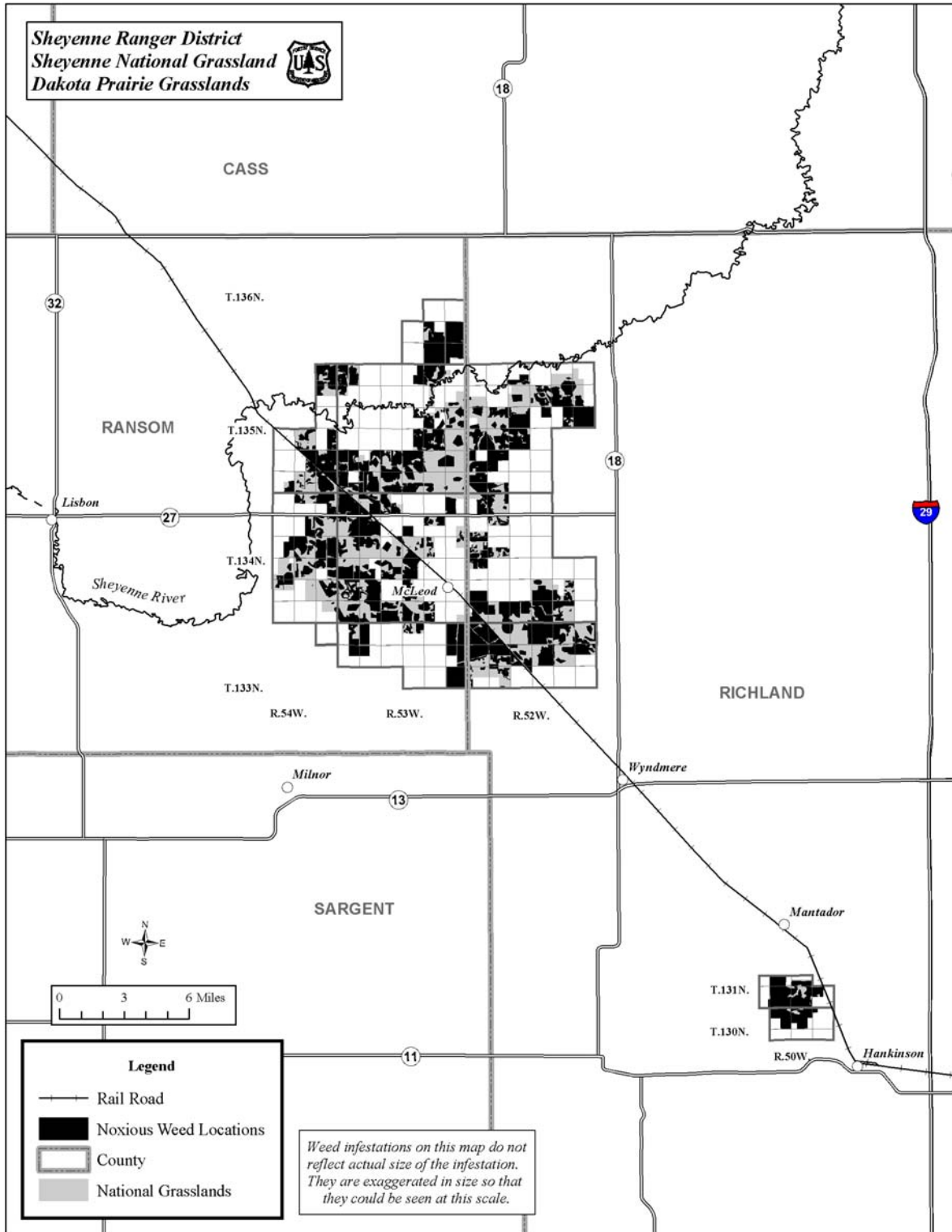


Figure 5. Sheyenne Ranger District Noxious Weed Map



PURPOSE AND NEED FOR ACTION

The purpose of this project is to economically implement those portions of the Grasslands Plan that call for implementation of a program to control and eradicate identified species of noxious weeds.

The eradication and control of noxious weeds will meet the need and requirement of the DPG to promote the ecosystem health of forested and rangeland habitats by maintaining or improving native forbs and grass species, ultimately preventing the loss of wildlife habitat. It is important to eradicate and control noxious weeds, with minimal disturbance to the soil and desired plants, in order to prevent damage to soils, minimize erosion, and to maintain wildlife habitat.

Failure to control or eradicate infestation sites will mean the spread of weeds, which displace native plant material. Some may be toxic to animals and humans, and few are desirable forage species for livestock or wildlife. The spread of these species increases the adverse impacts to humans, animals both domestic and wild, and native plant communities. Without treatment, weeds increase about 14 percent per year under natural conditions.

This action is needed because inventories on the DPG show that noxious weed populations have expanded from a few, small infestations to almost 58,000 acres. Studies completed in other parts of the country show that many noxious weeds have the ability to replace all native plants within a given area. These species pose a serious threat to ecosystem diversity and have a high potential to harm native plants and wildlife, especially threatened, endangered and sensitive species. Leafy spurge is of particular concern, on the DPG, due to its invasiveness. This plant tends to form monocultures (areas dominated by a single plant species) and eventually eliminate all other native plants. In addition, black henbane, and other species produce toxic substances that can pose threats to humans, livestock, and wildlife.

The effects of noxious weed growth on native plants include: a decline in ecosystem diversity and health; an increase in bare soil resulting in declines in watershed condition; a decrease in the overall capacity of the land to support wild and domestic ungulates; and a reduction in the quality of habitat for many wildlife species. Another concern is the current infestation in and along riparian corridors. Water in these habitats transports seeds and spores, spreading the infestation, which further reduces riparian habitat structure, and leads to an increase in sedimentation and a reduction in water-holding capacity.

The DPG has been controlling noxious weeds on each Ranger District under previous NEPA decisions including the 1986 Custer National Forest Noxious Weed Environmental Impact Statement. However, an updated noxious weed control analysis is needed to address newly listed noxious weed species, to identify additional acres of noxious weed infestations, to ensure compliance with the revised Grasslands Plan, and to incorporate the use of new, more effective herbicides, technologies, and biological controls as appropriate.

The purpose of this proposal is to:

- Prevent or reduce the loss of native plant communities associated with the spread of noxious weeds.
- Improve and protect the biodiversity and ecological integrity of the DPG by preventing or limiting the spread of weeds that could alter desired plant community composition and function.
- Eradicate new invaders (weed species not previously reported on the DPG) before they become established and become more difficult to control.
- Prevent or limit the spread of established weeds into areas with few or no infestations.
- Restore and protect wildlife and plant habitat.
- Restore availability and quality of forage for livestock.
- Improve the aesthetic quality of roadside and recreation areas.
- Reduce infestation and spread of noxious weeds associated with developed sites, including oil and gas facilities, campgrounds, trailheads, roads, trails and administrative sites.
- Improve the ability to control noxious weeds in areas occupied by threatened and sensitive species without significant impacts to those species.
- Protect sensitive and unique habitats (including research natural areas, wetlands, and sensitive plant populations) from invasion by weeds.
- Continued implementation of federal and state weed policies, executive orders, and other management plans.
- Continued cooperation with county, state, and federal agencies and private landowners interested in managing weed invasions.
- Implement Grasslands Plan goals and objectives.

PROPOSED ACTION

The Forest Service, through the application of an integrated adaptive noxious weed treatment strategy, proposes to treat all known acres of noxious weeds (57,234) on the DPG over the next 10 to 15 years. Annual programs would treat up to 25,000 acres.

It is also reasonable to assume that new or unknown noxious weed populations will be discovered during the next 10 to 15 years, and that new treatments may also become available. To accommodate these situations the Proposed Action includes an adaptive process, detailed in Chapter 2. Therefore, the Proposed Action includes up to 13,900 additional acres of new or previously unknown noxious weed infestations that would be treated as discovered over the next 10 to 15 years.

The proposed integrated treatment program would utilize a variety of tools, singularly or in combination, to treat noxious weeds. Table 5 identifies proposed treatment methods by weed species. Proposed methods include the following:

- Mechanical methods, such as hand pulling, mowing or cutting.
- Revegetation, where competitive vegetation is seeded to reduce noxious weed species, possibly after other treatments to remove the noxious weeds.
- Grazing with livestock such as goats or sheep.
- Biological control through the use of predators, parasites, and pathogens.
- Herbicide control using ground-based application methods.
- Herbicide control using aerial application methods.
- Prescribed fire in conjunction with other treatment methods.
- Education through the use of programs to inform people of noxious weed effects, methods of noxious weed spread and preventative management opportunities and practices.
- Prevention by using practices that reduce noxious weed spread, including a weed free forage program and washing vehicles to remove weed seeds.

Actual acres treated under the Proposed Action are dependent on annual financing of the noxious weed program. The Proposed Action likely represents the upper limit of annual treatment. Due to the persistence of some noxious weeds, infested areas may be annually treated or receive more than one treatment over the next 10 to 15 years. A detailed description of the Proposed Action is contained in the Alternatives section in Chapter 2 of this analysis.

TIERING

Tiering refers to the coverage of general matters in broader environmental impact statements with subsequent narrower statements incorporating the general discussion of those documents as well as decisions made and subsequently concentrating solely on the issues specific to the statement being prepared (40 CFR 1508.28). Environmental documents tiered by this FEIS include the following:

- Draft Environmental Impact Statement, Noxious Weed Treatment Project for the Modoc National Forest (USDA Modoc National Forest 2004h).
- Environmental Impact Statement, Noxious Weed Treatment Project for the Bitterroot National Forest (USDA Bitterroot National Forest 2003d).
- Environmental Impact Statement, Noxious Weed Treatment Project for the Gallatin National Forest (USDA Gallatin National Forest 2005a).
- Environmental Impact Statement, Northern Great Plains Land and Resource Management Plan Revisions (USDA Forest Service 2001a) and the accompanying Dakota Prairie Grasslands Land and Resource Management Plan (USDA Forest Service 2001b).
- Environmental Impact Statement, Pacific Northwest Region Invasive Plant Program (USDA 2005b).

SCOPE OF THE ANALYSIS

The scope of an analysis consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement (40 CFR Sec. 1508.25). To determine the scope of environmental impact statements, Council of Environmental Quality (CEQ) directs agencies to consider three types of actions, alternatives and impacts.

Actions

Connected actions – are actions that are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:

- Automatically trigger other actions, which may require environmental impact statements.
- Cannot or will not proceed unless other actions are taken previously or simultaneously.
- Are interdependent parts of a larger action and depend on the larger action for their justification.

Similar actions – are actions which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography.

Cumulative actions – are actions which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.

There are no connected or similar actions associated with the proposed project. Cumulative actions are addressed in Chapter 3.

Alternatives

Alternatives are to address the No Action and other courses of reasonable action including mitigation measures not included in the Proposed Action. Design criteria for the action alternative have been developed by the ID team and included in Chapter 2. Impacts of the no-action alternative, which would terminate all noxious weed treatment, are also considered. In addition, alternatives that were considered but not carried through detailed analysis are addressed. Alternatives are discussed in detail in Chapter 2.

Impacts

Regulations contained in 40 CFR 1508.25© require analysis of direct, indirect, and cumulative impacts. Direct effects are caused by the action and occur at the same time and place as the Proposed Action. Indirect effects are caused by the action and occur later in time or farther removed in distance, but are still reasonably foreseeable. Cumulative impacts are those impacts on the environment that result from incremental impact of the action where added to other past, present, and reasonably foreseeable future action. Direct, indirect, and cumulative impacts are analyzed in Chapter 3.

Geographic Scope

The geographic scope of this analysis is generally confined to the treatment areas that would occur within the DPG administrative boundary. For each resource issue an analysis area was determined that could be used to adequately measure cumulative effects of the proposed alternatives. Unless otherwise stated, the cumulative effects area is the same as the project area.

Temporal Scope

The timeframe for implementation of this project is 10 to 15 years.

DECISION FRAMEWORK

This final environmental impact statement (FEIS) is not a decision document. The FEIS displays the results of an analysis of the Proposed Action and No Action alternatives with respect to the key issues as well as the ability of those actions to meet the Purpose and Need. A Record of Decision (ROD) signed by the Grasslands Supervisor will document the decision and rationale for selection.

Based on the environmental analysis in the Final Environmental Impact Statement (FEIS), consideration of public comments, Grasslands Plan direction, Forest Service policy, and Federal and State laws, the Grasslands Supervisor of the DPG, who is the responsible official, for this proposal will decide:

- Whether to implement the Proposed Action as presented, modified, or not at all (No Action).
- Which treatment methods and herbicides will be available for control and eradication of noxious weeds.
- Which Design Criteria will be required to appropriately implement weed control methods.
- What monitoring will be required to ensure that project objectives are being met.
- What, if any, Grasslands Plan amendments are required.

CHAPTER 2. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

INTRODUCTION

This chapter provides a more detailed description of the agency's Proposed Action and No Action alternatives. This section also includes design criteria, a discussion on integrated and adaptive management and a summary table of the environmental consequences associated with each alternative.

PUBLIC INVOLVEMENT

A scoping letter was sent out to 160 organizations, county, state and federal agencies, county commissioners, individuals, businesses, media, and organizations on March 31, 2004. News releases were sent to the DPG's paper of record, The Bismarck Tribune, and other daily and weekly newspapers and radio stations. The proposed project has been published in the DPG National Environmental Policy Act (NEPA) Quarterly Schedule of Proposed Actions since the First and Second Quarters, January-June 2003 edition. The Notice of Intent (NOI) for the DEIS was published in the Federal Register on June 14, 2005. The NOI notified the public that a DEIS would be prepared for this project. The comment period associated with the NOI was 45 days. Twelve responses were received from scoping and two from the NOI.

A Notice of Availability for the DEIS was published in the Federal Register on May 5, 2006, and copies of the DEIS were sent to 42 individuals, organizations, and county, state and federal agencies. It was also posted on the DPG website. The comment period was 45 days, and the Forest Service received 12 responses. In addition, an open house was held on May 3, 2006 in McLeod, ND. Twenty people attended.

Comments on the DEIS were used to finalize the analysis. A summary of comments is included as Appendix H. Original comments are part of the project file.

PROCESS USED TO FORMULATE ALTERNATIVES

Alternatives were created based on scoping comments submitted by the public and from internal Forest Service comments.

Issues identified by the public and Forest Service were separated into significant and non-significant issues by the ID team. Significant issues were defined as those directly or indirectly caused by implementing the Proposed Action. Non-significant issues were identified as those: 1) outside the scope of the Proposed Action; 2) already decided by law, regulation, Grasslands Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations explain this delineation in Sec. 1501.7, "...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)..." The scoping comment analysis is located in the Project Record.

All scoping responses were analyzed and comments placed into one of five categories:

- Issues Addressed by Design Criteria
- Issues Addressed in the Effects Analysis
- Issues Beyond Scope of Purpose and Need
- Issue Already Decided (Addressed through law, regulation, and policy)
- No Issues – request for copies of documents and information

The ID team assessed both public and internal comments and identified four significant issues that were subsequently approved by the responsible official.

ISSUES

The significant issues used in the development of the alternatives are identified below as well as how the issue will be analyzed.

Issue 1. Noxious weed treatments may have adverse effects to soil and water quality.

Herbicide application by the Forest Service and adjoining landowners may have led to areas where there is a persistent amount of herbicides left in the soil, groundwater, or surface water. Some areas, which were suitable for herbicide application in the past, may no longer be, based on new label information, better knowledge of soil types and 16 years of water quality groundwater data.

Issue 2. Noxious weed treatments may have adverse effects on the western prairie fringed orchid, which is a Threatened species located on the Sheyenne National Grassland.

Treatment of noxious weeds is a challenge in the management of this species. The western prairie fringed orchid is sensitive to herbicide treatment. Past application of Plateau herbicide, on the Sheyenne National Grassland, has caused mutations in the orchids. These mutations have been temporary in scope, i.e., one to two years and are associated with the persistence of Plateau in the soil. However, it is essential to limit the spread of leafy spurge in orchid habitat as this weed competes with the orchid for habitat. Other treatments such as sheep or goat grazing may impact individual orchid plants.

Issue 3. The use of herbicides for noxious weed control may cause acute (short-term) or chronic (long-term) health problems for people who come into contact with the herbicides and/or treated areas.

Concern was expressed that the use of herbicides for noxious weed control may cause health problems for people who are exposed to the herbicides and/or treated areas. Although federal and state licensing, certification requirements, and EPA herbicide labels build in strict safety features before use, some people have reservations about the use of these products.

Issue 4. Aerial application of herbicides may have adverse effects on non-target species.

Aerial application can be beneficial because it allows coverage of greater areas of weed infestation in short amounts of time; however, it offers less specific control of where the herbicide is applied. Non-target broadleaf plants such as trees, shrubs, forbs and other resources may be adversely affected.

ALTERNATIVES CONSIDERED IN DETAIL

The Forest Service developed two alternatives, No Action and Proposed Action, in response to issues raised by the public and the interdisciplinary team for this project.

Alternative 1 – No Action

This alternative is required by regulation (40 Code of Federal Regulations (CFR) 1502.14) and would call for no weed management treatments applied to any National Forest System (NFS) lands, except for those NFS lands under road right-of-way (ROW) agreements with the different counties within the DPG. In these situations, the authority to undertake treatments is vested in those agencies. The alternative provides a baseline for comparison and analysis of effects.

There would be no herbicide application (ground based or aerial application), mechanical methods (hand or tool grubbing, mowing), revegetation, goat or sheep grazing, use of fire or biological control. Existing biological controls would be allowed to progress naturally, but no supplementation would occur. Ongoing weed prevention and education would still continue, but additional measures would not.

When this project was scoped with the public the No Action alternative was presented as no change from the current weed treatment program. Since that time the alternative has been modified to that stated above. The No Change alternative is discussed in the "Alternatives Considered But Eliminated From Detailed Analysis" section of this chapter.

Alternative 2 - Proposed Action

The Forest Service, through the application of an integrated adaptive noxious weed treatment strategy, proposes to treat all known acres of noxious weeds (57,234) on the DPG over the next 10 to 15 years. Annual programs will treat up to 25,000 acres. Table 2 provides information on current treatment acres and an estimate of the proposed annual treatment program by treatment method. The estimates of future treatment acres are based on professional knowledge of the infestations, treatment concerns, and the current best treatment option(s). As new treatments become available, or more effective combinations of methods are developed, the estimated acres by treatment method may change.

TABLE 2. ESTIMATED ANNUAL TREATMENT ACRES BY TREATMENT METHOD

TREATMENT METHOD	CURRENT ANNUAL TREATMENT ACRES	ESTIMATED FUTURE TREATMENT ACRES
Grazing (sheep, goats)	2,000 –3,000	9,500 –11,000
Herbicide (ground and aerial application)	5,500-7,800	7,200 –10,500*
Biological	800-1100	2,000 – 4,200
Mechanical	5	10 - 20
Fire	0	100 - 200
Revegetation	1	10-20

* Includes 2,000 acres of oil and gas pads

It is reasonable to assume that new or unknown noxious weed populations will be discovered during the next 10 to 15 years and that new treatments may become available. To accommodate these situations the Proposed Action includes an adaptive process, detailed in Chapter 2, for dealing with these eventualities. Therefore, included in the Proposed Action is up to 13,900 additional acres of new or previously unknown noxious weed infestations, which would be treated, as they are discovered, over the next 10 to 15 years.

The proposed integrated treatment program would utilize a variety of tools, singularly or in combination, to treat noxious weeds. Table 5 identifies proposed treatment methods by weed species. Proposed methods include the following:

- Mechanical methods, such as hand pulling, mowing, or cutting.
- Revegetation, where competitive vegetation is seeded to reduce noxious species, possibly after other treatments to remove the noxious weeds.
- Grazing with livestock such as goats or sheep.
- Biological control through the use of predators, parasites, and pathogens.
- Herbicide control using ground-based application methods.
- Herbicide control using helicopter aerial application methods. Fixed-wing aircraft may be used if all applicable design criteria are met.
- Prescribed fire in conjunction with other treatment methods.
- Education through the use of programs to inform people of noxious weed effects, methods of noxious weed spread and preventative management opportunities and practices.
- Prevention by using practices that reduce noxious weed spread, including a weed free forage program and washing vehicles to remove weed seeds.

Actual acres treated, under the Proposed Action, are dependent on annual financing of the noxious weed program. The Proposed Action likely represents the upper limit of annual treatment.

Table 3 identifies the noxious weeds that are proposed for treatment or potential treatment should they be found, and priority of treatment. The table includes noxious weeds identified by the States of North and South Dakota and selected species from adjacent states Minnesota and Montana. Additional species identified by different counties in North Dakota are also included. This list will likely change in the future as new plants are determined to be a threat and are added to the different state and county noxious weeds list.

TABLE 3. NOXIOUS WEEDS PROPOSED FOR TREATMENT.

COMMON NAME	SCIENTIFIC NAME	DPG OCCURRENCE	NOXIOUS WEED LIST	TREATMENT PRIORITY
Absinth wormwood	<i>Artemisia absinthium</i>	Known	ND, SD	High
Canada thistle	<i>Cirsium arvense</i>	Known	ND, SD, MT, MN	High
Diffuse knapweed	<i>Centaurea diffusa</i>	Unknown	ND, MT	High
Field bindweed	<i>Convolvulus arvensis</i>	Known	ND, SD, MT, MN	Low
Leafy spurge	<i>Euphorbia esula</i>	Known	ND, SD, MT, MN	High
Purple loosestrife	<i>Lythrum salicaria</i>	Potential	ND, SD, MT, MN	High
Russian knapweed	<i>Centaurea repens</i>	Known	ND, SD, MT	High
Spotted knapweed	<i>Centaurea maculosa</i>	Known	ND, MT	High
Yellow starthistle	<i>Centaurea solstitialis</i>	Unknown	ND, MT	High
Perennial sow thistle	<i>Sonchus arvensis</i>	Known	SD, MN	Low
Black henbane	<i>Hyoscyamus niger</i>	Known	Billings Co., ND	High
Dalmation toadflax	<i>Linaria dalmatica</i>	Unknown	ND, MT	High
Hoary cress	<i>Cardaria draba</i>	Known	SD, MT	Low
St. Johnswort	<i>Hypericum perforatum</i>	Unknown	MT	High
Saltcedar	<i>Tamarix ramosissima</i>	Known	ND, MT, SD	High
Yellow toadflax	<i>Linaria vulgaris</i>	Unknown	McKenzie Co., ND, MT	High
Bull thistle	<i>Cirsium vulgare</i>	Known	MN	Low
Musk thistle	<i>Cardus nutans</i>	Known	ND, MN, SD	High
Plumeless thistle	<i>Caruus acanthoides</i>	Known	MN, SD	Low
Houndstongue	<i>Cynoglossum officinale</i>	Known	MT	Low
Hemp	<i>Cannabis sativa</i>	Known	MN	High
Buckthorn	<i>Rhamnus cathartica</i>	Known	MN	High
Common Burdock	<i>Arctium minus</i>	Known	Billings Co, ND	Low

Strategy for Selection of Appropriate Control Methods

Under an integrated approach different treatment methods may be used singularly or in combination to treat noxious weeds infestations. An integrated management approach requires that control methods be evaluated in terms of effectiveness, safety, and impacts, among other considerations. The DPG proposes to use the following strategy as a guide in the selection of the most appropriate and effective control method. However, based on site-specific conditions and circumstances, strategies may change. Following EPA labels, APHIS direction, and design criteria will ensure that treatment methods are properly used.

Table 4 identifies treatment selection and prioritization guidelines that will be used to determine which control method(s) will be used to treat an infestation and to determine the priority of treatment.

TABLE 4. TREATMENT SELECTION AND PRIORITIZATION GUIDELINES

<p>BIOLOGICAL CONTROLS WILL BE EMPHASIZED FOR USE IN:</p> <ul style="list-style-type: none"> • Large infestations • Woody draws and other woodlands • Stream, riparian and wetland areas • Rough terrain • Bighorn sheep habitat • Sensitive species habitat • Areas where herbicide use is restricted or problematic (highly permeable soils, high water tables)
<p>GROUND HERBICIDE APPLICATION WILL BE EMPHASIZED FOR USE ON:</p> <ul style="list-style-type: none"> • Weeds for which no accepted and effective biological controls are known • New infestations • Small infestations • Easily accessed infestation sites • Edges of large infestations • Ownership boundaries • Oil well sites (producing and rehabilitated) • Sites where biological controls are not effective
<p>AERIAL HERBICIDE APPLICATION WILL BE EMPHASIZED FOR USE ON:</p> <ul style="list-style-type: none"> • Weeds for which no accepted and effective biological controls are known • Large infestations • Inaccessible or remote infestation sites
<p>MECHANICAL TREATMENTS WILL BE EMPHASIZED FOR USE ON:</p> <ul style="list-style-type: none"> • Infestations where other treatments are not effective • Small infestations where it is effective and practical • Developed campgrounds and day-use areas.
<p>GRAZING WILL BE EMPHASIZED FOR USE:</p> <ul style="list-style-type: none"> • On infestation areas where other methods are not effective or allowed • Where herbicide application is not practical • Where biological control methods are ineffective • On large infestations
<p>REVEGETATION WILL BE EMPHASIZED FOR USE:</p> <ul style="list-style-type: none"> • In combination with other treatments to revegetate bare ground
<p>FIRE WILL BE EMPHASIZED FOR USE:</p> <ul style="list-style-type: none"> • To enhance the effectiveness of other treatments (biological, herbicides and in revegetation efforts)
<p>PREVENTION AND EDUCATION:</p> <ul style="list-style-type: none"> • Prevention and education are ongoing programs.
<p>PRIORITY FOR TREATMENT</p> <p>While any noxious weed infestation may be treated, the following types of infestation or locations are considered priorities for noxious weed control:</p> <ul style="list-style-type: none"> • New infestations of new species • New infestations of existing species (outside currently infested areas) • Fast spreading species • Areas with high probability of success • Perimeters of existing infested sites • Sensitive plant habitat and rare plant communities • Ownership boundaries • Areas likely to accelerate weed spread (for example trails, trailheads, roads)

The Proposed Action includes an array of treatments that can be used singularly or in combination to control noxious weeds. Using the treatment strategy, described above, the ID team identified proposed control methods by target weed species. Table 5 identifies the proposed treatment(s) by the target weed species for each treatment method. Herbicides are identified by active ingredient and are analyzed accordingly. For the remainder of this document, herbicides are referred to by active ingredient and are analyzed accordingly. For a list of typical brand names associated with these herbicides, see Appendix A

TABLE 5. PROPOSED TREATMENT METHODS BY NOXIOUS WEED SPECIES

NOXIOUS WEED (KNOWN)	PROPOSED CONTROL METHOD ²				
	BIOLOGICAL CONTROLS	HERBICIDE ³	GRAZING	MECHANICAL	FIRE
LEAFY SPURGE	Flea beetles (<i>Apthona nigriticutis</i> , <i>A. lacertosa</i> , <i>A. czwalinae</i> , <i>A. adominalis</i> , <i>A. cyparissiae</i> , <i>A. flava</i>) long-horned beetle (<i>Oberea erythrocephala</i>), gall midge (<i>Spurgia esulae</i>), Leafy spurge hawkmoth (<i>Hyles euphorbiae</i>)	Picloram+ dichlorophenoxyacetic (2, 4-D), imazapic, dicamba, glyphosate, sulfometuron methyl.	Sheep or goat grazing	Hand pulling ¹	In combination with other treatments
SPOTTED KNAPWEED		Triclopyr, clopyralid, picloram, clopyralid +2, 4-D,		Hand Pulling	
RUSSIAN KNAPWEED		Triclopyr, clopyralid, imazapic Metsulfuron methyl, clopyralid +2, 4-D		Hand Pulling	
CANADA THISTLE	Thistle stem weevil (<i>Ceutorynchus litura</i>) thistle stem gall fly (<i>Urophora cardui</i>)	Clopyralid +2, 4-D, picloram, picloram+2, 4-D, triclopyr, 2,4-D clopyralid, imazapic		Mowing	In combination with other treatments
SALT CEDAR		Imazapyr, imazapyr+ glyphosate		Cutting, Hand Pulling	In combination with other treatments
ABSINTH WORMWOOD		Picloram, clopyralid +2, 4-D, triclopyr, clopyralid, dicamba, 2,4-D, glyphosate		Mowing	
MUSK THISTLE	Thistle crown weevil (<i>Trichosirocalus horridus</i>)	Picloram, clopyralid, triclopyr, metsulfuron methyl, dicamba+2,4-D			
HOARY CRESS		Imazapic, metsulfuron methyl, 2,4-D			
BUCKTHORN		Picloram, 2,4-D, glyphosate		Cutting	

NOXIOUS WEED (KNOWN)	PROPOSED CONTROL METHOD ²				
	BIOLOGICAL CONTROLS	HERBICIDE ³	GRAZING	MECHANICAL	FIRE
HOUNDSTONGUE		Picloram, 2,4-D, imazapic, metsulfuron methyl		Hand Pulling	
BLACK HENBANE		Picloram, glyphosate			
HEMP		2,4-D		Mowing	
PLUMELESS THISTLE	Thistle crown weevil (Trichosiocalus horridus)	Picloram, clopyralid, metsulfuron methyl, triclopyr, dicamba+2,4-D		Mowing	
BULL THISTLE	Thistle crown weevil (Trichosiocalus horridus)	Picloram, clopyralid, metsulfuron methyl, triclopyr, dicamba+2,4-D		Mowing	
PERENNIAL SOW- THISTLE		2,4-D, dicamba, picloram		Mowing	
FIELD BINDWEED		2,4-D, dicamba, picloram, clopyralid, dicamba+2,4- D,		Hand Pulling	
COMMON BURDOCK		2,4-D, dicamba, imazapic, clopyralid, triclopyr, clopyralid +2,4-D,		Hand Pulling	
PURPLE LOOSESTRIFE	Leaf feeding beetle (Galerucella pusilla, G. calmariensis), Root mining weevil (Hyllobius transversovitatus)	triclopyr, glyphosate, , imazapyr , 2,4-D (water soluble), glyphosate, imazapyr		Hand Pulling	
DALMATION TOADFLAX		picloram+2,4-D, imazapic, chlorsulfuron			
YELLOW TOADFLAX		picloram+2,4-D,			
ST. JOHNSWORT		Picloram, Picloram +2,4-D			
YELLOW STARHISTLE		Picloram, triclopyr, clopyralid, imazapyr, clopyralid +2,4-D		Hand Pulling	
DIFFUSE KNAPWEED		Clopyralid, triclopyr, picloram, imazapic, dicamba, clopyralid +2,4-D		Hand Pulling	

¹ Hand pulling is a treatment that would generally be applied for small numbers of plants.

² Revegetation would likely be used in any situation where control of a noxious weed has resulted in the creation of bare ground patches greater than a quarter of an acre.

² Prevention and Education are not identified in the table; however, they are an ongoing part of the control of all noxious weeds.

³ Herbicide selection would be based on environmental conditions such as groundwater depth, soil type, non-target vegetation, and management objectives. Herbicide selection considers the following criteria: Herbicide label considerations; Herbicide effectiveness on target species; Proximity to water and other sensitive resources; Soil characteristics; Potential unintended impacts to non-target species such as woody species or shrubs; Application

method (aerial, ground, or wick applicator); Other weed species present at the site, and effectiveness of herbicides on those species (for example leafy spurge infestations with inclusions of Canada thistle); Timing of treatments (spring/fall); and Priority weed – new invaders vs. existing.

DESIGN CRITERIA

Design criteria are actions designed into the Proposed Action and alternatives to reduce impacts of proposed activities. They include any requirements that must be complied with by law, regulation, or policy and include such things as Best Management Practices (BMPs), Grasslands Plan standards and guidelines, and standard operating procedures. Design criteria can also be mitigation measures designed into proposed actions and alternatives. The design criteria identified for the Proposed Action are:

TABLE 6. DESIGN CRITERIA

<p>HYDROLOGY</p> <p>The following management zones were created in response to concern about possible effects of herbicide application on surface and groundwater.</p> <ul style="list-style-type: none"> • Streamside Management Zones (SMZ) • Wetland Management Zone (WMZ) • Groundwater Vulnerable Zone (GVZ) • Wellhead Protection Area (WPA) <p>A summary of herbicide specific direction by management zone or protection area is contained in Appendix B. Detailed descriptions of the management zones and associated herbicide use information are found in Appendices B and C, and the Hydrology and Soils Report, located in the Project Record.</p>
<p>VEGETATION</p> <p>The following management zone was created in response to concern about possible effects of herbicide application on desired tree and shrub species.</p> <ul style="list-style-type: none"> • Woodland Management Zone (WDMZ) <p>A summary of herbicide specific direction by management zone or protection area is contained in Appendix B.</p>
<p>SENSITIVE PLANT SPECIES</p> <ul style="list-style-type: none"> • For identified sensitive plant populations/habitat there is a 50-foot no spray zone for all herbicides applied by broadcast-type spray equipment i.e. ATV, vehicle, or helicopter/fixed-wing mounted booms or boomless sprayers. • Spot herbicide treatment, via hand held wands, may occur within 50 feet of known sensitive plant populations. • Chlorsulfuron, imazapyr, and sulfometuron methyl are prohibited within the 50-foot buffer zone. • Glyphosate would only be applied within the 50-foot buffer if the sensitive plant species is dormant and known not to be affected by the glyphosate. Remaining herbicides may be applied following label instructions. • If a sensitive plant species is located in a Management Zone (Appendix B and C), that zone design criteria, if more restrictive, would supercede all other design criteria. • Consult with botanist or designated resource specialist prior to treating in sensitive plant habitat with known locations

SENSITIVE BUTTERFLY HABITAT

- For known locations of Dakota skipper, Powesheik skipper, Arogos skipper, Dion skipper, mulberry wing, and broad-winged skipper:
 - Contact biologist before application to determine known areas and restrictions.
 - Use most target-specific herbicide when treating near sensitive butterfly habitat.
 - Use target specific herbicide application methods (i.e. backpack/wand applicators, avoid boom sprayers).
 - Time application to minimize effects to forbs.
- On the Sheyenne National Grassland, include the following mitigation in prescribed burn plans:
 - Develop burn plans in consultation with a Forest Service biologist.
 - Do not burn in areas likely to support regal fritillaries until the area can be searched for violets. Violet concentrations should be mapped and excluded from burning. Priority areas for violet surveys include: Biesterfeld, Froemke, Gregor, Lee, Northrop, North Durler, North Frisk, and South Durler Allotments.
 - Do not burn in areas where Dakota skipper, Arogos skipper, or Powesheik skippers have been reported, or in areas where surveyors have indicated habitat potential for Dakota skippers unless clearance surveys have documented that the site is unoccupied. Priority areas for Arogos skipper surveys include A Annex and Sagvold Allotments. Priority areas for Dakota skipper surveys include A Annex, Biesterfeld, Brown, Bjugstad, D, Froemke, Gregor, Hanson, LX, Northrop, R, Solhjem, South Durler, and West A Allotments. Powesheik skipper surveys should concentrate in Biesterfeld, Bjugstad, and SA Jordheim Allotments.

WESTERN PRAIRIE FRINGED ORCHID

- Mowing Treatment - a survey would be required and performed to determine if flowering orchids are present. If the orchid is present and has 10 or more flowering orchids, mowing would be postponed until after seed dispersal, approximately September 15. If there are <10 flowering orchids, mowing would be allowed after July 15.
- Goat/Sheep Grazing – In orchid habitat grazing may occur before June 1 and after September 15. Grazing may occur between June 1 and September 15 if orchids are protected by a physical barrier such as agronomy cages or electric fences.
- Revegetation – seeding in orchid habitat may be done by broadcast seeding or using a no-till rangeland drill and conducted outside of the growing period (Oct. – May).
- Fall applications are recommended (not required) for herbicides considered safe or safe at lower formulations. Method of application is insignificant.
 - Clopyralid, 2,4-D and triclopyr are grass tolerant and are considered safe.
 - Dicamba, imazapic, and picloram are also considered safe at lower formulations.
- Glyphosate may only be applied during dormancy (October to May) of the orchid.
- If orchids are located in a Management Zone (see Appendix B and C), that zone design criteria, if more restrictive, would supercede all other design criteria.
- Consult with botanist or designated resource specialist prior to treating in orchid habitat.

FISH AND WILDLIFE

- For glyphosate, use only formulations approved for use in or near water (e.g., Glypro and Rodeo) in order to avoid potential hazards to fish.
- Do not use high¹ application rates of triclopyr in order to avoid potential hazards to birds and mammals.
- Consult with a Forest Service wildlife biologist prior to any aerial application of herbicide to determine if aerial application is allowable in site-specific areas and if any additional restrictions need to be followed (such as buffers or timing restrictions).
- Develop all burn plans in consultation with a Forest Service biologist.
- Sheep and goat grazing for noxious weed control is not allowed on the Little Missouri National Grassland in order to protect bighorn sheep from disease transmission.
- Herbicide applications between May 1 and June 15 would be coordinated with the District/Grasslands wildlife biologist to ensure that potential bighorn sheep lambing areas are protected from excessive disturbance.

REGISTERED HERBICIDES

- Only herbicides registered by the Environmental Protection Agency (EPA) for weed control will be used. Application rates and methods will meet EPA label requirements.
- To provide protection of natural resources, the use of 2,4-D anywhere on the Dakota Prairie Grasslands in Management Zones as described in Appendix B will be limited to those formulations designed and approved for use in or near water.
- Herbicides will be rotated, when and where possible, to prevent herbicide resistant plants.
- Procedures for mixing, loading, and disposal of pesticides and a spill plan will be followed. All herbicide storage, mixing, and post-application equipment cleaning is completed in such a manner as to prevent the potential contamination of any perennial or intermittent waterway, unprotected ephemeral waterway or wetland.
- Only those pesticides that have a low potential toxicity will be used within areas near surface waters or in areas with a high leaching potential.
- On those soils with a rapid permeability and/or excessive drainage, do not use water soluble herbicide to treat noxious weeds.
- Tank mixes of herbicides (sometimes called “cocktails”) can be considered if all herbicides in the mix were analyzed and approved by this EIS, or all of the herbicides in the mix meet the criteria for adding a new herbicide (See Adaptive Management Strategy). The most restrictive herbicide will be used to determine where and how the mix can be used.

BEST MANAGEMENT PRACTICES (BMPs)

BMPs for weed prevention and weed management are located in Appendix E.

BIOLOGICAL CONTROL

- Only biological control agents approved by the Animal and Plant Health Inspection Service (APHIS) for weed control will be used. All biological control agents would be released according to APHIS requirements, or Forest Service policy, whichever is more protective.

¹ Application rates of 10 lbs a.e./acre can cause problems for fish and wildlife and would be considered high. The label examined (Garlon 3A) limits use on range and pasture sites to 3 lbs a.e./acre.

HUMAN HEALTH

- All guidelines and mitigation measures presented in the Forest Service Manual 2150, Pesticide Use Management and Coordination, and in Forest Service Handbook 2109.14, Pesticide Use Management and Coordination Handbook, will be adhered to. Also, compliance with all federal, state, and local regulations regarding herbicide use will be met.
- EPA herbicide labels will be followed. Label restrictions on herbicides are developed to mitigate, reduce, or eliminate potential risks to humans and the environment. Label information and requirements include: Personal Protective Equipment; User Safety; First Aid; Environmental Hazards; Directions for Use; Storage and Disposal; General Information; Mixing and Application Methods; Approved Uses; Weeds Controlled; and Application Rates.
- Place signs in areas prior to aerial spraying and notify adjacent landowners in advance of aerial application. Ground crews will be onsite during spraying to verify that people are not in the area and to monitor spray conditions and drift cards.
- If necessary, reduce the amount of time a worker would ground apply an herbicide if there was a risk of exceeding RfD on a daily basis.
- Herbicide application will be performed by certified personnel (FSM 2154.2).
- Herbicide containers will be recycled or disposed of per guidelines in FSH 2109.14, 43.
- Accidental spills will be addressed in accordance with hazardous material procedures.

REVEGETATION

- All areas requiring revegetation will use a native grass and forb seed mixture identified by the Forest Service.

ARCHEOLOGY

- When fire treatment for noxious weeds takes place in *Wooded Riparian Areas* on the Little Missouri National Grassland, an archaeological survey may be required.
- All *Historic and Prehistoric Archaeological Sites* will be avoided in most mechanical treatments. Hand pulling several individual plants will not need consultation; however, larger areas of hand pulling may need to be surveyed.

RECREATION

- When herbicides are used in the following areas; the area will be posted prior to spraying to notify the public when the site will be sprayed and when re-entry is safe (as per the product label, usually 24 to 48 hours). Some of these areas may depend on the season herbicides are used. For example, dispersed recreation site normally only used during hunting season may only need to be signed just prior to hunting season. Another need for public signing may depend on the proximity to commonly used areas. Higher maintenance level roads in areas not normally used by the public may not need to be signed, while lower level roads near more popular areas may need signs.
 - *Areas of Concentrated Public Use* that include developed and dispersed undeveloped campsites, interpretive sites, historic sites; trailheads where system trails join forest roads and serve as a transition point from automobile travel to pedestrian, bicycle, horseback or motorized recreational vehicle travel.
 - *Areas of known higher recreation use*, which include but are not limited to open roads and trails, historic roads and trails, and National Historic Trails.

FIRE

- A burn plan would be required of all proposed prescribed burn activities.

AERIAL APPLICATION

- All aviation activities will be in accordance with FSM 5700 (Aviation Management), FSM 2150 (Pesticide Use Management and Coordination), FSH 5709.16 (Flight Operations Handbook), FSH 2109.14, 50 (Quality Control Monitoring and Post-Treatment Evaluation). A Project Aviation Safety Plan will be developed prior to aerial spray applications.
- Either helicopter or fixed-wing aircraft may be used to apply herbicide as long as all design criteria are met.
- A Forest Service representative will be present on site during aerial herbicide application activities.
- Prior to treatment, the pilot and project manager will review the treatment area to confirm locations. A GPS system will be used in the spray helicopter or fixed-wing aircraft to record treated areas.
- Communications will be maintained between the helicopter or fixed-wing aircraft and project leader during spraying operations. Ground observers will maintain communication with the project leader.
- Observers will be located at various locations adjacent to the treatment area, to monitor wind direction and speed, as well as to visually monitor drift and deposition of herbicide.
- Consult the appropriate Forest Service specialist when considering using aerial applications in Research Natural Areas, or near campgrounds.

MECHANICAL

- To limit the potential for equipment to spread exotic plant seeds, treatments should be completed before seed becomes viable. An exception to this is fall application of imazipic.
- Disposal of noxious weeds that are grubbed or manually removed will be as follows: If no flowers or seeds are present, pull the weed and place it off the ground, if possible, to dry out. If flowers or seeds are present, pull and place weeds in a plastic bag or a container to retain seeds. Dispose of weeds by burning them or taking them in closed garbage bags to a sanitary landfill.

PREVENTION

- Ensure all Forest Service employees are aware of and knowledgeable about Noxious Weeds (FSM 2081.2 11).
- Ensure all Grassland employees are reducing the chance of spreading noxious weeds. All Grassland employees will inspect, remove and properly dispose of weed seed and plant parts found on their clothing and equipment including Forest Service vehicles and all terrain vehicles (FSM 2081.2 11).
- The USDA Forest Service Guide to Noxious Weed Prevention Practices version 1.0 dated July 5, 2001 (see Appendix F), or any updates, will be followed.
- Implement prevention and control measures as outlined in Forest Service Manual 2080 (see Appendix E).
- The Off-Highway Vehicle Record of Decision and Plan Amendment for Montana, North Dakota and portions of South Dakota (OHV Decision) was signed in January 2001 by former Regional Forester Dale Bosworth. The OHV Decision prohibited wheeled motorized cross-country travel on the grasslands, where cross-country travel is defined as travel off existing roads and trails. The OHV Decision does not close any existing roads or trails, or prohibit construction of new roads and trails. It does not apply to private and states lands, or affect persons having existing access rights. It contains exemptions for wheeled cross-country motorized travel for the military, fire, search-and-rescue, law enforcement, official administrative business, lessees and permittees, and for travel to a campsite within 300 feet of an existing road or trail. Any new travel management decisions will be followed as the implementation of the 2004 OHV rule takes place.

The Line Officer may allow herbicide to be used in wooded areas where it has been determined that the wooded species are to be removed. This variance in the criteria will be allowed if the full intent of this analysis and resulting Record of Decision are still met. This decision shall be in a dated, written and signed document in advance of the treatment. This document and all analysis included in the variance will be filed in the appropriate 2080/2240 file, and shall be made on a site-specific basis.

ADAPTIVE MANAGEMENT STRATEGY

The Proposed Action also contains the concept of adaptive management to deal with weed infestations that are constantly changing. An adaptive management strategy offers an avenue to describe and evaluate the consequences of changing or new noxious weed infestations and new treatment options. As new infestations are discovered, and as new treatment methods are approved we can evaluate treating those areas using those methods. As long as the effects of methods remain within the effects described, then the results of this analysis remain valid.

Our adaptive management strategy consists of two principle components:

1. To quickly and effectively treat newly discovered weed infestations, a flowchart based on infestation size, location, site characteristics, and consultation with specialists would be used to select treatment methods (see Figure 6).

Using an adaptive management approach would allow for treatment of new sites or new species without a lengthy delay while still addressing other resource concerns. Although treatments of noxious weeds are expected to be effective in reducing existing weed infestations, all infestations cannot be treated immediately due to budgetary and logistical constraints. Existing infestations will expand before they can be treated, and new areas will be identified. Since every acre of the DPG has not been inventoried for weeds existing sites have yet to be identified. Also, new noxious weed species may be added to the noxious weed list and they will be incorporated into this analysis.

For analysis purposes, the Proposed Action includes a possible 24 percent increase in acres that may need treatment within the next 15 years. Under Alternative 2 this means that up to 13,900 acres may be treated and still be covered under the analysis completed for this FEIS. All new sites will need to be mapped and inventoried, and will need to follow the Decision Tree shown in Figure 6.

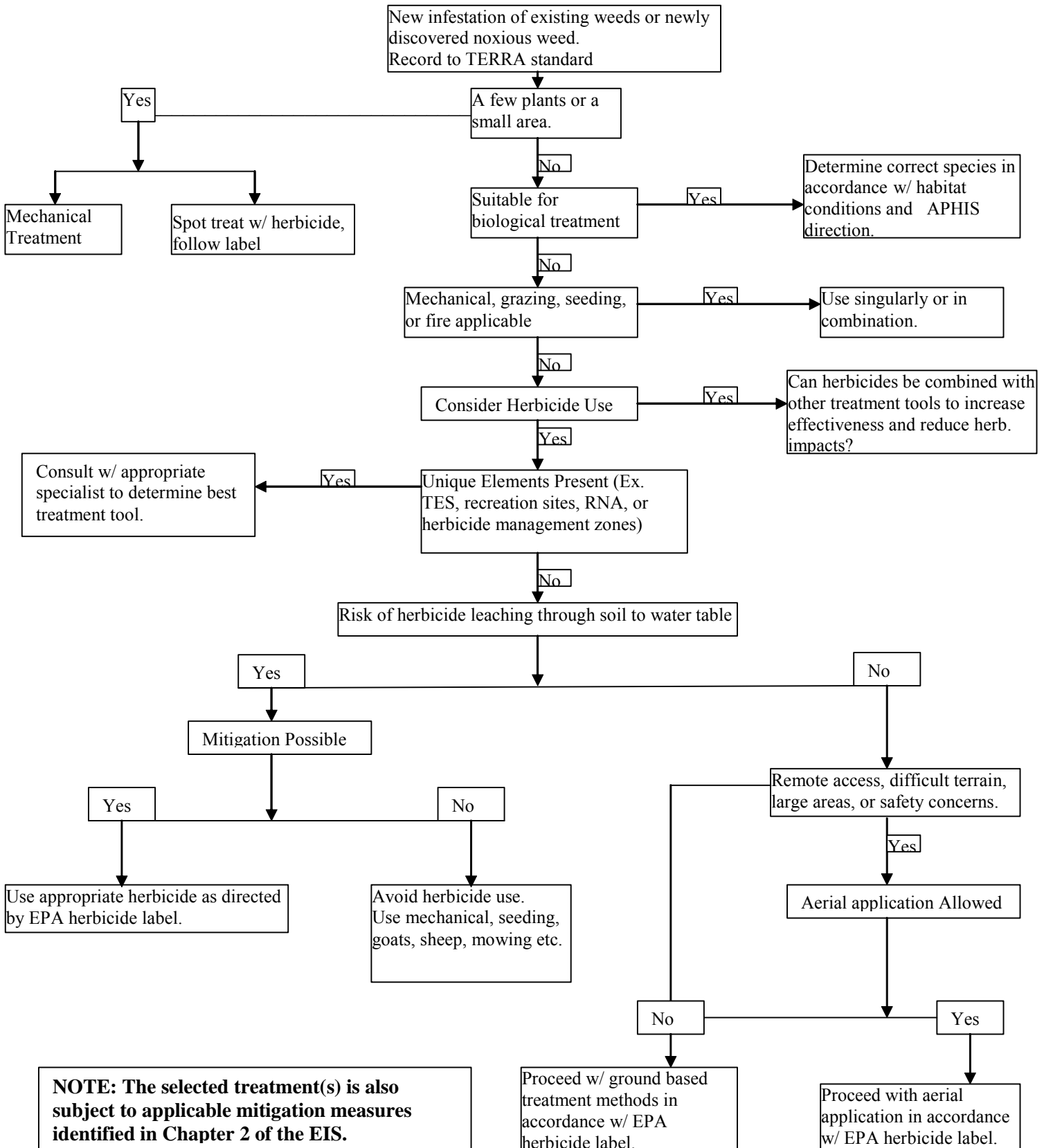
- The decision (if and how) to treat newly discovered infestations would be driven by the flowchart for New Weed Locations as shown in Figure 6;
 - New invaders, should be given high priority for eradication, if feasible;
 - New infestations may be treated with herbicide as long as the acres treated remain within the limits described above and adhere to all design criteria in this document.
2. To improve effectiveness and reduce impacts, new technologies, biological controls, or herbicides would be evaluated for use.

New technology, biological controls, herbicide formulations, and supplemental labels are likely to be developed within the next 15 years. These new treatments would be considered when there are indications that they would be more weed-specific than methods analyzed here, less toxic to non-target vegetation, less toxic to people, less persistent and less mobile

in the soil, or more effective. The Adaptive Management Strategy would allow incorporation of these new treatment methods if they meet the following criteria:

- The new or existing herbicide must have an Environmental Protection Agency (EPA) approved herbicide label.
- A risk assessment must be completed for the herbicide by the Natural Resources Conservation Service (NRCS), USDA Agriculture Research Station (ARS), Environmental Protection Agency (EPA), USDA Forest Service, or other federal land management agency.
- New biological agents must be determined to be detrimental to the target plants while at the same time being virtually harmless to native or desirable non-native plants.
- New biological agents must be approved by USDA Animal, Plant Health Inspection Service (APHIS) and the state of North Dakota prior to their introduction.
- A FSH 1909.15, 18.4 (Section 18) review of the DPG noxious weed treatment FEIS will be conducted to determine if the effects of the new or existing herbicide are consistent with those identified in the FEIS effects analysis.

Figure 6 TREATMENT DECISION FLOWCHART FOR NEW INFESTATIONS OR NEWLY DISCOVERED NOXIOUS WEEDS



INTEGRATED WEED MANAGEMENT

The following discussion of Integrated Weed Management (IWM) is adapted from the Bitterroot National Forest Noxious Weed Treatment Project FEIS. Integrated weed management is an integral part of the Proposed Action. IWM, as defined by Sheley, is “the application of many kinds of technologies in a mutually supportive manner. It involves the deliberate selection, integration, and implementation of effective weed control measures with due consideration of economic, ecological, and sociological consequences”. The IWM approach developed for this project does not center on treatment methods, but rather on a multi-faceted strategy that includes education, inventory, ecological impact and risk assessment, prioritizing treatment areas, choosing management techniques, evaluating the program through monitoring, and adapting as the program evolves. Sheley et. al. (1999) described the overall goal of IWM as “maintaining or developing healthy plant communities (restoration) that are relatively weed resistant, while meeting other land-use objectives such as forage production, wildlife habitat development, or recreational land maintenance.”

Key Components of an IWM program include:

- Preventing encroachment into non-infested areas;
- Detecting and eradicating new introductions;
- Eradicating small populations;
- Containing large weed populations;
- Re-vegetating when necessary; and
- Properly managing competitive vegetation (Goodwin and Sheley 2001).

A successful program consists of a sustained effort, constant evaluation, and adoption of improved strategies as they arise.

The goals of implementing the various elements of IWM are to:

- Increase public awareness regarding impacts of noxious weeds to resource values;
- Limit weed seed dispersal from roads and trails;
- Contain neighboring weed infestations; and
- Minimize soil disturbance.

Choosing Management Techniques

Selection of weed management tools is not a choice of one tool over another, but rather selection of a combination of tools that would be most effective on target species for a particular location. Reliance on one method or restricting use of one or more weed management tools may prove less effective. Effectiveness and applicability of each tool varies and depends on weed biology and ecology, location and size of the infestation, environmental factors, management objectives, and management costs.

Mechanical Treatment

Mechanical treatments involve physical damage to or removal of part or all of the plant. Examples of mechanical treatments include hand pulling, digging and cutting (shovels and

clippers), pulling tools (such as weed wrenches™), and power tools (such as weed whips, chainsaws, mowers). Mechanical methods can be highly selective for individual plants and used to treat individual plants or specific treatment areas. Mechanical treatments may need to be performed several times during a season and are often used in concert with other treatment methods such as application of herbicides or prescribed fire to treat re-sprouts and new seedlings.

Mechanical weed management methods can be effective on small infestations. Hand-pulling and hoeing are the oldest and most traditional weed management methods. These methods are labor intensive and relatively ineffective for management of large, dense infestations of perennial noxious weeds. Best results are achieved when the entire root is removed. This is often not possible for deep-rooted or rhizomatous perennials, such as leafy spurge and Canada thistle, since hand-pulling and hoeing often leave root fragments which can generate new plants.

While this control method is effective on single plants or relatively small infestations, it is not economically feasible on large, well-established knapweed infestations (Brown et al. 1999). In addition, hand-pulling plants that contain toxins or skin allergens can expose individuals to their poisonous effects (DiTomaso 1999).

Test plots established on Blue Mountain (Lolo National Forest) and the Lee Metcalf National Wildlife Refuge near Stevensville, Montana, measured effects of hand-pulling on spotted knapweed. On the two sites spotted knapweed covered 76 percent and 53 percent of the area, respectively. Average pulling cost for the two locations was calculated at \$8,498 per acre per year and is used to estimate pulling costs in this analysis (USDA FS 2001b). Hand-pulling provided 100 percent flower controls in 56 percent plant control at Blue Mountain, but increased bare ground from 2.7 percent to 13.7 percent during the first year after treatment (Brown et al. 1999).

Mowing or cutting is more effective on tap-rooted perennials such as spotted knapweed compared to rhizomatous perennials (Brown et al. 1999; Maxwell et al. 1984; Scholes and Clay 1994). Cutting or mowing plants can reduce seed production if conducted at the right phenological stage. For example, a single mowing at late bud growth stage can reduce the number of seeds produced on spotted knapweed (Watson and Renny 1974). Mowing can also weaken weeds' competitive advantage by depleting root carbohydrate reserves. Because of large carbohydrate reserves, mowing must be conducted several times a year for consecutive years to reduce the competitive ability of the weed. Cost of mowing twice a year (on terrain conducive to mowing) is approximately \$200 per acre (based on 1998 dollars).

Because noxious weeds flower throughout the summer, it is difficult to time mechanical treatments to prevent flowering and seed production. Repeated mechanical treatment too early in the growing season can result in low growth form that is still capable of producing flowers and seed (Benefield et al. 1999; Goodwin and Sheley 2001). Mechanical treatments on some rhizomatous weeds, such as leafy spurge, can encourage sprouting and result in an increase in stem density (Goodwin and Sheley 2001).

Revegetation Treatment

Revegetation methods of noxious weed management are generally targeted toward enhancing desirable vegetation to minimize weed invasion. Planting or seeding desirable species to shade or out-compete noxious weeds, applying fertilizer to desirable vegetation, and controlled grazing are common revegetation treatments.

In most cases, endemic native species do not appear capable of out-competing noxious weeds. On appropriate sites, herbicide application after weeds have emerged, followed by tillage and drill seeding, can be effective for establishing desirable species (Sheley et al. 1999). This process, however, can lead to increased soil compaction (DiTomaso 1999).

When seed is introduced to a site by non-natural means (e.g., seeding by humans), there is a risk of introducing non-native and/or noxious weed species. Use of certified weed free seed reduces this risk. The magnitude of the risk varies and may be determined by seed source, cleaning practices, and other factors. Certified weed free seed has tolerances for certain weed species and is only certified free of certain weed seeds (Feed Seed Act Section 201). Additional information is available at www.ams.usda.gov/lsg/seed/2005noxiousweed/pdf.

Grazing

Grazing can be an effective management tool for several weed species. Since grazing animals prefer certain forage, selective use of this forage can shift competitive balance of plant communities (Crawley 1983; Lukan 1990). For example, goats and sheep have been used in various areas for controlling knapweed and leafy spurge. The Sheyenne Ranger District has observed a decrease in the density of leafy spurge resulting from goat grazing (Personal Communication w/Braun, 2006). Appropriate grazing by animals preferring weeds can shift the plant community toward more desired grasses (Lacey et al. 1989). Conversely, grazing can also selectively reduce grass competitiveness, shifting the community in favor of weeds (Svejcar and Tausch 1991).

Use of grazing animals as a weed management tool must be based on selecting the appropriate grazer (cattle, sheep, or goats) for the target weed. Managers must also determine when, how much, and how often to graze animals to have maximum impact on the weed with minimum impact on desirable species (Olson 1999). A long-term commitment to small ruminant grazing is necessary for effective weed control and achievement of desired results. Noxious weeds can compensate quickly after the grazing pressure is removed because of their long-lived seeds in the soil, and because they can rapidly increase flower stem production once grazing pressure is removed (Olson et al. 1997, in Sheley et al. 1999).

Biological Treatment

Biological weed management is the deliberate use of natural enemies (parasites, predators, or pathogens) to reduce weed densities. Natural enemies are imported from areas where their target or host plant occurs as a native plant and are deliberately released into areas where their natural host plant has invaded as a noxious weed. Biological treatments are commonly referred to as biological control, or biocontrol. Examples include plant-feeding insects such as flea beetles (*Aphthona lacertosa*) for leafy spurge and stem gall fly (*Urophora carduii*) for Canada thistle. Biological agents should be host specific and have a negligible risk for becoming a pest. Noxious weeds are a problem on the DPG due in part to a lack of these limiting factors.

Biological management is self-perpetuating, selective, energy self-sufficient, economical, and well suited to integration in an overall weed management program (Wilson and McCaffrey 1999). Management with biological agents is a slow process that generally does not achieve eradication. Biological agents may be ineffective without being integrated with other strategies. Biological management may also not be appropriate against weeds closely related to beneficial

plants because the natural enemy may be unable to discriminate between related plant species (Duncan et al. 2001).

A weed infestation may increase in density and area faster than the newly released biocontrol agent populations; therefore, other control methods must be used in conjunction with the release of biocontrol agents. The perimeter of the infestation may be sprayed to keep the weed from spreading. As biocontrol agents increase in density and begin to occupy more area, herbicide use may be reduced to occasional spot treatments.

Fire Treatment

Fire use for the treatment of noxious weeds involves burning a predetermined area to reduce or set back the growth of noxious weeds to provide opportunity and promote the growth of desirable plants. Prescribed fires are most effective when the weed is more susceptible to the effects of fire when compared with intermingled native plants. Fire may be used in combination with another treatment such as an herbicide to increase the effectiveness of the noxious weed control.

Noxious weed management objectives for each prescribed fire treatment would be defined in a project-specific prescribed fire plan. Prescribed fire plans may also include follow-up treatments for post-fire noxious weed discoveries using appropriate integrated pest management treatment proposed in this FEIS.

Treatment with Herbicides

Use of herbicides for noxious weed treatment involves application of herbicides developed, labeled, and produced to treat weed species at certain stages of plant growth. Herbicides can be applied using a variety of application methods such as backpack hand pump sprayers, all-terrain vehicles (ATVs) equipped with sprayers, truck and tractor mounted spray systems, and aerial application. Herbicides considered in this analysis, include, 2, 4-D, chlorsulfuron, clopyralid, dicamba, glyphosate, imazapic, imazapyr, metsulfuron methyl, picloram, sulfometuron methyl, and triclopyr. Several herbicides are considered because they vary in their effectiveness on different noxious weeds and where they can safely be applied.

The length of time each herbicide controls noxious weeds varies with the type of herbicide, environmental conditions, and target weed. Some herbicides control weeds for a short time period, while others can provide several years of control from one application. The U.S. Environmental Protection Agency (EPA) - approved herbicide labels include safe handling practices, application rates, and practices to protect human health and the environment. More information on herbicide labels can be found at www.cdms.net/manuf/manuf.asp.

Weed Prevention and Education

Preventing introduction and spread of noxious weeds is one objective of the Integrated Weed Management Program on the Grasslands. The USFS has prepared a comprehensive Guide to Noxious Weed Prevention Practices (USDA FS 2001d) for use in planning grassland and wildland resource management activities and operations (see Appendix F). The guide assists managers and cooperators in identifying weed prevention practices that mitigate identified risks of weed introduction and spread for projects and programs. The document is contained in the

Project Record at the Supervisors Office in Bismarck, ND. Factors critical in a prevention program include:

- Limiting weed seed dispersal occurring from vehicles and equipment traveling grasslands roads, and people and livestock traveling grasslands trails;
- Containing neighboring weed infestations;
- Minimizing soil disturbance;
- Detecting and eradicating newly established weeds;
- Establishing competitive desirable vegetation; and
- Proper forage management, including revegetation and shade management.

In addition, the DPG depends on public education and weed prevention programs to deter establishment of new weed species such as leafy spurge and Canada thistle. Weed education and prevent programs are on the DPG. These programs have helped raise public awareness about noxious weeds, and what steps can be taken to help reduce the spread of existing weeds and establishment of new invaders.

Monitoring and Record Keeping

Detailed and accurate record keeping and monitoring is a fundamental component of a successful integrated weed management program. Record keeping is used to provide a historical record of activities and also to provide information that can be used to justify future noxious weed management activities. Monitoring and surveying are necessary to determine whether noxious weed treatments are effective and meeting management objectives. Annual reporting is important and required for program accountability and includes inventorying all noxious weeds treated and documenting specifics of each treatment. Global Positioning Systems (GPS units) are used to map the site or area treated and record specific site data which may include, but not limited to:

- Name of noxious weed targeted for treatment
- Treatment method
- Date and time of treatment
- Name, location, and estimated area of treatment site
- Biocontrol - species and number of biological control agents released
- Herbicide – brand name and USEPA registration number of materials used
 - Formulation
 - Mix rate
 - Amount applied
 - Applicator's name
 - General weather conditions, including wind speed

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). A number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

An alternative that considered prevention only.

This alternative would alter or eliminate activities that provide vectors for weed infestation and spread. The intent of the alternative is to address and take action on human activities that promote the spread of weeds, specifically, close roads, alter or eliminate authorized livestock grazing permits, oil and gas exploration and development, and recreational Off-Highway Vehicle (OHV) activities.

Prevention is very important and is recognized in the FEIS by incorporating it into the Proposed Action. However, weed prevention alone does not address the management of existing weeds or meet the purpose for this project, which is to treat weeds within the DPG and to reduce the impact of weeds on other resources. Human uses and activities are authorized through previous decisions made in the Record of Decision for the Grasslands Plan, which incorporates requirements of several public land laws and regulations authorizing multiple uses on National Forest Systems lands. Taking action on activities, authorized under existing public laws, regulations, and permits on the DPG, which may contribute to the spread of weeds, is beyond the scope of this FEIS. All existing activities are periodically re-authorized or terminated, and will be evaluated for risk to weed spread at that time and if necessary, will require additional mitigation measures to address this concern.

Prevention is currently addressed through a variety of existing mechanisms including:

- Off-Highway Vehicles acting as a major vector of weeds has been minimized by the implementation of the 2001 Off-Highway Vehicle Record of Decision, which was incorporated into the Grasslands Plan in July of 2002. The OHV Decision prohibited wheeled motorized cross-country travel on the grasslands, where cross-country travel is defined as travel off existing roads and trails. It contains exemptions for wheeled cross-country motorized travel for the military, fire, search-and-rescue, law enforcement, official administrative business, lessees and permittees, and for travel to a campsite within 300 feet of an existing road or trail. The DPG is also in the process of travel plan analysis that may result in further travel changes.
- In addition to restricting OHV use, the Regional Forester for the Northern Region incorporated other prevention activities (listed in Appendix E) into the Forest Service Manual in 2001. The DPG is currently implementing and will continue to implement these prevention activities. Please review Appendix E, to see a complete list of all the prevention activities currently covered by the Forest Service Manual.
- Noxious weed management direction in the Grasslands Plan which provides direction for noxious weed management including but not limited to:
 - The use of certified noxious weed seed free product requirements for recreational animal feed and revegetation projects.
 - Prevention provisions for contracts.
 - Haying guidelines designed to prevent the spread of noxious weeds.

- Prevention and Education
 - Noxious weed displays in district office for employees and visitors. This helps create awareness and is a start at teaching weed ID to summer crews, visitors, etc.
 - Presentations on weed significance, ID, control, etc. to 4-H clubs, girl scouts, school groups, etc.
 - Weed free feed and seed programs.
 - Posting signs, brochures, weed free notices, etc. at campgrounds and trailheads.
 - USDA Forest Service Guide to Noxious Weed Prevention Practices version 1.0 dated July 5, 2001 (see Appendix F).

An alternative that only considers prevention does not comply with the Forest Service's Integrated Pest Management program because it doesn't effectively deal with existing noxious weed infestation and their adverse effects on the Grasslands, which violates federal and state laws and executive orders. As ongoing activities are reviewed in the future, the issue of noxious weeds will be evaluated if it pertains to the project. If the project causes an increase in weeds, the project will be modified to reduce the risk of spreading weeds. Finally, a prevention alternative that prohibits activities that are authorized under existing public laws, regulations, permits, and the Grasslands Plan is beyond the scope of this FEIS and will not be considered.

An alternative that considered continuing the current weed treatment program.

The current weed treatment program is guided by direction contained in the 1986 Custer National Forest Noxious Weed Treatment Program FEIS. In 1998, the DPG was proclaimed a separate unit and a DPG Land and Resource Management Plan (Grasslands Plan) has since been created. Some of the existing treatments contained in the 1986 FEIS needed to be modified and others added to implement the new Grasslands Plan.

Traditionally, the noxious weed treatment program on the DPG has been very dependent on herbicide treatments. Biological agents have shown great promise in more effectively controlling some species, but are not fully analyzed in the existing FEIS. Integrated use of treatments, such as combinations of biological control agents, prescribed fire, grazing, and newer herbicides were not included in the older analysis. Although some of these treatments have been taking place, analysis of the entire program has not occurred.

Herbicide use in some places appears to have lead to some problems with the western prairie fringed orchid and picloram has been showing up periodically in tested water wells on the Shyenenne Ranger District. The western prairie fringed orchid was listed as a threatened species in 1989, so the effects of current management activities on this species were not analyzed in the 1986 FEIS. The agency has been changing and adapting management to address these issues through the years, which again leads to the need to change current management and do new analysis. Further analysis and use of integrated and adaptive management of noxious weeds will be useful in better identifying and responding to potential problems while providing control options.

Current noxious weed treatments have been successful in eliminating small infestations, lowering the weed density in places, and limiting the spread of some noxious weed species in places. While this has been helpful, public comments and preliminary analysis indicated that improvements could be made for more effective treatment. Combinations of newer treatments,

integrated approaches using multiple methods of treatments, and inclusion of the flexibility of aerial spraying opportunities would help in eliminating or more effectively controlling more acres of infestation.

Newer herbicides have advantages for noxious weed control, such as greater selectivity, less harm to desired vegetation, reduced application rates, and lower toxicity to animals and people. The existing analysis does not provide sufficient direction, is not current with existing laws and Grasslands Plan direction, and doesn't provide adequate tools for noxious weed treatment. Incorporating new techniques, tools, research, and management advancements in combining treatments is desirable. More information on the effectiveness, successes and lessons learned from the current program are found in Chapter 3 in the existing condition discussions. Therefore, the current weed treatment program alternative was not considered further.

An alternative that considers all treatments except for herbicide treatment.

An alternative of this nature was considered, but eliminated from detailed analysis because a non-herbicide alternative would not meet the underlying need for action. Some noxious weeds, such as Saltcedar, black henbane, and purple loosestrife that infest or can be expected to infest the DPG can only be effectively controlled with herbicides.

The issue of scale needs to be considered when planning treatments of noxious weed species. Small populations of different noxious weeds are most effectively treated with herbicides because biological agents either don't exist to treat the weeds or the populations are too small to sustain the insects. Other treatment methods such as mechanical, fire, and hand pulling are generally not effective in removing or killing root systems which is particularly important when dealing with the DPG's primary noxious weed, leafy spurge. Large populations of certain noxious weeds can be treated with biological agents in some cases. Treatment of leafy spurge, with flea beetles, on the western portions of the DPG has yielded some impressive results. However, they have not been effective on the eastern portion of the DPG. The flea beetles are part of an integrated program, which includes herbicides, because the beetles generally do not completely eradicate an infestation of leafy spurge.

The purpose and need of this FEIS includes making new practices, technologies, and chemical formulations of herbicides available for use on the DPG. Making additional herbicides available for use by the DPG will increase available options for controlling noxious weeds while protecting native plant communities and environmental quality. By making additional herbicides available, it does not mean that the DPG will always be choosing to use herbicides over other types of control methods. Through this FEIS the DPG will be able to consider different herbicides with distinct properties that better address the balance of effective control and protecting the environment.

An alternative that would have included the use of the herbicides quinclorac (Paramount), diflufenzopyr (Overdrive) and fosamine (Krenite).

Fosamine (Krenite), diflufenzopyr (Overdrive), and quinclorac (Paramount) were dropped from the analysis because a Risk Assessment has not been completed for these herbicides. A Risk Assessment discusses and discloses potential effects of a given chemical on human health. Without this assessment, full disclosure of the risk to human health would be difficult, if not impossible to display in this analysis. A Risk Assessment completed by the Natural Resources Conservation Service (NRCS), USDA Agriculture Research Station (ARS), Environmental

Protection Agency (EPA), USDA Forest Service, or other federal land management agencies is a requirement under this FEIS (see page 41 under adaptive management) when considering the use of a new herbicide. As part of the Adaptive Management strategy, if and when a risk assessment is completed for these, or other chemicals that meet the criteria described above, a review of this new information may allow these herbicides to be used on the DPG.

An alternative that included invasive plants.

Invasive plants, other than noxious weeds, were not included in this analysis because of their extensive presence across the DPG. Many of these species were introduced in the dust bowl era of the 1930s to control erosion and have become commercially important forage. Control of invasive plants is a complex question and the DPG has not, at this time, developed a strategy to address their control. To include invasive plants in this analysis would have greatly increased its scope and required resources beyond those available. Therefore, the responsible official, for this project, decided to narrow the scope of the analysis to include only noxious weeds.

MONITORING

Monitoring is the process of collecting information to determine the effectiveness of management actions in meeting prescribed objectives. Monitoring will focus on the: 1) density and rate of spread, and the effect noxious weeds have on natural resources; 2) effects of treatments on noxious weeds; and 3) presence of herbicide in surface or groundwater.

Implementation Monitoring: The monitoring program includes annual survey and mapping of weed populations. Annual survey information will be entered into the Forest Service's Natural Resource Information System (NRIS) – Terra/Invasive Plants database. This is the agency's flora and fauna database and analysis program. Infestation maps, generated from the surveys, will be kept in GIS (Geographic Information System) format. The maps will be created consistent with the national Forest Service standards. Annually noxious weed treatment locations, dates, and treatment method details will be recorded and entered into the Forest Service Activity Tracking Database (FACTS) database.

Treatment Effectiveness: The baseline measurements contained in the FACTS and NRIS will be used to compare against future acreage calculations to document the effectiveness of each type of treatment in terms of noxious weed density and rate of spread. Every third year a ten percent sample of treated areas, including sensitive plant and western prairie fringed orchid areas, will be visited and remapped. This information will be compared to the baseline information contained in the FACTS and NRIS databases to determine treatment effectiveness, rate of spread, etc.

Water Quality: For water quality monitoring, the Grasslands hydrologist or district weed manager will review the noxious weed program of work and select sensitive water resources areas to monitor. At the end of the growing season, a random selection method will be used to select 10 to 30 water samples from water wells and reservoirs in herbicide treatment areas.

If an herbicide is detected in a sample, the source waters will be tested at six-month intervals until the herbicide is no longer detected. The use of the herbicide may be temporarily halted in an area until it is no longer detected in local water samples.

Once every five years, the NDDH monitors groundwater quality in the Denbigh, Sheyenne Delta, and Hankinson aquifers. Results of these analyses will be used to augment the sampling performed by Forest Service personnel.

Western Prairie Fringed Orchid: The Forest Service has developed an Orchid Recovery Strategy for the orchid in consultation with the U.S. Fish and Wildlife Service. Monitoring would include tasks identified in the Monitoring and Recovery section of the strategy. Also, prior to treatment, orchid locations will be mapped and treatments discussed with the appropriate specialists. Treated areas will be sampled for treatment effectiveness as described under the Treatment Effectiveness section.

Sensitive Species: Prior to treatment, sensitive plant locations and densities will be mapped and proposed treatments discussed with the appropriate specialists. Treated areas will be sampled for treatment effectiveness as described under the Treatment Effectiveness section.

Human Health: Effects on human health resulting from exposure to daily treatment operations, accidents, and long-term exposure will be monitored through documentation of project records, including worker and public health complaints. Risk to human health regarding use of herbicides has been evaluated in Chapter 3. Risk to workers is expected to be minimal if they are properly trained, follow instructions on herbicide labels, and apply design criteria practices. Risks to the public are expected to be minimal if the design measures outlined in Chapter 2 are followed.

Drift Detection: Monitoring of aerial applications of herbicides and drift detection will include the following activities. The first aerial herbicide application of each season adjacent to special management zones or areas (streams, lakes, wetlands, sensitive plants) will be monitored to determine the amount and distribution of spray drift. Spray detection cards will be placed along the perimeter of the treatment area and inside the buffer around sensitive areas. The cards will be visually examined immediately after spraying and photographed. A written summary of the drift pattern as interpreted from the detection cards and the photos will be used to document the result. If necessary, aerial application methodology will be modified (buffer size, droplet size, different weather parameters) to reduce the amount of drift.

COMPARISON OF ALTERNATIVES

This section provides a summary of the effects of implementing each alternative according to the Purpose and Need and the significant issues. Detailed information on the effects of the alternatives is contained in Chapter 3.

TABLE 7. SUMMARY OF COMPARISON BY ALTERNATIVE

PURPOSE & NEED / ISSUES	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PROPOSED ACTION
Improve and protect the biodiversity and ecological integrity of the DPG by preventing or limiting the spread of weeds that could alter desired plant community composition and function, especially in those areas which currently have few or no infestations.	Would allow noxious weeds to spread. Noxious weeds spread at a rate of 1 to 35 percent per year. Untreated areas and travel ways would serve as source for re-infestation of treated and non-infested sites. Weeds may spread from NFS land onto adjacent private and state lands	The Proposed Action would contain and control infestations. Treatments would control, reduce, and in some instances eliminate noxious weeds improving biodiversity and ecological integrity.
Eradicate new invaders (weed species not previously reported on the DPG) before they become established and become more difficult to control.	New invaders would not be treated and would continue to infest new sites.	The Proposed Action includes an adaptive strategy to treat new noxious weeds or previously unknown infestations of existing noxious weeds.
Restore and protect wildlife and plant habitat.	While some species would be affected more than others, most would experience negative effects through loss of habitat and competition for remaining habitat, particularly on the SNG. Population viability of some sensitive butterfly species on the SNG would be impacted because of the high impacts to habitat, small home ranges and low species vagility.	There may be some short-term negative affects to individuals or habitats in localized areas as non-target vegetation is affected, but these impacts will not affect population or species viability. In the long-term, there will be beneficial impacts for fish and wildlife as habitats are improved through the reduction of noxious weeds and increase in native vegetation.
Restore availability and quality of forage for livestock.	Noxious weeds may be poisonous or unpalatable to livestock. The forage value, if any, is minimal. The loss of native or desired non-native vegetation would be substantial. The forage available to livestock on the Grasslands would decrease.	Noxious weed infestations would be contained to their present level and within the next ten years would become less dense, smaller in patch size, and possibly even eliminated in some situations. Native plants would return to these sites and would increase the amount and quality of forage available for livestock.
Continued cooperation with county, state and federal agencies and private landowners interested in managing weed invasions.	Cooperation would be limited to county agencies treating right-of-way on roads passing through National Forest System lands.	Under the Proposed Action, the DPG would continue to work with state and county agencies and landowners as part of an integrated noxious weed treatment program.

PURPOSE & NEED / ISSUES	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PROPOSED ACTION
Continued implementation of federal and state weed policies, executive orders, and other management plans.	Weed policies and orders would not be implemented and would thereby violate executive orders, state and county laws. State and county weed treatment programs would continue.	Under the Proposed Action, the DPG would continue to work with state and county agencies, and cooperators, such as grazing associations and oil and gas companies, as part of an integrated noxious weed treatment program.
Implement Grasslands Plan goals and objectives.	The noxious weed direction in the Grasslands Plan would not be implemented.	The Proposed Action would implement the Grasslands Plan direction for treatment of noxious weeds.
Reduce infestation and spread of noxious weeds associated with developed sites, including oil and gas facilities, campgrounds, trailheads, roads, trails and administrative sites. Improve the aesthetic quality of roadside and recreation areas.	<p>There would be no check on the spread or introduction of noxious weeds. The opportunity to spread weeds via livestock, recreationists, and motorized vehicles would increase.</p> <p>Roadsides and recreation areas would provide opportunities for the continued spread or introduction of existing or new noxious weeds. In some areas, visitors may see fewer native species and diversity, and more monocultures of noxious weed species.</p>	Treatment of noxious weeds along roads and recreation facilities provides for a better recreational experience. Treatment of these areas minimizes potential spread of noxious weeds by recreationists and others using the road systems.
Improve the ability to control noxious weeds in areas occupied by Threatened, Endangered and Sensitive (TES) species without significant impacts to those species.	The threat to Threatened, Endangered and Sensitive species would significantly increase if treatment of noxious weeds were discontinued. There would likely be a further reduction in western prairie fringed orchid habitat.	No effect on Threatened and Endangered wildlife (see below for effects to Threatened plant species). For Sensitive species there may be a short-term impact to individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species. Long-term, there is a beneficial impact associated with noxious weed treatment.
Protect sensitive and unique habitats (including research natural areas, wetlands, and sensitive plant populations) from invasion by weeds.	Sensitive and unique habitat may be lost or suffer severe impacts due to the displacement of native vegetation by noxious weeds.	The Proposed Action identifies design criteria, which would allow treatment of noxious weeds in special areas and provide for protection and habitat improvement in those areas.
Issue 1. Noxious weed treatments may have adverse effects to water quality.	<p>There would be no risk to water quality from herbicide application on National Forest System lands on the DPG. Water quality may improve on the Sheyenne Ranger District where picloram has been detected in wells.</p> <p>Noxious weeds would continue to</p>	The proposed design criteria should decrease the frequency and magnitude of ground-water contamination. However, because of on going herbicide application surrounding the SNG may not be completely eliminated. Eradication of weeds and restoration of desired native plants should decrease bare ground as well as decrease runoff,

PURPOSE & NEED / ISSUES	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PROPOSED ACTION
	spread in affected areas, likely resulting in increased bare ground and corresponding increases in runoff, erosion, and sedimentation, which would adversely affect quality of surface waters.	erosion and sedimentation in surface waters.
Issue 2. Noxious weed treatments may have adverse effects on the western prairie fringed orchid, which is a Threatened species located on the Sheyenne National Grassland	The continued spread and increase in the density of existing noxious weeds on the Sheyenne National Grassland may result in the threatened western prairie fringed orchid losing habitat.	Under this alternative, proposed treatments, in the short-term, may impact individuals or habitat, but they will not likely contribute to a trend towards federal listing or cause a loss of viability. Long-term, there is a beneficial impact to orchid habitat associated with noxious weed treatment.
Issue 3. The use of herbicides for noxious weed control may cause acute (short-term) or chronic (long-term) health problems for people who come into contact with the herbicides and/or treated areas.	<p>There would be no herbicide effects due to implementation of this alternative. There is no potential to exceed the reference dose (RfD), and no risks to human health from previously approved application of herbicides.</p> <p>Public exposure would remain minimal, if any, and would be well below the Lowest Observable Effect Level.</p>	The human health analysis reveals that the herbicides in this analysis will have neither acute nor chronic health effects if 1) EPA herbicide label directions are followed, 2) personal protective equipment is used, and 3) the appropriate design criteria, identified (Chapter 2), are implemented. Implementation of these measures will ensure that workers and the general public are not exposed to doses of herbicide that are above the reference dose (RfD) identified by the EPA.
Issue 4. Aerial application of herbicides may have adverse effects on non-target species.	There would be no effect as no aerial application would take place.	Implementation of design criteria identified in Chapter 2 would mitigate drift concerns.

AGENCY PREFERRED ALTERNATIVE

Alternative 2, the Proposed Action, is the agency's preferred alternative.

CHAPTER 3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This Chapter summarizes the physical and biological environments of the project area and the effects of implementing each alternative on that environment. Direct, indirect and cumulative effects are addressed. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. Each resource section is a summarization of a detailed analysis located in the project record at the Dakota Prairie Grasslands Supervisor's Office.

Cumulative effects are addressed by resource. Council of Environmental Quality (CEQ) guidance on considering past actions in cumulative effects analysis (June 24, 2005), states agencies should 1) use scoping to focus on the extent to which information is relevant to reasonably foreseeable significant adverse impacts, is essential to a reasoned choice among alternatives, and can be obtained without exorbitant cost. Generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions (CEQ, 2005).

In this analysis, past actions generally include livestock grazing practices and associated developments, past noxious weed treatments by both the agency and adjoining landowners, oil and gas development on the LMNG including road and pad construction, other road and trail maintenance, recreational activities, spread of invasive species (other than noxious weeds), conversion of native prairie to other uses, and natural disturbances such as wildfire and drought. Their combined effects are described in the affected environment sections.

Current and reasonably foreseeable activities that could contribute to the degree of impacts include travel planning, including potential reconstruction and decommissioning of routes, livestock grazing practices, continued herbicide and/or other chemical application for both noxious weeds and agricultural purposes by adjoining landowners, anticipated increases in recreation use and developments such as campgrounds and trails, and oil and gas activities.

NOXIOUS WEEDS AND NON-TARGET VEGETATION

This section addresses effects of the alternatives on noxious weed infestations and non-target vegetation (other than those covered in the preceding section on endangered, threatened, proposed and sensitive plant species). Direct and indirect effects to noxious weeds and other vegetation are considered for National Forest System (NFS) lands across the Dakota Prairie Grasslands (DPG). Cumulative effects are considered for all lands within the administrative boundaries of the DPG, which includes some state and private lands

Noxious weed infestation and vegetation information was gathered using existing information. Data and information from each DPG district was used, as well as from the Geographic Information System (GIS) department of the DPG. Other sources of information were gathered from various Internet web pages and other noxious weed environmental impact statements as referenced. This report tiers to the Final Environmental Impact Statement for the Northern Great Plains Management Plan Revisions (USDA Forest Service 2001a).

Vegetation Affected Environment

Extent of Noxious Weed Infestation on the Dakota Prairie Grasslands

The project area includes all Ranger Districts on the DPG. Noxious weed infestations cover approximately 57,000 acres (four percent) of the 1,257,300-acre DPG. Many noxious weed infestations on the McKenzie, Medora and Grand River Ranger Districts (western North Dakota and northwestern South Dakota) are concentrated in less common habitats – woody draws and riparian areas. However, on the Sheyenne Ranger District in eastern North Dakota, noxious weeds are more widespread and impact 100 percent of the Grassland acres with at least 50 percent of the District infested. Denbigh and Souris Experimental Forests are small tracts, with Denbigh fairly heavily infested with leafy spurge similar to the SNG and Souris lightly infested.

Table 1 (Chapter 1) portrays the estimated acres of the most prevalent noxious weed species on each unit of the DPG. In addition to the acres of noxious weeds on the rangeland, approximately 2,000 acres of oil and gas pads on the Medora and McKenzie Ranger District are treated for weeds.

Without treatment, weeds increase about 14 percent a year under natural conditions. From these trends, we expect the pattern of expansion to continue and infested acreages to increase on the DPG in the absence of aggressive control treatments.

Twenty-three plant species are currently listed as noxious weeds on State and County noxious weed lists. Of these 23 plant species, 17 are known to occur on the DPG. Weed species addressed in this analysis are included on State and County weed lists from North Dakota, South Dakota, Montana and Minnesota. This analysis covers adjacent states' noxious weeds because they are potential threats. If the weed should appear on the DPG, the Forest Service will be in position to actively control the weed.

Leafy spurge comprises 93 percent of the infestations on the Dakota Prairie Grasslands. The other 16 known weed species of varying densities make up 7 percent of the infestation sites. All weed species currently considered for control measures are listed in Table 3 (in Chapter 2).

Existing Weeds and Control by Ranger District / Grassland

Sheyenne Ranger District – Sheyenne National Grassland

Existing Weeds

On the Sheyenne National Grassland (SNG) leafy spurge is the major weed of concern. It currently infests large acreages in all landforms: choppy sand dunes, hummock and swale, river terrace and deltaic plain. In recent drought years (late 1980s), leafy spurge was found in all habitat sites. In recent wet years (1993-1998) the sedge meadows were inundated with water for several years and the leafy spurge backed out of the extremely wet sites.

Since 1999, a moderate moisture regime has occurred, the inundated sites (standing water and cattails) dried out and the sedge meadows returned. In the aftermath of the long-term inundation, Canada thistle and bull thistle established in these disturbed sites. The thistles started to show up in the sedge meadows the fall of 2002. Since this time, bull thistle and Canada thistle have been

found in the sedge meadows of the deltaic plain and hummock and swale landforms, and in depressions of aspen groves in the choppy sand dunes.

Absinth wormwood occurs around old homesteads. This plant has been present for several years, but has not expanded beyond the disturbed sites.

Buckthorn is found in eastern deciduous woodlands along the Sheyenne River, creeks and springs. It also is found in oak thickets in the choppy sand dune landforms.

Current Control Treatments

Leafy spurge is treated annually. About 4,000 to 6,000 acres are treated each year with herbicides. Grazing control with goats treats 2,000 to 3,000 acres, mainly in the choppy sand dunes landform. Biological control agent flea beetles (*Ahphthona nigriscutis* and *A. lacertosa/A. czwalinae*) are released at 15 to 50 sites per year. In 2001 long horn beetles (*Oberea erythrocephala*) were released at five sites. Through monitoring, the leafy spurge hawkmoth (*Hyles euphorbiae*) has been found on the district.

Canada thistle was treated in the fall of 2003 with herbicide on approximately 40 acres.

Grand River Ranger District – Grand River and Cedar River National Grasslands

Existing Weeds

On the Grand and Cedar National Grasslands, the major noxious weed is leafy spurge. Most of the leafy spurge on the Grand River National Grassland occurs in two areas: along the drainage of South Fork Grand River and along the North Fork Grand River with leafy spurge occurring in the open grassland areas of these drainages. On the Cedar River National Grassland, Canada thistle is found in small scattered patches in the grassland. Russian knapweed is found in some open grassland areas.

Current Control Treatments

Annually, 300-500 acres of leafy spurge, about 10 to 15 acres of Canada thistle and about 10 acres of knapweed are treated with herbicide.

McKenzie and Medora Ranger Districts – Little Missouri National Grassland

Existing Weeds

Leafy spurge is the noxious weed of most concern across the Little Missouri National Grassland (LMNG). On the Medora Ranger District, the greatest area of concern runs from Highway 10 north to McKenzie County line. It is bordered on the east by the Little Missouri River and on the west by the grassland boundary. On the McKenzie Ranger District, leafy spurge is located along the Little Missouri River corridor, Rough Creek, Cinnamon Creek, Clear Creek, and the Charlson and Tobacco Garden areas. Most of the populations have been contained to less than 10 acres, but there are a handful of sites along the Little Missouri River that have between 50 to 90 acres of leafy spurge.

Spotted knapweed has been found in numerous locations across the LMNG, but favors conditions found along the Little Missouri River corridor and road corridors in areas of high oil and gas activity.

There has been one population of Russian knapweed found on the McKenzie Ranger District; it is located in the Little Missouri River corridor. One location (less than one acre in size) also occurs on the Medora Ranger District and has been treated with herbicide.

Canada thistle can be found throughout the LMNG along drainage ways or small depressions and around stock ponds, which are inundated with water at some time during the year. It is widely distributed, but rarely occurs in populations exceeding one acre in size.

Absinth wormwood is not widespread and is confined to highly disturbed areas including areas of heavy livestock use, along road ditches, on the face of dams and in abandoned scoria pits. Black henbane is found along roadways and disturbed sites. Hoary cress is located primarily in drainages. Saltcedar is found in or around riparian zones or wetland range sites.

Current control treatments

On the Medora Ranger District, biological control with flea beetles (*Apthona czwalinae* / *Apthona lacertosa* mix and *Apthona nigriscutis*) has been quite successful to control leafy spurge, reducing spurge by 50 percent in the core infestation area described above. Remaining leafy spurge infestation is generally sparse, compared to the high stem density that occurred before flea beetle release. Flea beetles have also been released in areas along Wannagan Creek, Bell Lake, and Roosevelt Creek among other areas. The district applies herbicides on approximately 800 acres of leafy spurge annually. Canada thistle control consists of approximately 100 acres treated annually with herbicide. Saltcedar, henbane, hoary cress and burdock are also treated with herbicide, totaling no more than 100 acres annually.

Currently the McKenzie Ranger District treats 400 to 600 acres of leafy spurge with herbicide each year. Canada thistle is also treated with herbicide, with most infestations under an acre. Saltcedar has shown up along the Little Missouri River and in Magpie Creek and Rough Creek and about 10 acres is treated annually with herbicide.

Denbigh and Souris Experimental Forests

Existing Weeds

On the Souris Experimental Forest, small scattered patches of leafy spurge and Canada thistle (less than ½ acre in size) are found among the planted juniper and pine groves of the experimental forest. On the Denbigh Experimental Forest leafy spurge is found throughout the 640 acres, with the heaviest infestation in the 40 acres of native prairie.

Current Control Treatments

On the Souris unit, the scattered patches of leafy spurge and trace amounts of Canada thistle are treated with herbicide. The Denbigh unit has not been treated recently.

Vegetation by Ranger District / Grassland

Sheyenne Ranger District – Sheyenne National Grassland

The SNG borders the tallgrass and mixed-grass prairie regions of North Dakota. Components of both types are found intermingled throughout the grassland.

Manske (1980) described vegetation associated with various landforms on the SNG. These landforms include mostly level deltaic plain, the rolling hummock and swale, the choppy sand dunes, the valley slopes above the Sheyenne River, and the river bottom directly adjacent to the Sheyenne River.

Tallgrass prairie is characteristically found on the large, nearly level areas of deltaic plain. It is also present in the hummocky region. The tallgrass prairie type in the hummocky area is commonly found encircling the lower base of the hummocks. The major dominants of the tallgrass prairie or “mid-sites” are big bluestem (*Andropogon gerardii*) and little bluestem (*Andropogon scoparius*). A lowland sedge meadow community occupies the depressions found in the hummocky and deltaic plain regions. The vegetation is mainly made up of wooly sedge (*Carex lanuginosa*) and northern reed grass (*Calamagrostis inexpansa*).

Mixed-grass prairie is found mainly in the hummocky and choppy sand dune area. It is situated on the summits and shoulder slopes in the upland portions of the hummocky areas and is generally distributed throughout the choppy sand dune terrain. Characteristic components of the hummocky uplands are blue grama (*Bouteloua gracilis*), needle and thread (*Stipa comata*), sun sedge (*Carex heliophila*) and prairie sandreed (*Calamovilfa longifolia*). The vegetation of the choppy sand dunes resembles the upland of the hummocky landform. However, the more xeric locations support species like sand dropseed (*Sporobolus cryptandrus*), hairy grama (*Bouteloua hirsuta*), and sand bluestem (*Andropogon halli*).

Wetland vegetation is found in small, localized areas scattered throughout the grassland in the hummock and swale, deltaic plain, and in oxbows within the riparian areas. The vegetation is composed principally of a sedge-cattail-willow community.

Woodland and shrubland vegetation exists in the region. The riparian forests along the Sheyenne River Valley are typified by basswood (*Tilia americana*), American elm (*Ulmus americana*) and green ash (*Fraxinus pennsylvanica*). The denser upland woodland areas commonly situated on the top of the river valley and extending into the mixed grass prairie of the choppy sand dunes is predominately made up of bur oak (*Quercus macrocarpa*) with green ash as an important subordinate. A bur oak savanna exists at the periphery of the denser oak stands and extends out into the surrounding grassland. Quaking aspen (*Populus tremuloides*) groves generally occupy basins/depressions within the choppy sand dunes and hummocks terrain. Shrubland communities of smooth sumac (*Rhus glabra*), buckbrush (*Symphoricarpos occidentalis*), and willow (*Salix spp.*) are found scattered throughout the region.

Grand River Ranger District – Grand River and Cedar River National Grasslands

The Grand River and Cedar River National Grasslands (GRNG and CRNG) are located within the Northern Plateau sub-region of the Great Plains Province. The vegetation described herein for the GRNG is similar on the CRNG, with the exception of very few trees and minor components of shrub communities on the CRNG.

The GRNG is classified as wheatgrass-needlegrass (*Agropyron-Stipa*) prairie by Kuchler (1964). The dominant plant species are western wheatgrass (*Agropyron smithii*), blue grama (*Bouteloua gracilis*), needle and thread (*Stipa comata*) and green needlegrass (*Stipa viridula*). Open hillsides composed of eroded sandstone include patches of little bluestem (*Andropogon scoparius*) and prairie sandreed (*Calamovilfa longifolia*).

The shrublands of the GRNG, and to some extent the CRNG, are composed of shrub/grass communities on arid and mesic sites. Major shrubs on open sites and badlands consist of snowberry (*Symphoricarpos occidentalis*), silver sagebrush (*Artemisia cana*), rubber rabbitbrush (*Ericameria nauseosa*), skunkbush sumac (*Rhus trilobata*) and snakeweed (*Gutierrezia sarothrae*). Willows (*Salix spp.*) and snowberry are found along stream channels and the Grand River. False indigo (*Amorpha fruticosa*) can be with these two species along the Grand River.

Riparian areas occur along the north and south forks of the Grand River and many of the larger drainages on both grasslands. A strong component of sedges and rushes dominates the plant community; three square bulrush (*Scirpus pungens*), bulrushes (*Scirpus spp.*), spikerushes (*Eleocharis spp.*), and inland saltgrass (*Distichlis spicata var. stricta*). Cottonwoods (*Populus spp.*) and willows are intermittently found along streams and rivers.

Interspersed within the landscape are patches of woodlands associated with drainages and river bottoms. The dominant tree on the landscape is green ash (*Fraxinus pennsylvanica*). Cottonwood (*Populus spp.*) is found in scattered places along the Grand River and some larger tributaries. The overstory is dominated by green ash, with boxelder (*Acer negundo*), American elm (*Ulmus Americana*), and some Rocky Mountain juniper (*Juniperus scopulorum*). The understory is dominated by chokecherry (*Prunus virginiana*). Longbeak sedge (*Carex sprengeii*) and Kentucky bluegrass (*Poa pratensis*) are the common species in the herbaceous understory.

McKenzie and Medora Ranger Districts – Little Missouri National Grassland

The LMNG includes some of the largest intact remnants of the highly diverse mosaic of grassland, shrub steppe and woodlands that distinguish the Northwestern Great Plains. Grassland vegetation is generally categorized as “northern mixed prairie” a transition zone between short- and tall grass prairie.

Grassland habitat types dominate the LMNG. They represent approximately 58 percent of the area. The native rolling prairie is dominated by cool season, midgrass species such as western wheat grass (*Agropyron smithii*), green needlegrass (*Stipa viridula*) and needle and thread (*Stipa comata*). Shortgrass species, primarily blue grama (*Bouteloua gracilis*), and cool season sedges (*Carex spp.*) dominate some sites. The far northern part of the LMNG is classified as the Northern Glaciated Plain Section, which includes gently undulating to rolling continental glacial till plains. Grassland vegetation is dominated by cool season midgrasses with inclusion of little bluestem (*Andropogon scoparius*) on hill slopes with thin soils.

Shrublands of the LMNG are typically composed of shrubs, grasses and forbs. They comprise approximately 12 percent of the landscape. There are two general types of shrublands: arid (dry) and mesic (moist). Arid environments include big sagebrush (*Artemisia tridentata*), silver sagebrush (*Artemisia cana*), and skunkbrush (*Rhus trilobata*). These shrublands are generally associated with dry river terraces and drier upland sites. Mesic environments include snowberry (*Symphoricarpos occidentalis*), woods rose (*Rosa woodsii*) and shrubby cinquefoil (*Potentilla*

fruitcosa). These mesic shrubs are often found on north-facing slopes, draw bottoms and shallow depressions.

Riparian areas in the Rolling Prairie generally have a strong vegetative cover of wetland species such as prairie cordgrass (*Spartina pectinata*), Baltic rush (*Juncus balticus*), three square bulrush (*Scirpus pungens*), and spikerush (*Eleocharis palustris*). Saline riparian areas are dominated by inland saltgrass (*Distichlis spicata var. stricta*) and plain bluegrass (*Poa arida*). In the badlands, the most common riparian plant species found are three square bulrush (*Scirpus pungens*) and spikerush (*Eleocharis spp.*) Plains cottonwood (*Populus deltoides*) is found in the floodplains.

Dotting the landscape are patches and ribbons of woodlands that cover about 10 percent of the LMNG. The woodlands occur mainly in the badlands and along the Little Missouri River. The dominant hardwood type is green ash (*Fraxinus pennsylvanica*) associated with snowberry and chokecherry (*Prunus virginiana*). Isolated populations of aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), and bur oak (*Quercus macocarpa*) are also found. Rocky mountain juniper (*Juniperus scopularum*) is the dominant conifer woodland. It is associated with cool, moist, north-aspect slopes in the badlands. There are two small, unique forests, one of ponderosa pine and one of mixed limber pine and juniper, on the Medora District.

Denbigh and Souris Experimental Forests

The Denbigh Experimental Forest is a planted forest with many deciduous, pine and juniper varieties from all over the world. About 40 acres of the 640 acres are in native vegetation. The native vegetation is very similar to the Sheyenne National Grassland vegetation types. The native prairie also has a similar weed infestation as the Sheyenne.

The Souris Experimental Forest contains about 160 acres in a flat landscape that has been planted to pine and juniper trees. In between the planted tree belts, the dominant grasses are Kentucky bluegrass (*Poa pratensis*) and smooth brome (*Bromus inermis*)

Alternative 1 – No Weed Treatment

Direct and Indirect Effects on Noxious Weeds

Alternative 1, the No Action Alternative, would not implement a noxious weed treatment program. Weed species would continue to go through their life cycle of flowering and fruiting and the seed would spread the plants beyond their current sites, and acreage of noxious weeds would subsequently increase.

Vectors for the spread of noxious weeds would continue to be present on the DPG. These vectors include numerous ground-disturbing projects such as road construction and maintenance; trail building and maintenance, oil and gas development, prescribed burning, grazing of allotments and recreation. Noxious weeds would continue to take advantage of these new ground disturbances and consequently, new sites, population levels, and acres of the 17 known noxious weeds would continue to expand on the DPG.

Leafy spurge rate of spread would continue to increase rapidly, doubling every 10 years. Many other noxious weeds would continue to spread at an estimated rate of 8-14 percent per year (di Tomaso unknown date). A small infestation of knapweed left unchecked can increase to 36,513 acres after 10 years (USDI Bureau of Land Management 2005c).

Additional noxious weed species would likely be introduced and there would be no noxious weed treatment to control these new weeds. These new weeds would also increase in number of sites, population levels, and acreage.

Biological control agents (flea beetles) on the Medora Ranger District of the Little Missouri National Grassland where they have been effective for leafy spurge control would be allowed to expand and contract naturally as leafy spurge expands. Biological control agents have been released on the Sheyenne National Grassland but have not built up sufficient numbers to be effective. If past release sites should become established on the Sheyenne National Grassland, biological control would continue naturally for leafy spurge control.

Cumulative Effects on Noxious Weeds

Other activities currently authorized and occurring on the Grasslands with potential to impact noxious weeds include livestock grazing, trail and road maintenance, oil and gas development and recreation. Livestock grazing can result in local ground disturbance and potential weed invasion and spread. Road and trail maintenance, and oil and gas development has the potential to introduce and facilitate spread of weeds. Recreation activities can be a vector of introduction and spread of weeds as well. Events such as fire and drought would create disturbed areas susceptible to invasion by noxious weeds, furthering their spread. Overall, this alternative would contribute to cumulative increases in noxious weeds across the DPG.

Direct and Indirect Effects on Non-target Vegetation

Noxious weeds would continue to infest rangelands reducing plant diversity, structure and function in native plant communities by out-competing native species for available resources. Some noxious weeds release secondary compounds, or allelopathogens, that can affect the establishment of native plant species.

These changes in native species composition and structure can have severe impacts on livestock carrying capacity and wildlife populations by altering forage availability, and reducing cover and habitat.

Cumulative Effects on Non-target Vegetation

Other major activities that can affect vegetation include livestock grazing and natural disturbance regimes such as drought and fire. Livestock would have less native vegetation to graze, thereby having more effect on the vegetation that does exist. In conjunction with no noxious weed control, these activities would have cumulative negative effects to native vegetation.

Alternative 2 – Proposed Action

Direct and Indirect Effects on Noxious Weeds

Table 5 (Chapter 2) identifies the available control methods of the Proposed Action.

Noxious weeds are an ongoing battle, especially where eradication is unlikely. The odds of having an effective eradication program improves drastically with treating weeds before they become established through seed reserves and or /extensive root networks. The adaptive management approach included in this alternative provides for early detection and eradication.

Herbicide Effects on Noxious Weeds

As indicated in Table 5 (Chapter 2), there are several effective herbicides available to treat most noxious weeds on the DPG. The effectiveness of any herbicide on a target weed is dependent upon a number of factors, including level of infestation, seed bank, timing, application rate, weather, and follow-up application. If all individual plants within an infested site are not treated, or if there is a seed bank in the soil, control will not be complete with one or even several years of treatment; therefore, control with herbicides does take constant diligence and monitoring to be effective. Aerial application of herbicides will allow large or remote infestations to be treated in a safe, efficient and economical manner.

Biological Control Effects on Noxious Weeds

Biological controls have been developed for several noxious weed species, as identified in Table 5 (Chapter 2). Biological control is a slow and long-term process. While biological control agents won't totally eradicate any one species, they have lessened the impacts significantly for some species such as leafy spurge and Canada thistle in some areas. Flea beetles (*Aphthona spp*) are effective for leafy spurge control because the larvae feed on the root system, the population can increase rapidly after introduction and the insect is easily captured for transport to additional locations. Flea beetles have greatly reduced the density of leafy spurge infestations on the Medora Ranger District. Flea beetles have been successful throughout most of North Dakota; however, they have been difficult to establish on sandy soils. On the SNG flea beetles have established in very low numbers, but have not yet become abundant enough to control leafy spurge. Ongoing flea beetle research with North Dakota State University is in the initial stages of some positive indications that flea beetles may become established in sufficient numbers to control leafy spurge on the SNG.

Mechanical Effects on Noxious Weeds

Mechanical treatments have varying degrees of effectiveness on noxious weeds. It is fairly ineffective for leafy spurge, except possibly for very small, new infestations. However, mowing and similar mechanical treatments may result in uniform regrowth of spurge that allows a timelier herbicide treatment. Mowing spurge can also reduce seed production if repeated every two to four weeks throughout the growing season. Repeated mowing of thistles would reduce thistle infestations, especially if the plants are biennial; however it requires several repeated treatments each year. Very small infestations of most other noxious weed species can be controlled to some degree with mechanical treatments. Mechanical treatments by themselves are not successful for saltcedar control. Hand pulling, digging or grubbing can be effective on small infestations of purple loosestrife, houndstongue, black henbane, hoary cress, hemp and burdock if all roots are removed and treatment occurs before seed set

Grazing Effects on Noxious Weeds

Grazing leafy spurge causes significant reductions in leafy spurge stem density, height, cover and biomass. Grazing alone will not eradicate leafy spurge but will reduce the infestation, and slow the spread of the weed. Sheep and goats are best suited to control leafy spurge on large infestations or along waterways and wooded areas where herbicide control is restricted. On a sheep grazing trial on leafy spurge stem density was reduced 76 to 99 percent (Dahl et. al unknown date).

Revegetation Effects on Noxious Weeds

Revegetation efforts to convert noxious weed plant communities back to native plant communities would require herbicide control, seedbed preparations and seeding. Native plants would need to be able to compete with the noxious weed that is being replaced.

Fire Effects on Noxious Weeds

In the Proposed Action, fire is a potential treatment method. It would be used in combination with other treatment methods to control leafy spurge and, to a lesser extent, Canada thistle. Fire can make other treatment methods, such as herbicides or biological controls, more effective by creating stands of uniform age and structure.

Cumulative Effects of Alternative 2 on Noxious Weeds

The same cumulative activities identified for the No Action alternative would contribute to cumulative effects of the Proposed Action on noxious weeds. However, rather than contributing negatively, the Proposed Action, in conjunction with ongoing weed control efforts on adjacent state and private land, will result in overall better control of noxious weeds. Overall, size and number of weed infestations will decrease.

Direct and Indirect Effects on Non-target Vegetation

Measures taken to control weeds will negatively impact some non-target plant species in the short-term. Impacts on plant communities increase as weed infestations expand in size and density. The increased impacts come not just from the weeds but also from the control measure. When treatments must be broadcast across an entire area and not specifically focused on the target plant, control measures have a greater potential for negative impacts. This is true for mechanical, biological and herbicide treatment methods. It is important to note that although most weed control activities may have impacts on some individual native plants in the short-term, the action would be intended to prevent the far greater loss of species diversity resulting from further uncontrolled weed infestation. Implementation of this alternative would improve native vegetation in the long-term by suppressing, containing or eradicating noxious weeds.

On the Little Missouri, Grand and Cedar River National Grasslands noxious weed control is limited to small areas. The non-target vegetation with the highest potential for adverse effects are shrublands and wooded areas because these areas contain the most noxious weeds. While noxious weed infestations tend to occur in shrubs and wooded areas on these grasslands, there is still likely to be little effect on these life forms. Noxious weeds infest approximately 6 percent of broadleaf tree and shrub communities on the Medora Ranger District, less than 1 percent on the

McKenzie Ranger District, and less than 3 percent on the Grand River Ranger District. Therefore, the impacts to shrubs and woody draws are limited in scope compared to the total existing acres of these life forms. Design criteria for Woodland Management Zones will help protect these areas from herbicide impacts.

The Sheyenne National Grassland, with the greatest infestation of leafy spurge on the DPG, will incur the most impacts to native vegetation. Proper integrated control strategies (herbicides, goat grazing, etc) and following design criteria should minimize the impacts to native vegetation. While some non-target vegetation will be impacted, affects will be short-term and localized. Long-term effects will be positive.

Herbicide Effects on Non-target Vegetation

Use of herbicides has the highest potential to impact native plant communities. Herbicide use can kill, injure or suppress non-target plants. The degree of mortality to injury of native species depends on the herbicide used and the application method, rate and frequency. Herbicides proposed for use vary in selectivity to plant families and have different effects on native vegetation. Herbicide rate and timing of application can be adjusted to avoid long-term impacts to non-target species. Spot application with backpack sprayers and truck mounted sprayers can focus herbicide on the target weed with limited treatment to adjacent non-target vegetation.

Aerial application is most likely to affect non-target native plants because it provides the least control of where herbicide is applied and has the greatest potential for spray drift. Aerial application design criteria will minimize impacts to non-target plants.

Overall, individual native plants will be killed or injured from herbicide treatments in the short-term, however, it is expected that native plants would naturally reoccupy treated areas in the long-term. The Proposed Action would revegetate areas that have significant bare soil resulting from weed treatment, although this is not expected to occur. Selecting the appropriate herbicide and application method and following design criteria will reduce effects to non-target plants.

Mechanical Effects on Non-target Vegetation

Mechanical treatment such as pulling or digging up target weeds has little effect on native vegetation. This is due primarily to the very limited area that can be effectively treated by this method and the fact that just the target plant is being pulled. Pulling or digging may affect adjacent plant species due to soil disturbance when removing the entire root system. Significant soil disturbance is rare and generally only seen where weed species densities are very high. Mowing, however, may reduce the vigor and reproductive ability of native plant species which are mixed in with target weeds. As the goal of mowing is to prevent weeds species from producing viable seed, timing of the treatment can be used to reduce the impact to native species. For either of these methods the extent of their use is very limited and proportion of the native plant population affected would be small.

Biological Control Effects on Non-target Vegetation

In general, biological control agents are useful in native plant communities because they avoid the non-target vegetation. Biological controls are permitted by the USDA Animal and Plant Health Inspection Services (APHIS) after rigorous screening and assessment to ensure their

safety in the environment and the ability of the biological control to limit its affects to target species (USDA APHIS PPQ 2000 and USDA APHIS 2006). However, not all native species are tested for each new agent. Even though control agents are reviewed and approved by APHIS prior to release in this country, there is a slight risk that an approved agent the Forest Service releases may unintentionally affect native plants. There also remains the possibility that regardless of what the Forest Service does, unapproved agents or agents known to affect non-target species will spread from neighboring lands to National Forest System lands.

Flea beetle control of leafy spurge on the Medora Ranger District has been very successful in an area of high leafy spurge infestation. The reduction in leafy spurge has allowed native grasses and forbs to increase in density and production.

Grazing Effects on Non-target Vegetation

Sheep Grazing -A multi-species (sheep, and sheep/cattle) grazing trial was conducted in western North Dakota from 1996 to 2002 (Dahl et. al. unknown date). The results showed that sheep grazing alone or mixed with cattle is an effective tool in controlling leafy spurge. There were no negative or positive effects on native species diversity by grazing sheep or cattle alone or together after five grazing seasons.

Goat Grazing – A goat grazing study conducted on the Sheyenne National Grassland indicated that goats prefer leafy spurge and avoided most grasses except sand dropseed (*Sporobolus cryptandrus*) (Hanson 1994). In this study, leafy spurge seed dissemination was eliminated; and cover percentages, heights, and biomass of leafy spurge decreased. Other herbaceous plant classes (grasses, forbs, and sedges) were not affected or sometimes even increased. Shrubs and small tree were grazed/hedged by goats, with a preference for juneberry, chokecherry, oak and aspen.

Revegetation Effects on Non-target Vegetation

Reseeding will have the direct effect of reestablishment of native species.

Fire Effects on Non-target Vegetation

Prescribed fire provides an overall benefit to the continued growth, health and maintenance of the mixed grass and tall grass prairies. Prescribed fires remove stagnant, dead plant accumulations while converting that mass to ash. Fire tends to increase species diversity and reduce woody species relative to grass and forbs species.

The effects of prescribed fire on plants are species-specific. Fire may either increase or reduce germination and vigor of plants. For example, late spring burns will reduce Kentucky bluegrass and stimulate warm season grasses. Follow up treatments would likely be used to control noxious weeds after fire.

Cumulative Effects on Non-target Vegetation

The same cumulative activities identified for the No Action alternative would contribute to cumulative effects of the Proposed Action on native vegetation. The Proposed Action will contribute with both positive and negative effects to native vegetation. Design criteria will limit negative effects to very low levels that will not contribute appreciably to cumulative effects.

LIVESTOCK FORAGE

Livestock Forage Affected Environment

The livestock grazing program on the Dakota Prairie Grasslands is the largest in the National Forest Service System. Annually, 535,696 animal unit months (AUMs) are permitted to graze on 1,255,000 acres of federal land on the four national grasslands in North and South Dakota. Within these national grasslands are seven grazing associations, which were established under state law and recognized by the Forest Service as having the authorized responsibility to administer livestock grazing on National Forest System lands. Approximately 677 ranch families are members of these grazing associations, and depend upon the federal land grazing permit for their livelihood. The Dakota Prairie Grasslands rangeland management staff work with the associations to implement practices that maintain and improve resource conditions.

The presence and spread of noxious weeds on the national grasslands has been an on-going concern in relation to livestock grazing. Noxious weeds and livestock, generally, do not complement one another. Most noxious weeds are unpalatable to cattle and horses; the ones that are palatable, are often poisonous. Noxious weeds are fierce competitors for space on grasslands, crowding out the native grasses, forbs, shrubs and trees that previously inhabited that space. As weeds expand, grasses and forbs decline, simultaneously reducing available forage for livestock. If weed infestations become severe, as is the case on the Sheyenne National Grasslands, livestock carrying capacity is reduced. The grazing association and Forest Service must adjust livestock numbers accordingly, adversely affecting individuals and the association as a whole.

Of the Sheyenne's 70,300 acres, over 35,000 acres are infested with leafy spurge and other noxious weeds. Livestock operators on the Sheyenne are primarily cattle growers and cows do not eat leafy spurge. Depending on the density of the leafy spurge, grass and forbs can grow in and amongst the spurge. Spurge plants become rank and rough as the summer progresses, deterring livestock grazing of other plants within their midst. Though spurge densities have been reduced on the Sheyenne due to diligent treatment efforts by the association and the Forest Service, available livestock forage is not what it was prior to the outbreak of leafy spurge in the 1970s.

The Little Missouri National Grasslands encompass over a million acres of badlands and rolling prairie. Inventory and treatment efforts show almost 21,000 acres infested with leafy spurge and other noxious weeds. Though the scale of the weed infestation is not as immense as that of the Sheyenne's, certain areas and grazing allotments have been adversely affected by large infestations of leafy spurge, which diminishes available livestock forage. The rough terrain of the badlands makes it difficult to detect and treat noxious weeds. The grazing associations, Forest Service and others have worked to control spurge and have enjoyed notable success with biological control agents (flea beetles).

The Grand River and Cedar River National Grasslands have a much smaller weed problem; of their combined 161,700 acres, 605 acres are weed-infested. The association and Forest Service work together to keep the problem under control and prevent expansion.

Alternative 1 – No Weed Treatment

Direct and Indirect Effects

This alternative would not allow any weed treatments to be applied to National Forest System lands. The spread of current weed infestations combined with the establishment of new infestations would diminish livestock forage in proportion to noxious weed spread. Weeds know no boundaries and would move onto adjacent private and state lands, counter to the agency's "good neighbor" policy. Rangeland health would deteriorate as weeds replaced native plants and adversely effected soil and hydrologic conditions.

Within a ten-year time frame, the Sheyenne National Grasslands could realize a 50 percent reduction in livestock carrying capacity if noxious weeds went untreated. The Little Missouri National Grasslands could realize a 5-10 percent reduction, and the Grand/Cedar River National Grasslands could realize a 2 percent reduction. Resource conditions would deteriorate under this scenario, leading to further reductions of available livestock forage in the future.

Cumulative Effects

The lack of treatment on Forest Service lands would make it more difficult to control noxious weeds on adjacent private lands. This would reduce the amount of forage on the private lands and increase the cost of weed control on these lands.

Alternative 2 – Proposed Action

Direct and Indirect Effects

This alternative would annually treat up to 25,000 acres of existing infestations with a mix of treatment methods, selected to meet the needs and issues of each particular infestation. All noxious weed species would be treated with a variety of tools, singularly or in combination, including mechanical, biological, grazing, herbicide, fire, and revegetation control efforts.

Noxious weed infestations would be contained to their present levels and within the next ten years, are expected to become less dense, smaller in patch size, and possibly eliminated in some situations. Available livestock forage would be maintained or increased.

Rangeland health would improve as noxious weeds are replaced with native species, and soil and water properties are allowed to function under a native plant environment.

Cumulative Effects

Alternative 2 will have beneficial cumulative effects by either maintaining or increasing available livestock forage and reducing risk of weed spread onto adjacent private and state lands.

SOIL AND HYDROLOGIC RESOURCES

This section addresses the effects of the alternatives on soil and water resources. The analysis is concentrated on lands and waters within the administrative borders of the Dakota Prairie Grasslands (DPG). In some places, lands and waters that are down-gradient from National Forest Service System lands are considered.

The analysis considers effects over approximately the next 15 years. Cumulative effects also include past actions (to the degree they can be determined) from approximately 40 years of past herbicide treatment on and near the DPG.

Existing information from a variety of sources was used to develop this analysis. Soil data for counties within the DPG was obtained from the USDA Natural Resources Conservation Service. Groundwater, aquifer, aquifer media, and vadose zone information were derived from county geologic bulletins and groundwater reports prepared collaboratively by the North Dakota Geological Survey and the State Water Commission. Additional water-well data, especially water-table elevations, were obtained from a U.S. Geological Survey web site. Groundwater-quality data and concentration of pesticide in groundwater were obtained from publications of the North Dakota Department of Health. The DPG also obtained groundwater-quality data by contracting with the U. S. Geological Survey in 2002 and 2003 through an interagency agreement, and by hiring A&L Midwest Laboratories, Omaha, Nebraska, from 1990 through the present. The environmental properties and fate of the active ingredients examined in this study were gathered from a combination of state, federal, and industrial sources, both written and electronic databases available on the Internet.

The following individuals provided technical information used in the preparation of this analysis:

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- John Nowatski, North Dakota State University Extension Services, Fargo, North Dakota
- Myra Kosse, North Dakota Department of Health, Environmental Laboratory, Bismarck, North Dakota
- Jeff Olson, North Dakota Department of Agriculture, Bismarck, North Dakota

Soil and Hydrologic Resources Affected Environment

Soils across the DPG are highly variable. Soils that are the most vulnerable to effects from noxious weed management, particularly herbicide application, are the sandy textured soils on the Sheyenne National Grassland (SNG) and Denbigh Experimental Forest (DEF). These soils overlie shallow aquifers and have high rates of infiltration.

Water quality is of primary concern on the SNG, where a shallow groundwater aquifer is ubiquitous and approximately one-half of the National Forest System (NFS) lands have infestations of leafy spurge. The Environmental Protection Agency DRASTIC model is described below. The DRASTIC model is used to determine the relative risk of groundwater contamination on the SNG and DEF. Water-quality data for aquifers beneath DPG lands are provided and discussed.

Pesticide DRASTIC Model

The North Dakota Department of Health evaluated all 192 glacial-drift aquifers in the state to determine their relative vulnerability, sensitivity, and risk of contamination (Radig, 1994). Vulnerability is determined using the DRASTIC model, developed by the Environmental Protection Agency, to evaluate the potential for ground-water pollution; sensitivity reflects the value of commodities produced in an area; and risk measures the value related to the loss of the beneficial use of water (Radig 1994). DRASTIC is an acronym derived from the primary factors used to determine the vulnerability of an aquifer to contamination. These factors are **D**epth to water, net **R**echarge, **A**quifer media, **S**oil media, **T**opography, **I**mpact of the vadose zone, and hydraulic **C**onductivity. The vulnerability of an aquifer is evaluated by the DRASTIC score, using the generalized formula:

$$D_r D_w + R_r R_w + A_r A_w + S_r S_w + T_r T_w + I_r I_w + C_r C_w = \text{Total score}$$

where r = rating and w = weight.

The weightings range from 1 (least significant) to 5 (most significant) for generic contaminant types (pesticides, animal waste, petro-chemicals, other industrial waste, etc.; (Table 8). Herbicides have their own weighting system, which are used to calculate Pesticide DRASTIC scores (Table 8). Weightings used in this analysis follow the usage of Radig (1994).

TABLE 8. ASSIGNED WEIGHTS FOR DRASTIC PARAMETERS

PARAMETER	"GENERIC" DRASTIC WEIGHT	"PESTICIDE" DRASTIC WEIGHTS
DEPTH TO WATER	5	5
NET RECHARGE	4	4
AQUIFER MEDIA	3	3
SOIL MEDIA	2	5
TOPOGRAPHY	1	3
VADOSE ZONE MEDIA	5	4
HYDRAULIC CONDUCTIVITY	3	2

All glacial-drift aquifers in the state with High or Moderate total monitoring scores are tested on a five-year period. Glacial-drift aquifers that lie partially or entirely beneath National Forest System lands in North Dakota include the Sheyenne Delta aquifer, Hankinson aquifer, Denbigh aquifer, Yellowstone-Missouri aquifer, Charbonneau aquifer, Bennie Peer aquifer, Cherry Creek aquifer, Tobacco Gardens aquifer, Little Missouri River aquifer, Cannonball River Valley aquifer, and Cedar Creek Valley aquifer. The vulnerability of an aquifer is determined by its DRASTIC or Pesticide DRASTIC score. In the case of chemical herbicides, the following ratings are used (Table 9):

TABLE 9. RATINGS FOR VULNERABILITY FACTOR

PESTICIDE DRASTIC SCORE	RATING
0 - <130	1 (low)
130 - <160	2 (moderate)
>=160	3 (high)

The North Dakota Department of Health, Division of Water Quality, has rated all 192 glacial-drift aquifers in the state. The ratings for those aquifers that underlie National Forest System lands in North Dakota are provided in Table 10. Of these, only the Hankinson, Sheyenne Delta, Denbigh, and Yellowstone-Missouri aquifers are included in the state's monitoring program because their total monitoring score is either High or Moderate.

TABLE 10. PESTICIDE DRASTIC SCORES, DRASTIC SCORES, RELATIVE STATE-WIDE RANK, AND TOTAL MONITORING SCORE FOR GACIAL-DRIFT AQUIFERS ON NFS LANDS (FROM RADIG 1994).

AQUIFER NAME	PESTICIDE DRASTIC SCORE	RANK*	DRASTIC SCORE	RANK*	TOTAL MONITORING SCORE
HANKINSON	185 (High)	9	149	43	8 (High)
SHEYENNE DELTA	182 (High)	10	153	38	9 (High)
DENBIGH	182(High)	11	162	12	6 (Mod)
YELLOWSTONE-MISSOURI	178 (High)	22	143	56	5 (Mod)
CANNONBALL RIVER VALLEY	138 (Mod)	101	128	85	4 (Low)
LITTLE MISSOURI RIVER	126 (Mod)	116	124	90	3 (Low)
CEDAR RIVER VALLEY	126 (Mod)	117	121	98	3 (Low)
CHERRY CREEK	126 (Mod)	118	115	109	3 (Low)
TOBACCO GARDEN	119 (Low)	143	111	116	4 (Low)
CHARBONNEAU	112 (Low)	140	97	138	4 (Low)
BENNIE PEER	76 (Low)	192	69	188	3 (Low)

*of 192

The majority of the SNG has a High Pesticide DRASTIC score.

Groundwater-Quality Data

State and Federal laws (Safe Drinking Water Act) provide standards for safe drinking water. Four of the active ingredients used in current and proposed herbicide treatments of noxious weeds have established maximum contamination levels (MCLs). These MCLs (or health advisory levels (HALs)) are shown in Table 11.

TABLE 11: ESTABLISHED MAXIMUM CONTAMINATION LEVELS (MCL) FOR HERBICIDES USED ON THE DPG.

HERBICIDE	MCL
2,4-D	70 µg/l
Dicamba	200 µg/l
Glyphosate	700 µg/l
Picloram	500 µg/l

Herbicides have been applied to NFS lands and surrounding state and private lands for a few decades. The North Dakota Department of Health has analyzed samples of groundwater to determine the extent of contamination from herbicides. Additional groundwater-quality data have been collected by the DPG since 1990. The results of these analyses are summarized here to document the existing water-quality condition on the DPG. Monitoring was performed on federal, state, and private lands; all results with pesticide contamination are included here to illustrate the degree to which aquifers are susceptible to contamination.

Sheyenne Delta and Hankinson aquifers – Sheyenne National Grassland

The Sheyenne Delta and Hankinson aquifers were analyzed in 1994 (Radig and Bartelson 1994), 1999 (Bartelson and Goven 1999), and 2004. The 2004 report is not available to the public following an opinion of the State's Attorney General (Stenehjem 2003). Results of the monitoring are summarized in the narrative below and in Table 12.

The Sheyenne Delta represents sand and minor amounts of gravel deposited by the ancestral Sheyenne River when it emptied into the margin of glacial Lake Agassiz. It occupies an area of approximately 750 square miles (Baker 1967). The delta has two prominent units, a lower unit interpreted as bottomset beds, which are predominately silt and clay sediments and thicken to the east. The upper unit is fluvial-deltaic sand that is thickest on the west margin, thinning and fining to the northeast and east. The surface of the Sheyenne Delta has been modified by wind into high-relief sand dunes and low-relief hummock and swale topography.

The soil, vadose zone, and aquifer media are generally medium to fine sand. The water table is generally less than 15 feet below the ground surface, except under the high dunes. The shallow water table intersects the ground surface in many places creating seasonal and permanent wetlands and water bodies.

The Hankinson aquifer consists of sand and gravel deposited on a high beach of glacial Lake Agassiz (Baker 1967). The water table is generally 20 to 25 feet below the ground surface, except under the high dunes.

From November 1993 to July 1994, 113 samples from 60 wells in the Sheyenne Delta aquifer were sampled (Radig and Bartelson 1994, Table 12). Seven pesticides were detected in sixteen of these wells. The pesticides detected included picloram, 2,4-D, atrazine, metolachlor, aldicarb-sulfoxide, pendimethalin, and cyanazine. Of these, only 2,4-D and picloram are applied on National Forest System lands. 2,4-D was detected in 2 samples from 2 different wells, and picloram was detected in 22 samples from 10 wells. The highest concentration of 2,4-D was 0.230 µg/l (MCL is 70.0 µg/l); and that of picloram was 10.4 µg/l (MCL is 500.0 µg/l).

Twenty samples were collected from twenty wells in the Hankinson aquifer in 1994 (Radig and Bartelson 1994, Table 12). Two wells contained 2,4-D; two contained dicamba; and two contained picloram. The two samples with dicamba had concentrations less than 0.5 µg/l (MCL 200 µg/l), and the two samples with picloram had concentrations less than 0.3 µg/l (MCL is 500 µg/l). One sample had only a trace of 2,4-D, whereas another had a concentration of 16.6 µg/l (MCL is 70.0 µg/l).

The Sheyenne Delta aquifer was re-sampled in 1999. Eighty-nine samples were collected from 69 wells and 17 wells contained pesticides (Bartelson and Goven 1999, Table 12). Eight wells contained picloram and one had 2,4-D. The highest concentration of picloram was 1.26 µg/l; all other samples had less than 0.4 µg/l (MCL is 500 µg/l). The one sample with 2,4-D had a concentration of 0.280 µg/l (MCL is 70.0 µg/l).

In 1999, 33 samples were collected from 25 wells in the Hankinson aquifer (Bartelson and Goven 1999, Table 12). Five samples from three wells contained picloram; and two samples from two wells contained 2,4-D. The highest concentration of picloram was 2.190 µg/l; all other concentrations were less than 0.270 µg/L. One sample had a concentration of 2,4-D of 5.110 µg/L; the other was 0.350 µg/L. Subsequent sampling in the fall of 1999 indicated that no 2,4-D was detected in these wells (Bartelson and Goven 1999).

TABLE 12. SUMMARY OF WATER-QUALITY DATA COLLECTED BY THE NORTH DAKOTA DEPARTMENT OF HEALTH

YEAR	HANKINSON AQUIFER			SHEYENNE DELTA AQUIFER			DENBIGH AQUIFER		
	1994	1999	2004	1994	1999	2004	1993	1998	2003
NUMBER WELLS SAMPLED	20	25	NA**	60	69	N.A.	8	6	N.A.
NUMBER SAMPLES COLLECTED	20	33	N.A.	113	89	N.A.	10	6	N.A.
NUMBER WELLS WITH PICLORAM	2	3	N.A.	10	8	N.A.	2	0	N.A.
PERCENT WELLS WITH PICLORAM (%)	10	12	N.A.	17	12	N.A.	20	0	N.A.
NUMBER SAMPLES WITH PICLORAM	2	5	N.A.	22	11	N.A.	3	0	N.A.
MAXIMUM CONCENTRATION (MICRO-G/L) OF PICLORAM	0.27	2.2	N.A.	10.4	1.3	N.A.	0.18	0	N.A.
PERCENT OF MCL* (%)	0.05	0.4	N.A.	2.1	0.3	N.A.	0.036	0	N.A.
NUMBER WELLS WITH 2,4-D	2	2	N.A.	2	1	N.A.	0	0	N.A.
PERCENT WELLS WITH 2,4-D (%)	10	8	N.A.	3	2	N.A.	0	0	N.A.
NUMBER SAMPLES WITH 2,4-D	2	2	N.A.	2	1	N.A.	0	0	N.A.
MAXIMUM CONCENTRATION (MICRO-G/L) OF 2,4-D	16.6	5.1	N.A.	0.2	0.3	N.A.	0	0	N.A.
PERCENT OF MCL* (%)	23.7	7.3	N.A.	0.3	0.4	N.A.	0	0	N.A.
NUMBER WELLS WITH DICAMBA	2	0	N.A.	0	0	N.A.	0	0	N.A.
PERCENT WELLS WITH DICAMBA	10	0	N.A.	0	0	N.A.	0	0	N.A.
NUMBER SAMPLES WITH DICAMBA	2	0	N.A.	0	0	N.A.	0	0	N.A.
MAXIMUM CONCENTRATION (MICRO-G/L) OF DICAMBA	0.6	0	N.A.	0	0	N.A.	0	0	N.A.
PERCENT OF HAL* (%)	0.3	0	N.A.	0	0	N.A.	0	0	N.A.

*MCL = Maximum Contaminant Level HAL = Health Advisory Level

**N.A. Data not available to the public by legislative action

From 1990 through 2005, Forest Service personnel on the Sheyenne NG have conducted a water-quality monitoring program on water from stock wells. During the 16 years of monitoring, 145 samples have been collected (generally 10 samples per year, though only 6-9 samples were collected in the first few years). Of these, picloram has been detected in 21 (15 percent) samples; the highest concentration to date was 4.1 ppb. Monitoring for 2,4-D began in 1995, and it has not been detected in 107 samples collected from 1995 through 2005. Forest Service monitoring is summarized in Table 13.

TABLE 13. WATER SAMPLING BY THE DPG ON THE SHEYENNE NATIONAL GRASSLAND*

YEAR	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
NUMBER OF STOCK WELLS	10	10	10	10	10	10	10	10	9	8	10	8	6	6	6	12
NUMBER OF WELLS WITH PICLORAM	0	2	2	2	2	1	2	2	1	1	1	2	1	1	0	1
MAXIMUM CONCENTRATION (PPB) OF PICLORAM	0.0	0.3	4.1	2.8	1.3	0.8	4.1	1.7	1.6	1.8	0.5	0.4	0.2	0.4	0.0	0.5
NUMBER OF WELLS WITH 2,4-D	0	0	0	0	0	0	0	0	0	0	0	NA**	NA**	NA**	NA**	NA**

*Source: Swenson (2005) **NA = Not Analyzed

Denbigh aquifer – Denbigh Experimental Forest

The Denbigh aquifer is a surficial aquifer and a buried valley consisting of sand and gravel. The water table ranges from approximately 3 to 17 feet below the ground surface (Randich 1981b). Much of the overlying sediment represents dune and sheet sand deposited and/or reworked during the Holocene. Therefore, the soil and vadose media are highly permeable and generally vulnerable to groundwater contamination by those pesticides that are easily leached. Monitoring of the Denbigh aquifer is summarized in the narrative below and in Table 12.

The Denbigh aquifer was monitored in the fall of 1993 and spring of 1994, 1998, and 2003. Ten samples from 8 wells were collected in 1993 and 1994. Three samples from two wells contained picloram; none of the samples had a concentration greater than 0.18 µg/l (Radig and Bartelson 1993, MCL is 500.00 µg/l).

In 1998, six samples were collected from six wells in the Denbigh aquifer. No pesticides were detected in any of these samples (Bartelson and Goven 1998).

Water-quality data collected by the North Dakota Department of Health in 2003 are not available to the public following an opinion of the State's Attorney General (Stenehjem 2003).

Yellowstone-Missouri aquifer – Little Missouri National Grassland

The Yellowstone-Missouri aquifer occurs in northwestern McKenzie County. The vast majority underlies non-Forest Service land. It comprises 90 to 100 feet of coarse glacial outwash overlain by 20 to 45 feet of finer alluvial material.

In 1996, 12 water samples were collected from 11 wells in the Yellowstone-Missouri aquifer. Only one sample contained any pesticide (Bartelson and Gunnerson 1996), and this pesticide is not one that is applied on National Forest System lands.

In 2001, water samples were collected from 10 wells in the Yellowstone-Missouri aquifer. One well contained picloram at a concentration of 0.07 µg/l (Bartelson and Goven 1999, MCL is 500 µg/l).

Alternative 1 – No Weed Treatment

Direct and Indirect Effects

Soils and surface water resources are likely to be adversely affected by the No Action alternative. Noxious weeds commonly form monoculture stands that out-compete and displace native plants. A common consequence of noxious weed establishment is the increase in bare ground, due to the loss of litter and mulch from native grasses. An increase in exposed ground leaves soil more susceptible to wind and water erosion. Soil that is eroded by overland flow can be transported into streams, where it can affect turbidity, suspended sediment load, and sedimentation rates on spawning beds of aquatic organisms, pH, concentration of dissolved solids, and biological availability of dissolved oxygen.

The amount of herbicide detected in the groundwater on the SNG may decrease under this alternative, however, that is difficult to determine because of intermingle and surrounding private lands where application of the detected herbicides is likely to continue. For the remainder of the DPG there would be no affects from herbicides with Alternative 1.

Cumulative Effects

Past, current and foreseeable activities on both National Forest System (NFS) lands of the DPG and intermingled private lands that are most likely to combine with noxious weed effects on soil and water include oil and gas road and pad construction, other road and trail maintenance, livestock grazing and associated developments, spread of invasive species (other than noxious weeds), conversion of native prairie to other uses, and natural disturbances such as wildfire and drought. While Forest Service activities are designed to minimize impacts to soil and water, it is often impossible to eliminate effects. Therefore, Alternative 1 will combine with other activities to increase negative impacts on soil and surface water resources.

The elimination of the use of herbicides may ultimately have a net beneficial cumulative effect on groundwater in the SNG, however, as explained under the previous section this would be difficult to determine.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Herbicides

This effects analysis is based primarily on the known behavior of herbicides in soil and water media. Most of the information summarized below is drawn from four sources: (1) pesticide fact sheets prepared by Information Ventures, Inc., for the U.S. Department of Agriculture, Forest Service; (2) pesticide information profiles prepared in a cooperative project with the extension offices of Cornell University, Oregon State University, University of Idaho, University of California at Davis, and the Institute for Environmental Toxicology at Michigan State

University (the work received major support and funding from the U.S. Department of Agriculture Extension Service, National Agricultural Pesticide Impact Assessment Program, available online at: <http://extoxnet.orst.edu/pips/>); (3) individual herbicide specimen labels for some of the common brand names; and (4) technical fact sheets prepared by the U.S. Environmental Protection Agency (available online at: <http://www.epa.gov/safewater/dwh/t-soc/>). Other sources used are identified in the project file.

The following discussion is focused on the environmental fate (pathways of movement, degree of mobility, processes of degradation, time for degradation) of the primary active ingredient of herbicides rather than of the specific individual brand names of herbicides.

2,4-D (2,4-Dichlorophenoxyacetic acid)

Soil. 2,4-D is a moderately mobile pesticide. Adsorption of 2,4-D increases with increasing soil organic matter and with increasing soil acidity. Therefore, soil with low pH and high organic-matter content will bind 2,4-D the most readily. In contrast, 2,4-D can be desorbed from mineral soils with high pH and low organic-matter content.

2,4-D is not very persistent in soil. It will persist for 30 days in soil. It degrades rapidly in soil, especially by soil microorganisms. Degradation is more rapid under higher temperatures and moister conditions, which tend to promote microbial activity. The half-life of 2,4-D is short, variously measured as 5.5 days and 7 to 10 days. 2,4-D is taken up from the soil by target plants.

Water. The solubility of 2,4-D varies by form. The form commonly used on the DPG (amine salts) dissolves very well in water. In general, 2,4-D has a low potential to contaminate groundwater because it degrades rapidly in most soils and is taken up by plants rapidly. However, 2,4-D is highly mobile in soils that have a high pH, are low in organic matter, and have coarse textures, such as sand, loam, sandy loam, and loamy sand.

2,4-D residues dissipate rapidly in moving water but are detectable in still water after six months. If 2,4-D is released to water, it will be lost through biodegradation (typical half-lives range from 10 to >50 days) or ultraviolet photolysis (half-lives of 2-4 days).

Accumulation. Because 2,4-D has low to moderately low persistence in soil and moving surface water, it does not have a cumulative effect that exceeds one growing season. The application of 2,4-D in one growing season is completely inert by the next growing season.

Chlorsulfuron

Soil. Chlorsulfuron is highly mobile and has a high leaching potential. Chlorsulfuron is weakly adsorbed by soil. Adsorption is slightly greater in soil with higher organic-matter content. It is also readily leached in permeable soils, especially those with sand, sandy loam, silty loam, and silty clay loam textures.

Chlorsulfuron is degraded in soils by microorganisms. Soil half-life ranges from 10-185 days, though average representative measurements range from 10 to 70 days. However, microbial degradation is much more rapid in soils with low than high pH, at higher than lower temperatures, and in moister than drier environments.

Water. Solubility of chlorsulfuron increases markedly with increase in pH. Chlorsulfuron is relatively soluble at neutral to alkaline solutions, is highly mobile in most soils because of its low sorption in soil, and leaches readily in permeable soils. It is a known contaminant in

groundwater. Recent modeling indicates that irrigation water from ground or surface water sources, in areas with repeated chlorsulfuron use, may adversely affect non-target plants and sensitive agricultural crops.

Chlorsulfuron is degraded in water by hydrolysis and photolysis. It has a half-life of 23 to 24 days in acidic solutions but is relatively stable in neutral and alkaline solutions. In anaerobic pond sediments, the half-life is greater than one year. Therefore, the 5 foot setback established for a Streamside Management Zone is increased to 25 feet for a Wetland Management Zone.

Accumulation. Chlorsulfuron is generally degraded within one growing season; however, it is persistent and may accumulate in the soil under alkaline and dry conditions. Consequently application in alkaline soils (especially those with visible alkali and/or salt deposits at the surface, or those sites dominated by alkali-tolerant plants, such as inland saltgrass), should be limited to once per growing season. Chlorsulfuron may also persist in anaerobic sediments; therefore its use should be restricted in environments where it can wash into still or stagnant water bodies.

Clopyralid

Soil. Clopyralid is not strongly adsorbed by soil. Instead, it is generally active in soil and absorbed from the soil by plants. Clopyralid is persistent under anaerobic conditions and/or in soils with low microorganism content. Its half-life in soil can range from 15 to 290 days. Soil microorganisms degrade clopyralid.

Water. Clopyralid is very mobile primarily because it is highly soluble in water and is not adsorb to soil particles. Therefore, clopyralid may leach into and contaminate groundwater, especially where soils are very permeable and the water table is shallow. Clopyralid has the potential to contaminate surface waters if it is applied directly to bodies of water or wetlands.

Accumulation. Clopyralid may be persistent under anaerobic conditions; therefore, it should not be used in or near hydric soils or wetlands.

Dicamba

Soil. Dicamba is highly mobile in most soils, because it does not bind to soil particles. Dicamba is active in the soil and is moderately persistent in soil. Its half-life in soil generally ranges from 1 to 4 weeks, although a range from 4 to 555 days has been reported. Its degradation is a function of moisture, temperature, soil organic matter, and texture. Break down of dicamba is by soil microorganisms and is faster at lower pH, higher temperatures, higher soil organic-matter content and higher soil moisture; however, when soil moisture increases above 50 percent, the rate of biodegradation declines.

Water. Dicamba is highly soluble in water. Because it does not bind to soil particles, it is highly mobile, readily leached, and can contaminate groundwater. It has been found in surface and groundwater. In humid areas, dicamba is leached from the soil in 3 to 12 weeks.

Dicamba breaks down in water primarily by microbial degradation; photolysis may also occur. Aquatic hydrolysis, volatilization, adsorption to sediments, and bioconcentration are not expected to be significant.

Accumulation. Under most conditions Dicamba is not persistent in soil and water environments.

Glyphosate

Soil. Glyphosate has a low mobility index, as it is strongly adsorbed by soil, even those low in organic matter and clay. Glyphosate is moderately persistent in soil with reported half-lives ranging from 1 to 174 days and typically about 47 to 60 days. It is degraded primarily by microbes, and loss by volatilization or photodegradation is negligible.

Water. Glyphosate is highly soluble in water. It is moderately persistent with a half-life in water ranging from 12-70 days.

Because glyphosate is strongly adsorbed by soil, it does not leach appreciably. Consequently, it is well suited for use in a Groundwater Vulnerable Zone. However, glyphosate can enter surface water when the soil particles that it is adsorbed to are eroded by overland flow and washed into surface water.

Glyphosate persists in stream sediments for over 1 year; however, residues of glyphosate are not easily released back into the water. Glyphosate in water is degraded primarily by microbes.

Accumulation. Treatments of glyphosate that are limited to one application per year or two applications at one-half maximum application rate should not have a cumulative effect from one growing season to the following.

Imazapic

Soil. Imazapic has limited mobility in soil. It binds weakly to moderately with most soil types. In general, imazapic moves less than 12 inches; although in sandy soil, it may leach to depths of 18 inches; however, some sources suggest that imazapic has a high potential to leach below the root zone of plants. Soil binding increases as pH decreases and with increasing clay and organic-matter content. Field studies do not indicate any potential for it to move from soils with surface water.

Imazapic is moderately persistent in soil. The average soil half-life is 120 to 232 days. It breaks down in soil primarily by microbial degradation. It does not volatilize from the soil surface and photolytic breakdown on soils is negligible.

Water. Imazapic is soluble in water; however, field studies do not indicate any potential for it to move from soils with surface water. In surface water, imazapic is rapidly photodegraded by sunlight (1-2 days). Nevertheless, imazapic is not registered for aquatic use.

Accumulation. At the time of this analysis, the U.S. Geological Survey and the North Dakota Department of Health did not have analytical methods to test for imazapic; therefore, its accumulation in surface and groundwater is unknown. [NOTE: On February 22, 2006, M. Kosse informed the DPG hydrologist that Anatek Lab in Moscow, Idaho has developed an analytic method to test for imazapic; therefore, the DPG will add imazapic to regular water-monitoring tests (see Monitoring section in Chapter 2)]. It is persistent in many soils and in groundwater; therefore, its use is limited to one application at maximum rate every two years or two applications at one-half maximum rate in a two-year interval in Streamside and Wetland Management Zones or Groundwater Vulnerable Zones.

Imazapyr

Soil. Imazapyr binds strongly with soil organic matter. However, because imazapyr binds strongly to some soils, it is moved with eroded soil particles as runoff into surface water.

Imazapyr is also relatively persistent in soil. Measured half-lives range from a couple weeks to more than 4 years. Imazapyr is broken down in soil by microorganisms.

Water. Sources vary considerably in their assessment of the mobility of imazapyr. Some references indicate that imazapyr has a low potential for leaching into groundwater, whereas others suggest there is moderate leaching potential, and others suggest high leaching potential and mobility. There is general agreement that imazapyr moves with eroded soil particles in runoff and can contaminate surface waters. Imazapyr is readily broken down in surface water by photolysis. The average half-life of imazapyr in surface water is about 4 days or less.

Accumulation. Imazapyr may be persistent in some soils, and is commonly detected more than one year after application in many soils. Areas should be treated with imazapyr only once every two years.

Metsulfuron methyl

Soil. Metsulfuron methyl is active in the soil. It is relatively soluble, especially in neutral to alkaline solutions.

Metsulfuron methyl remains active in the soil for varying lengths of time. The half-life of metsulfuron methyl ranges from 14 to 180 days with average representative values of 28 to 30 days.

Metsulfuron methyl breaks down in soil by microorganisms under anaerobic conditions and by chemical hydrolysis. Chemical break down is faster under acidic conditions, in soils with higher moisture content, and under higher temperatures.

Water. Metsulfuron methyl dissolves easily in water, and solubility increases with increase in pH. The time for half of the material to dissipate in water was measured as >84 days when high concentrations of the chemical were applied and 29 days at concentrations typically used in forestry applications.

Metsulfuron methyl is highly mobile and leaches readily through permeable soils. Consequently metsulfuron methyl has the potential to contaminate groundwater at very low concentrations. In addition, there is potential for metsulfuron methyl to contaminate surface waters.

Accumulation. Metsulfuron methyl is highly persistent, especially in aerobic conditions and in alkaline environments. Therefore, its application should be limited to once every two years in a given treatment area.

Picloram

Soil. Picloram is poorly bound to most soils, though it does attach to clay particles and organic matter. In soils with little clay or organic matter, picloram is very mobile and easily moved by water. More importantly, picloram is moderately to highly persistent in soil. It has an average soil half-life of 55-100 days or more, with reported field half-lives from 20 to 300 days.

Picloram can remain active in soil at levels toxic to plants for more than a year after application at normal rates. The persistence of picloram is dependent on the type of soil, level of soil

moisture, and temperature. Persistence increases under alkaline conditions, fine-texture clay soils, and low density of plant roots. Degradation by microorganisms is mainly under aerobic conditions and is dependent on rates of application. Photodegradation is significant only on the soil surface.

Water. Picloram is soluble in water and can leach into groundwater, especially where the overlying soils have low organic-matter content, high alkalinity, and sandy textures with high permeability.

Picloram can contaminate surface water too. It can be carried by surface runoff into streams, ponds, lakes, and wetlands. Picloram should not be applied to stream banks, irrigation ditches, or water intended for domestic use.

Picloram is primarily degraded in groundwater by microbes and in surface water by photolysis. The half-life of picloram in shallow surface water ranges from 2.3 to 41.3 days.

Accumulation. Picloram is persistent in some soil and water environments; therefore its use is limited to one treatment at maximum application rate or two treatments at one-half of maximum application rate every two years in Streamside or Wetland Management Zones to prevent loading of aquatic systems.

Sulfometuron methyl

Soil. Sulfometuron methyl is practically insoluble in water and degrades relatively rapidly, particularly in moist, warm, acidic soils. It is slightly more persistent in cooler, drier, and more alkaline soils. Field data indicated most of the parent compound stays within the top 3 inches of soil. Sulfometuron methyl is degraded by soil microorganisms, hydrolysis and photolysis. It has relatively short half-life in soil ranging from 20-30 days. Field-dissipation studies indicate a range of half-lives from 10-20 days in moist environments to 100-120 days in arid environments. Half life is longer under anaerobic conditions than aerobic conditions.

Water. Sulfometuron methyl is relatively insoluble in water and has little potential to leach into groundwater, except when applied to water-saturated alkaline soil, as may be found in wetlands or riparian areas in the Little Missouri, Cedar River, and Grand River National Grasslands. Because sulfometuron methyl is generally retained within the top 3 inches of soil, it is more likely to be transported on eroded soil particles and to contaminate surface waters if applied to areas where runoff is likely to occur.

Sulfometuron methyl generally breaks down rapidly in water. In well aerated water, its half-life is 1-10 days though in anaerobic conditions, half-life may be several months.

Accumulation. Sulfometuron methyl is short-lived in most soil and water environments. Generally, it does not have cumulative effects that persist from one growing season to the next.

Triclopyr

Soil. Triclopyr has a very high mobility index. It is active in the soil and is absorbed by plant roots. In general, triclopyr is not strongly adsorbed to soil particles and has the potential to be mobile, especially in permeable soils, though it is adsorbed by clay particles and organic-matter particles in the soil. The average half-life in soil is 46 days, with a range of 30-90 days.

Triclopyr is degraded by soil microorganisms and degradation is more rapid under warmer, moister conditions.

Water. Triclopyr may leach from light soils under heavy rainfall. In surface waters, triclopyr is rapidly broken down by sunlight. The half-life of triclopyr in most surface waters is less than 24 hours. The half-life is longer (typically 1-10 days) in turbid waters.

Accumulation. Triclopyr has a short-half life in most soil and water environments. It does not persist from one growing season to the next.

Summary of Herbicide Direct and Indirect Effects

Some herbicides may have a slight adverse effect on some soil resources. Most herbicides are quickly degraded and/or neutralized in soil; however, picloram and imazapic are persistent in soil for periods greater than one year under certain environmental conditions. The conclusion is that most herbicides may pose no measurable effect on soils, whereas a couple (imazapic and picloram) may have slight and short-lived (less than a few years) effects on some soils and soil microorganisms.

Some herbicides may be introduced to surface or groundwater because of their leaching potential or their translocation when adsorbed to eroded soil particles. Leaching potential is greatest for chlorsulfuron, clopyralid, dicamba, metsulfuron methyl, picloram and triclopyr. Leaching potential is generally greatest in coarse-textured soils rich in sand with little clay and little organic matter, such as those on the Sheyenne NG. Some herbicides may have a slight adverse effect on some water resources. For example, imazapic is readily degraded by photolysis in surface waters; however it has a half-life of more than 6 years in anaerobic conditions. Imazapic can cause severe crop damage if it is present in irrigation water, even in minute concentrations. Also, some herbicides (e.g., glyphosate, imazapyr, and to some extent sulfometuron methyl) are strongly adsorbed to soil particles and can enter surface water through soil erosion. The greatest risk of water contamination comes from spills and improper disposal of surplus chemical and equipment wash waters.

Mechanical

Mechanical treatment may have a short-term adverse effect on soil and water resources by dislodging soil and by disaggregating soil clods making it easier for wind and water to move soil particles. Small-scale, short-lived soil disturbance can have long-term benefits by improving water infiltration, gas exchange, and nutrient recycling. The net effect of mechanical treatments on soil and water resources is probably unobservable and not measurable.

Grazing

Herbivory of noxious weeds by domesticated livestock may have locally adverse to locally beneficial effects on soil and water resources. All livestock present a management challenge requiring proper stocking rates and adequate rest periods between grazing periods to reduce impacts to soils and water. Concentration of livestock for excessive time or in excessive numbers may lead to excessive trampling and compaction of sensitive hydric and riparian soils, and to degradation of water quality related to animal waste and to suspension of sediment when livestock walk in streams, ponds, and wetlands.

Burning

The time, frequency, and temperature of burns are all keys in a successful burn program. Burning may have short-lived negative impacts on soil and water resources. Loss of vegetation cover can lead to short-lived episodes with high rates of wind and water erosion of soil. Soil may be washed into streams in large volumes until vegetation cover is restored. The key to controlling soil loss is to monitor fuel loads and soil moisture during prescribed burns. Burns conducted within prescription parameters will not injure the root system of desirable grasses, and these roots will provide soils with adequate strength to resist erosive processes.

Biological Controls

Biological control agents have no direct effect on soil or water resources. Conversely soil properties may have an effect on some insects, such as flea beetles. For example, flea beetles have difficulty maintaining or expanding populations in sandy soils.

Cumulative Effects

Monitoring of water wells has detected herbicides in some of the SNG aquifers. Concentrations of these herbicides were found to be substantially less than the maximum contamination level and currently pose no known threat to humans. The contamination of these aquifers is due to past and current use of herbicides on the DPG and intermingled private and state lands. It is reasonable to assume that herbicides will continue to be used into the future to treat existing and possible future noxious weed infestations. Continued herbicide use under this alternative in combination with other use by non-federal entities probably means that herbicides will continue to be found in the groundwater of the SNG if new actions aren't taken. Application of the design criteria, located in Chapter 2, should result in a reduction of detected herbicides. It is unlikely, however, that these criteria alone will result in a total decontamination of the currently affected aquifers because of the amount of intermingled non-NFS lands associated with the effected aquifers. It will take an integrated approach involving federal, state and private landowners to ultimately solve this problem.

Treatment methods other than herbicides have the potential to have short-term adverse effects on soil resources. There is a long-term beneficial effect on soils through on the restoration of native plant diversity which in turn provides for improved wildlife habitat and forage.

THREATENED, ENDANGERED, PROPOSED AND SENSITIVE PLANT RESOURCES

This section addresses the potential effects of the proposed alternatives for noxious weed treatment activities on Threatened, Endangered, Proposed, and Sensitive (TEPS) plant species and their habitat. Direct and indirect effects to TEPS plant species and habitats are analyzed for Forest Service lands across the Dakota Prairie Grasslands (DPG). Cumulative effects are determined for all lands within the administrative boundaries of the DPG, which includes some state and private land. For timeframes referred to in this section, short-term refers to one growing season after treatment; long-term would be beyond that time.

The Biological Evaluation (BE) for sensitive species is incorporated into this section, and BE determinations are made for each alternative. Biological Assessment (BA) determinations for TEPS species are not required for all alternatives, only for the alternative chosen in the Record of Decision. BA determinations are provided here for the Proposed Action, Alternative 2.

TEPS Plant Affected Environment

Noxious weeds are a threat to native plants and plant communities throughout the DPG. TEPS plant species and their habitat are particularly vulnerable since many of the habitat characteristics overlap. Noxious weed infestations degrade suitable habitat by taking over a site and displacing native and preferred vegetation. On all DPG units other than the Sheyenne National Grassland (SNG), noxious weed infestations are currently low and having little impact on TEPS plant species. On the SNG, noxious weed infestations, particularly leafy spurge, may be impacting TEPS plant populations and habitat. The existing condition of TEPS plant species is included in the accounts below.

Western Prairie Fringed Orchid (Platanthera praeclara) – Threatened Species

One federally listed Threatened plant species, the western prairie fringed orchid (*Platanthera praeclara*), occurs on the DPG, located only on the SNG. There are no Endangered or Proposed plant species on the DPG.

The western fringed prairie orchid occurs primarily in and adjacent to graminoid wetlands in the sandy prairies on the SNG. Specifically, it has been found in several habitat types within the Hummocky Sandhills and Deltaic Plain habitat association as described by Manske (1980), including mesic toe slopes and wetlands classified as the Lowland Grassland habitat type, and adjacent tallgrass prairie classified as the Midland Grassland habitat type.

The SNG supports one of the three metapopulations of the orchid remaining in North America.

Extensive surveys have been conducted for the western prairie fringed orchid on the SNG since approximately 1984. The orchid is known to occur in 31 allotments occupying approximately 3,900 acres.

Leafy spurge is estimated to infest approximately 35,000 acres on the SNG and has significant overlap of about 1,600 acres with the occurrence of the western prairie fringed orchid.

Canada thistle and bull thistle infestations also overlap with orchid habitat. Approximately 200 acres of Canada and bull thistle are estimated to infest the SNG.

Leafy spurge, Canada thistle, and bull thistle are a threat to the western prairie fringed orchid species and habitat.

Sensitive Species

Forest Service Manual (FSM) 2670.5 defines sensitive species as “those plants and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers, density, or habitat capability that reduce a species existing distribution.” In FSM 2670.22, management direction for sensitive species is, in part, to ensure that species do not become threatened or endangered because of Forest Service actions, and to maintain viable populations of all native species.

Forty-three plant species are listed on the U.S. Forest Service Region-1 Sensitive Plant List for the DPG. Thirteen are listed for the Little Missouri National Grassland (LMNG) and Cedar River and Grand River National Grasslands (CR/GRNG), and 30 are listed for the SNG.

Sensitive plant surveys on the LMNG have recorded 13 sensitive plant species on the Medora Ranger District and 3 sensitive plant species on the McKenzie Ranger District. One of three known nodding buckwheat populations is threatened by leafy spurge. The only active population of smooth goosefoot is being encroached upon by leafy spurge. A few populations of Hooker’s townsendia occur on the edge of leafy spurge and Canada thistle infestations. Habitat of sand lily and blue-lips is being impacted by leafy spurge.

Smooth goosefoot and Dakota buckwheat are the only 2 sensitive plant species known to occur on the CR/GRNG. Leafy spurge is present but has not encroached into these habitats.

Thirty sensitive plant species are known to occur on the SNG. Several of these populations have been encroached or are being threatened by leafy spurge and Canada thistle.

Sensitive plant occurrence maps and records are the result of ongoing field surveys initiated since at least 1986 and are located in each District Office. Table 14 provides a summary of known sensitive plant occurrences and habitat, and status of noxious weed threat.

TABLE 14. TEPS PLANT AND NOXIOUS WEED EXISTING CONDITION SUMMARY

TEPS PLANT NAME	# Known Sites by District	General Habitat	Level of Noxious Weed Threat*
CHENOPODIUM SUBGLABRUM (SMOOTH GOOSEFOOT)	1 - Medora 3 - GRNG	Sandy soils on river terraces (along Little Missouri River and on sand dunes adjacent to the South Fork of the Grand River) and sand outcrops	Medora - Leafy spurge - Encroached Canada thistle – Present GRNG – Leafy spurge – Present
COLLINSIA PARVIFLORA (BLUE LIPS)	4 - Medora 1-McKenzie	Moderately moist slopes, open woods and prairies	Leafy spurge – Present

TEPS PLANT NAME	# Known Sites by District	General Habitat	Level of Noxious Weed Threat*
CRYPTANTHA TORREYANA (TORREY'S CRYPTANTHA)	1 – Medora	Dry plains, pine slopes	No threat – No further analysis
ERIOGONUM CERNUUM (NODDING BUCKWHEAT)	4 – Medora	Open sandy grasslands and hillsides	Leafy spurge – Encroached 1 site. No threat to other 3 sites.
ERIOGONUM VISHERI (DAKOTA BUCKWHEAT)	60– Medora, McKenzie 1,281 - GRNG	Barren, highly erodible, sedimentary rock outcrops or erosional features where soil is clayey and exposed; side slopes and outwashes at base of buttes	No threat – No further analysis
LEUCOCRINUM MONTANUM (SAND LILY)	2 – Medora	Open coniferous woods, hillsides and short-grass prairies	Leafy spurge – Present (in habitat)
MENTZELIA PUMILA (DWARF MENTZELIA)	2 – Medora	Arid slopes and sandy plains; occasionally on hard clays and rocky soils, limber pine scoria outcrops	No threat – No further analysis
MYOSURUS APETALUS (SEDGE MOUSETAIL)	1 – Medora	Wet meadows, fens, vernal pools and sloughs, bogs, muddy shores of lakes and streams	No threat – No further analysis
PHLOX ALYSSIFOLIA (ALYSSUM-LEAVED PHLOX)	6 – Medora	Sandy or gravelly silt, clay banks and limestone ridges of open prairie	No threat – No further analysis
PINUS FLEXILIS (LIMBER PINE)	1 – Medora	Semi-arid exposed rocky ridges and foothills	No threat – no further analysis
POPULUS X ACUMINATE (LANCELEAF COTTONWOOD)	6 – Medora	Floodplains and stream banks	No threat – No further analysis
SPOROBOLUS AIROIDES (ALKALI SACATON)	10 – Medora	Dry to moist sandy or gravelly soil, tolerant of saline conditions; secondary succession habitats of clay out washes	No threat – No further analysis
TOWNSENDIA HOOKERI (HOOKER'S TOWNSENDIA)	10 – Medora 2-McKenzie	Dry barren plains, hillsides, sandy, gravelly sparsely vegetated areas and knolls	Leafy spurge - Present
APIOIS AMERICANA (AMERICAN POTATOEBEAN)	2- SNG	Moist woods, prairie ravines, stream and pond banks, bench below seeps	Buckthorn – Present
ATHYRIUM FILIX-FEMINA (NORTHERN LADY-FERN)	9 – SNG	Eastern deciduous forest, edges of marshes, seeps, bogs, and fens	Leafy spurge - Present Canada thistle - Present
BOTRYCHIUM MULTIFIDUM (LEATHERY GRAPE-FERN)	2- SNG	Eastern deciduous forest	Buckthorn – Present
BOTRYCHIUM SIMPLEX (LITTLE GRAPE-FERN)	2 - SNG	Eastern deciduous forest, sedge meadows	Canada thistle - Present
CAMPANULA APARINOIDES (MARSH BELLFLOWER)	8 – SNG	Wetland thickets, woodland seeps, ponds, marshes, bogs, and fens	Buckthorn – Present

TEPS PLANT NAME	# Known Sites by District	General Habitat	Level of Noxious Weed Threat*
CAREX ALOPECOIDEA (FOXTAIL SEDGE)	1 – SNG	Eastern deciduous forest	No threat – No further analysis
CAREX FORMOSA (HANDSOME SEDGE)	4 – SNG	Eastern Deciduous Forest	No threat – No further analysis
CAREX LEPTALEA (DELICATE SEDGE)	2 – SNG	Wetland thickets, woodland seeps, and fens	No threat – No further analysis
CYPERUS BIPARTITUS (BROOK FLATSEDGE)	1 - SNG	Wetland thickets, woodland seeps, and fens	No threat – No further analysis
CYPRIPEDIUM CANDIDUM (WHITE LADY’S-SLIPPER)	3 – SNG	Tallgrass prairie wetlands	Leafy spurge - Present Canada thistle - Present
CYPRIPEDIUM REGINAE (SHOWY LADY’S-SLIPPER)	8 – SNG	Wetland thickets, woodland seeps, and fens	Buckthorn - Present
DRYOPTERIS CRISTATA (CRESTED WOODFERN)	9 – SNG	Wetland thickets, woodland seeps, and fens	Leafy spurge - Present Buckthorn - Present Canada thistle - Present
EQUISETUM PALUSTRE (MARSH HORSETAIL)	5 – SNG	Wetland thickets, woodland seeps, marshes, fens, and pond edges	Canada thistle - Present
EQUISETUM PRATENSE (MEADOW HORSETAIL)	2 – SNG	Wetland thickets, woodland seeps, bogs, and fens	Leafy spurge - Present Canada thistle - Present
ERIOPHORUM GRACILE (SLENDER COTTONGRASS)	1 - SNG	Wetland thickets, woodland seeps, bogs, and fens	No threat – No further analysis
EUONYMUS ATROPURPUREA (WAHOO)	9 – SNG	Eastern deciduous forest	Leafy spurge – Encroached Buckthorn - Present
GALIUM LABRADORICUM (BOG BEDSTRAW)	1 – SNG	Wetland thickets, woodland seeps, bogs, and fens	Buckthorn - Present
GYMNOCARPIUM DRYOPTERIS (OAKFERN)	1 –SNG	Eastern deciduous forest	Buckthorn - Present
HELIANTHEMUM BICKNELLII (BICKNELL’S SUNROSE)	4 –SNG	Sand dunes and sand prairie; dry sandy hummocks and slopes	Leafy spurge - Encroached
HUDSONIA TOMENTOSA (WOOLY BEACH-HEATHER)	2 – SNG	Sand dunes and blowouts	Leafy spurge - Encroached Canada thistle - Present

TEPS PLANT NAME	# Known Sites by District	General Habitat	Level of Noxious Weed Threat*
LECHEA STRICTA (PINWEED)	4 - SNG	Sand dunes and sand prairies; dry sandy hummocks and slopes	Leafy Spurge – Encroached
LIPARIS LOESELII (LOESEL’S TWAYBLADE)	4 –SNG	Wetland thickets, woodland seeps, and fens, base of aspen trees in exposed or open peat	Leafy spurge - Present Canada thistle - Present
MENYANTHES TRIFOLIATE (BUCKBEAN)	2 – SNG	Wetland thickets, woodland seeps, and fens	No threat – No further analysis
ONOCLEA SENSIBILIS (SENSITIVE FERN)	1 – SNG	Wetland thickets, woodland seeps, and fens	Buckthorn - Present
OPHIOGLOSSUM PUSILLUM (ADDER’S-TONGUE FERN)	20 –SNG	Tallgrass prairie wetlands	Leafy spurge – Present Canada thistle - Encroached
PLATANThERA PRAECLARA (WESTERN PRAIRIE FRINGED ORCHID) THREATENED	44 - SNG	Wetlands	Leafy spurge - Encroached Canada thistle - Encroached
RIBES CYNOSBATI (PRICKLY GOOSEBERRY)	1 – SNG	Eastern deciduous forest	Buckthorn - Present
SALIX PEDICELLARIS (BOG WILLOW)	unknown	Wetland thickets, woodland seeps, and fens	Buckthorn -Present
SOLIDAGO FLEXICAULIS (ZIGZAG GOLDENROD)	1- SNG	Eastern deciduous forest	Buckthorn - Present
THELYPTERIS PALUSTRIS (MARSH FERN)	6 – SNG	Wetland thickets, woodland seeps, and fens	Buckthorn - Present
TRIPLASIS PURPUREA (PURPLE SANDGRASS)	1 – SNG	Sand dunes and blowouts	Leafy spurge - Present

*Level of noxious weed threat: Encroached - noxious weed among sensitive plant population or in habitat area
Present/Threat - noxious weed nearby and has high potential to encroach without treatment
No threat - noxious weeds are not a threat nor present

Alternative 1 – No Weed Treatment

Direct and Indirect Effects

The No Action Alternative would have significant adverse impacts on the DPG's only threatened plant species, the western prairie fringed orchid. The SNG, home of the orchid, has an estimated infestation of leafy spurge of 35,000 acres. The orchid has been mapped on approximately 3,900 acres, of which, approximately 1,600 acres overlap between orchid and leafy spurge. If no weed treatment for leafy spurge were to occur, it would quickly take over, becoming a monoculture across the landscape reducing and possibly eliminating the extent of the western prairie fringed orchid habitat. The SNG supports one of three metapopulations of the orchid remaining in North America. If noxious weed treatment were to cease, this species could be imperiled to the point of listing it as endangered.

For sensitive plant species, the No Action alternative also would have direct adverse impacts to populations and their habitat. Without active noxious weed control, the weeds will continue to spread unchecked. Noxious weeds are highly competitive and will out-compete native species for water, nutrients and sunlight. Leafy spurge is estimated to spread by about 10 percent each year, thus doubling the area it infests about every 7 years. If untreated, leafy spurge would expand into sensitive plant species habitats displacing native vegetation and existing sensitive plant populations. Habitats particularly vulnerable and at risk from invasion by leafy spurge and Canada thistle are the riparian and woodland areas, where many of the sensitive plants occur. Because of their competitive advantage, noxious weeds near or within areas of sensitive plant occurrences are expected to displace sensitive plants within the reasonably foreseeable future (10-20 years). Over a longer period of time, if not sooner, entire sensitive plant occurrences could be lost. As the noxious weeds spread to new areas, additional sensitive plant occurrences would be affected.

These effects would be severe enough to cause loss of viability to sensitive plant populations or to cause a trend toward federal listing. Some occurrences would be lost, and given enough time, it is reasonable to assume that some sensitive plant populations could lose viability and eventually be lost. Especially at risk are those species that occur only on one or very few sites, which is the case for the majority of DPG sensitive plants. While some species would be affected more than others, most would experience direct and indirect adverse effects through loss of habitat and competition for remaining habitat, particularly on the SNG. Under this alternative, it is also possible that the western prairie fringed orchid or its habitat could be imperiled to the point of listing it as endangered.

Cumulative Effects

Past, current and foreseeable activities on both National Forest System (NFS) lands of the DPG and intermingled private lands that are most likely to combine with noxious weed effects include: oil and gas development, livestock grazing and associated developments, spread of invasive species (other than noxious weeds), and conversion of native prairie to other uses.

Projects that involve ground disturbance have had the greatest impact to sensitive plant species and their habitat. Conversion of native prairie to cropland, non-native pastures and other uses has resulted in loss of habitat. Some sensitive plant communities such as smooth goosefoot, have been disrupted by trampling and overgrazing by livestock.

In the present, oil and gas development and recreational activities (trail use) are increasing on the LMNG. These human disturbances are a part of the Forest Service multiple-use mission and will continue indefinitely, creating new avenues for noxious weeds to spread and effect sensitive plant populations and habitat. Past weed control has helped limit the current extent and spread of noxious weeds. Data demonstrates that leafy spurge left untreated could double every seven years and would be very damaging to the tallgrass prairie and associated plant communities on the SNG. The aggressive nature of noxious weeds, coupled by the increased opportunities for noxious weed seed to spread, would reduce and eliminate suitable habitat for sensitive species. These effects could be severe enough to cause loss of viability to sensitive plant populations or to cause a trend toward federal listing. Especially vulnerable or at risk are those populations known to occur only at one or very few sites, which are the majority of sensitive plants listed for the DPG.

Alternative 2 – Proposed Action

Floristic plant surveys for TEPS plants have been conducted in many areas across the DPG. Although the DPG has not been surveyed in its entirety for sensitive plant species, sufficient analysis of the risks to TEPS plants and their habitat can be accomplished based on current information, existing surveys and inventories, and professional knowledge by resource specialists.

Direct and Indirect Effects

Western Prairie Fringed Orchid

Manual or Mechanical Treatments

Hand-pulling, digging, grubbing, cutting or mowing are proposed for treating small areas and could directly damage or kill individuals of the listed species if they are growing directly next to the noxious weed being treated. Some plants may be damaged by foot traffic or by mechanical equipment being used in the treatment process. Impacts from mowing would be short-term and minor, affecting only a few individual plants as long as design criteria for mowing are followed. The other mechanical treatments would be very selective for individual weed plants if they were to appear in orchid habitat. Impacts to individual plants would be negligible. There would be long-term benefits to orchid habitat preservation.

Grazing with Sheep or Goats

Grazing can be detrimental to individual orchids, both in terms of reducing carbohydrate reserves and in preventing seed production. Yet, grazing or other defoliation treatments like mowing may enhance orchid regeneration by reducing competition from other vegetation and litter accumulation.

Sheep and goat grazing have proven successful in controlling and reducing leafy spurge infestations. Beginning in 1990, angora goats were introduced on the SNG for control of leafy spurge. Goat grazing reduces height, cover, and biomass of leafy spurge compared to non-grazed areas. Monitoring confirms that the goats graze western prairie fringed orchids and prefer the orchids in the bud stage. Orchids in the vegetative stage are less conspicuous to the goats

and not grazed as much, but are subject to varying degrees of trampling. The survival percentage is low for damaged budding orchids and below 50 percent for vegetative orchids.

Goats currently graze in orchid habitat but are not allowed access to existing orchid plants. Current management involves doing a pre-grazing inventory where orchid locations are identified and protected using electric fences, agronomy cages, or having the goat herder avoid the area. Cattle grazing is also being deferred on a portion of habitat during the growing period.

The Proposed Action with design criteria complies with the Recovery Plan. Goat or sheep grazing would be limited to that period before 6/1 or after 9/15; or if between 6/1 and 9/15, orchids must be protected by a physical barrier such as agronomy cages or electric fences as currently occurs.

No impacts to individual orchids or its population are expected. Goat and sheep grazing would have long-term beneficial impacts on orchid habitat by controlling and reducing leafy spurge.

Revegetation

Sites considered for revegetation would be relatively small and disturbance minimal. If revegetation were considered within orchid habitat, seeding would only be done by broadcasting or using a no-till drill and conducted outside of the growing period (Oct. – May). Therefore, revegetation would have no impacts to the orchid population. As native vegetation reestablishes, there would be long-term benefits to orchid habitat preservation.

Biological Control Treatment

Any biological control agent released on the DPG would be approved by APHIS and would have no demonstrated affinity for native plant species. Those already introduced have had no impact to the western prairie fringed orchid. Because any proposed biological control agent would be specific to its noxious weed host and the fact that the orchid is in a family separate from any of the noxious weeds, there would be no impacts to the species. Biological controls may contribute to the reduction of leafy spurge and Canada thistle densities in orchid habitat, therefore, impacts may be long-term and beneficial.

Prescribed Burning

Fire seems to be important in the flowering dynamics of the orchid, but fire's long-term effect on survival of the plant is unknown. Currently Iowa, Kansas, and Minnesota have orchid populations that are being managed exclusively with prescribed fire in early spring. The orchids seem to be able to coexist with this management.

Burning may directly impact orchid populations through mortality of individual plants from localized increased burning intensities and indirectly through a reduction of flowering plants. Also, there may be some localized, short-term minor effects from prescribed burning operations, such as vehicle tire depressions for ignition and holding operations. Overall, data supports that direct and indirect impacts of prescribed burning on orchid populations and habitat are beneficial and long-term, with some minor, short-term adverse impacts to individual plants.

Herbicide Treatments (Aerial and Ground)

Herbicide use to control leafy spurge in orchid habitat has been ongoing since the 1950s, except for a short-term discontinuation in the late 1960s. Because herbicide treatment ceased, the infestation spread quickly resulting for treatments to be resumed in the early 1970s.

The principal means of control of leafy spurge on the SNG has been a mixture of 2,4-D and Picloram (Tordon). 2,4-D is applied without picloram in areas where the water table is shallow and wetland-type conditions exist following label restrictions. In recent years, Imazapic (Plateau) applied at a 6-8 oz per acre rate has become the herbicide of choice for reducing leafy spurge density on the SNG. A recent study (Erickson 2003) revealed that Imazapic injured some orchid plants 1 and 2 years after treatment when applied at an 8 oz per acre rate. Orchid injury also occurred at the 6 oz per acre rate on a few plants, but was limited to 12 months or less after application. In general, Imazapic may have a negative effect on flower and seed production, in particular at the 8 oz per acre rate. However, failure to produce fully grown flowers may have been partially a result of the drier conditions in 2002 compared to 1999 through 2001. Future monitoring on the effects of imazapic on the western prairie fringed orchid is needed.

Herbicides vary in selectivity to plant families and have different effects on native vegetation, like the western prairie fringed orchid. Each herbicide varies in terms of its chemical and biological behavior in the environment. Factors that affect herbicide behavior in the environment include herbicide properties and mode of action (how it kills or suppresses plants), formulation rates, soil characteristics, and climatic conditions. To determine if herbicide treatment of noxious weeds will impact the orchid, the following factors were reviewed; selectivity and non-target species susceptibility, soil persistence, residual soil activity, and formulation rates.

An herbicide risk assessment was completed and the following narrative and Table 15 provide a summary of expected susceptibility of the orchid for each herbicide proposed.

Herbicide Risk Assessment Summary for Western Prairie Fringed Orchid

Clopyralid, 2,4-D and triclopyr are grass tolerant and are considered safe to use in and around orchid habitat. There would be no expected effects from direct contact (deliberate application and unwarranted drift) or indirect contact (root uptake) by these herbicides if applied according to label specifications and rate. Although considered safe according to label, fall applications are recommended.

Dicamba, imazapic, and picloram are also considered safe at lower rates of application. Inadvertent drift using higher rates nearby could result in adverse effects. Therefore, a 50 foot buffer zone would be required for these herbicides when used at higher rates than specified. Using low recommended rates and a no spray buffer zone when applied at higher rates, there would be no expected impacts to the viability of the orchid population.

Glyphosate is a nonselective herbicide, but it can safely be used in the fall after its growing period while the plant is dormant. Glyphosate has little to no soil activity; therefore, no residual effects to the orchid would occur. Glyphosate applied during plant dormancy would have no impact to the viability of the orchid population.

Chlorsulfuron, imazapyr, and sulfometuron methyl are all broad-spectrum herbicides and are very active in the soil. Metsulfuron methyl is selective for some grasses and can be persistent in

the soil. Direct or indirect contact by these herbicides would result in injury or death to the exposed orchids. These herbicides would not be considered for use within 50 feet of known orchid plants and method of application would be controlled to prevent drift.

Following herbicide product labels, using recommended formulations, adhering to mitigation measures and design criteria, and consulting with unit botanist or designated specialist as required, impacts by herbicides to the orchid population would be negligible or not at all. Overall, long-term benefits to orchid habitat would occur as leafy spurge densities decline.

TABLE 15. SUMMARY OF RISK ASSESSMENT OF PROPOSED HERBICIDES ON WESTERN PRAIRIE FRINGED ORCHID.

HERBICIDE	SELECTIVITY AND VEGETATION SUSCEPTIBILITY	SUSCEPTIBILITY OF THE ORCHID
2,4-D (AMINES)	Foliage applied. Selective. Some broadleaf, woody and aquatic plants susceptible.	Safe
CHLORSULFURON	Foliage applied. Selective. Some broadleaf plants and grasses susceptible.	Not Safe
CLOPYRALID	Foliage applied. Selective. Many broadleaf and woody species susceptible	Safe
DICAMBA	Foliage applied. Selective. Some broadleaf plants, brush and vines susceptible.	Safe with lower end application rates.
GLYPHOSATE	Foliage applied. Nonselective. Most plants are susceptible. Broad spectrum for broadleaf plants and grasses.	Safe only with Fall Application or while orchid is dormant.
IMAZAPIC	Foliage applied. Selective. Some broadleaf plants and grasses susceptible.	Generally safe with 6 oz or lower application rate.
IMAZAPYR	Applied pre- or post-emergence. Broad spectrum. Most annual and perennial broadleaf plants, grasses and woody vegetation.	Not Safe
METSULFURON METHYL	Applied pre- or post-emergence. Selective. Some broadleaf weeds and annual grasses.	Not Safe
PICLORAM	Foliage applied. Selective. Most annual and perennial broadleaf and woody plants are susceptible. Grasses are tolerant.	Safe using the lower end allowed application rates.
SULFOMETURON METHYL	Applied pre- or post-emergence. Broad spectrum. Many annual and perennial grasses and broadleaf plants. Woody vegetation tolerant.	Not Safe
TRICLOPYR	Foliage applied. Selective. Woody plants, some broadleaf plants, and root-sprouting species are susceptible. Grasses are tolerant.	Safe

Aerial Application Herbicide Non-target Drift Effects on Western Prairie Fringed Orchid

In general, aerial application of herbicide is a concern because there is more potential for drift of herbicide into non-target areas than there is when ground-based equipment is used. On the DPG, aerial application would be limited to relative large, heavily infested areas or remote, inaccessible areas. Following herbicide label instructions, using recommended formulations, and implementing design criteria should minimize drift potential and eliminate most concern.

Sensitive Plant Species

Manual or Mechanical Treatments

Mechanical treatments as proposed would occur over small areas. There could be some short-term negligible impacts to a sensitive plant species site through localized disturbance caused by human foot traffic or equipment use. There would be long-term benefits to sensitive plant species habitat by controlling the spread of noxious weeds.

Grazing with Sheep or Goats

Design criteria identified in Chapter 2 would prohibit grazing sheep or goats for noxious weed control on the LMNG to protect wild bighorn sheep populations; therefore, no impacts would occur to sensitive plants on the LMNG.

Data is lacking on the effects of grazing for specific sensitive plant species. A multi-species (sheep, and sheep/cattle) grazing trial in western North Dakota was conducted 1996 to 2002 (Dahl et al unknown date). Results after six grazing seasons show that no year or treatment effects were present in the number of forbs and shrub stems. A goat grazing study conducted on the SNG indicated that the goats prefer leafy spurge and avoided most grasses, except for warm season species, specifically sand dropseed (*Sporobolus cryptandrus*) (Hanson 1994). Other grasses, forbs, and sedges were either not affected or sometimes even increased. Based on these two studies, other studies using sheep and goat grazing to control leafy spurge, and historic and current grazing by cattle on the SNG, inference can be made that grazing with sheep or goats at appropriate stocking rates would not contribute to a trend towards federal listing or cause a loss of viability to any of the sensitive plant species in this analysis.

Revegetation

Revegetation is site specific and would be considered for reestablishing native vegetation where noxious weed control treatments have left an area void of live vegetation. There are no known sensitive plant sites with the level of infestation that if treated would remove a considerable amount of vegetation. Revegetation is not anticipated in any of the known sensitive plant locations where noxious weeds exist or are nearby. There would be no impacts.

Biological Control

Several species of biological control have been released in and around the DPG, all of which are host specific and do not affect any of the sensitive plant species. Any biological control agent released on the DPG would be tested and approved by APHIS and would have no demonstrated affinity for native and sensitive plant species. There would be no impact to sensitive plant populations. There would be long-term beneficial impacts to native plant communities by reducing noxious weeds.

Prescribed Burning

All prescribed burning activities require approved burn plans. Fire used alone for noxious weed control is unlikely. Instead, fire helps to prepare an area for implementing other noxious weed control methods. Prescribed burning could impact some individual sensitive plant species that occur in areas of noxious weeds through disturbance from burning, direct mortality in some

cases, and temporary loss of habitat until the burned area recovers. Generally, prescribed burning for noxious weed control would occur in areas where habitat suitability is already compromised by noxious weed invasion. Grasslands Plan standards and guidelines and project design criteria would limit effects to acceptable levels, protecting populations. Long-term effects would be beneficial by restoring native vegetation and reducing or preventing spread of noxious weeds. Overall, habitat conditions would improve.

Herbicide Treatments (Aerial and Ground)

Use of herbicides has the highest potential to impact sensitive plant populations. Herbicides are often the most effective tool to control specific noxious weeds, such as leafy spurge and Canada thistle. Herbicides also can eradicate many noxious weeds that exist in low numbers in a relatively short amount of time and minimal cost. In these instances, the benefits of herbicides may outweigh potential risks. With design criteria identified in Chapter 2, risks can be kept minimal or even eliminated.

Of the eleven herbicides proposed, 7 are selective, 3 are broad-spectrum, and 1 is non-selective as discussed in the section above on the western prairie fringed orchid.

Selectivity of herbicides to specific plant species is based on formulation (application rate) and timing. Timing refers to season of application and growth stage of the target weeds.

The extent of any non-target vegetation loss would depend on the proximity of desirable species to the treated site, method and rate of herbicide application, formulation of the herbicide, and herbicide used. To minimize potential direct and indirect impacts to sensitive plant populations a 50-foot no-spray zone would be imposed for all herbicides being applied by broadcast-type spray equipment – ATV, vehicle, and helicopters/fixed-wing aircraft or mounted booms and boomless sprayers. Use of the three broad-spectrum herbicides, chlorsulfuron, imazapyr, and sulfometuron methyl, is prohibited in the 50-foot zone. The seven ‘selective’ herbicides; clopyralid, 2,4-D, triclopyr, dicamba, imazapic, picloram, metsulfuron methyl can be applied up to and around sensitive plant populations using hand application targeting individual plants. Because these seven herbicides do vary in soil persistence, soil activity, and species susceptibility, each district botanist or designated specialist would be notified prior to any herbicide applications that occur within 50-feet of any sensitive plant population. Glyphosate can be applied within the 50-foot buffer if the sensitive plant species in the area is dormant and is known to be unaffected by the treatment, such as the western prairie fringed orchid.

On the LMNG and the CR/GRNG herbicide application is limited to smaller areas compared to the leafy spurge infestation on the SNG. At present, only 5 sensitive plant locations on the LMNG are in areas where nearby herbicide use will be implemented. The CR/GRNG and Denbigh and Souris units have no known sensitive plant populations in areas where noxious weed control efforts would be implemented.

Following herbicide product labels, using recommended formulations, adhering to design criteria, and consulting with unit botanist or designated specialist as required, impacts by herbicides to sensitive plant populations would be negligible or not at all. Overall, impacts to the viability of sensitive plant species and habitat would be beneficial and long-term.

Aerial Application Herbicide Non-target Drift Effects on Sensitive Plants

In general, aerial application of herbicide is a concern because there is more potential for drift of herbicide into non-target areas than there is when ground-based equipment is used. On the DPG, aerial application would be limited to relative large, heavily infested areas or remote, inaccessible areas. Following herbicide label instructions, using appropriate formulations, and implementing mitigation measures and design criteria should minimize drift potential and eliminate most concern.

Cumulative Effects

Little information is available on the cumulative effects of land management activities on sensitive plant species and their habitats for the Sheyenne National Grassland. Major land management activities have included livestock grazing, revegetation and soil stabilization projects, mowing, burning, and noxious weed control.

Mowing and burning of vegetation may influence livestock grazing patterns and utilization. Monitoring of utilization levels by SNG district personnel in spring burned and early season grazed temporary and seasonal wetlands showed a 40 percent to 50 percent utilization level versus a 20 percent utilization level in similar unburned habitats. Increasing grazing by cattle, sheep, or goats may result in trampling or grazing of sensitive plants.

There are no foreseen adverse cumulative effects on sensitive plant species and habitat by implementing the Proposed Action on the LMNG and GRNG. Overtime, sensitive plant habitats should improve and species occurrences may increase.

Biological Assessment/Evaluation Effects Determination

The existing management guidelines (Recovery Plan, Appendix N of Grasslands Plan) and design criteria for the Proposed Action will provide appropriate management direction for the western prairie fringed orchid. Therefore, the Biological Assessment determination for the Proposed Action is “may effect, not likely to adversely affect” the western prairie fringed orchid.

Table 16 shows the sensitive species determinations for each alternative.

TABLE 16: BIOLOGICAL EVALUATION DETERMINATIONS FOR SENSITIVE SPECIES UNDER EACH ALTERNATIVE

TEPS PLANT NAME	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 1 ¹	EFFECT DETERMINATION FOR ALTERNATIVE 1 ²	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 2 ¹	EFFECT DETERMINATION FOR ALTERNATIVE 2 ²
CHENOPODIUM SUBGLABRUM (SMOOTH GOOSEFOOT)	High	WI	Low	MIIH – short-term BI – Long-term
COLLINSIA PARVIFLORA (BLUE LIPS)	High	WI	Low	MIIH – short-term BI – Long-term
CRYPTANTHA TORREYANA (TORREY’S CRYPTANTHA)	High	WI	Low	MIIH – short-term BI – Long-term
ERIOGONUM CERNUUM (NODDING BUCKWHEAT)	High	WI	Low	MIIH – short-term BI – Long-term
ERIOGONUM VISHERI (DAKOTA BUCKWHEAT)	Low to Moderate	WI	Low	MIIH – short-term BI – Long-term

TEPS PLANT NAME	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 1¹	EFFECT DETERMINATION FOR ALTERNATIVE 1²	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 2¹	EFFECT DETERMINATION FOR ALTERNATIVE 2²
LEUCOCRINUM MONTANUM (SAND LILY)	Low to Moderate	WI	Low	MIIH – short-term BI – Long-term
MENTZELIA PUMILA (DWARF MENTZELIA)	Low to Moderate	WI	Low	MIIH – short-term BI – Long-term
MYOSURUS APETALUS (SEDGE MOUSETAIL)	Low to Moderate	WI	Low	MIIH – short-term BI – Long-term
PHLOX ALYSSIFOLIA (ALYSSUM-LEAVED PHLOX)	High	WI	Low	MIIH – short-term BI – Long-term
PINUS FLEXILIS (LIMBER PINE)	Low to Moderate	WI	Low	MIIH – short-term BI – Long-term
POPULUS X ACUMINATE (LANCYLEAF COTTONWOOD)	Low to Moderate	WI	Low	MIIH – short-term BI – Long-term
SPOROBOLUS AIROIDES (ALKALI SACATON)	Moderate to High	WI	Low	MIIH – short-term BI – Long-term
TOWNSENDIA HOOKERI (HOOKER'S TOWNSENDIA)	High	WI	Low	MIIH – short-term BI – Long-term
APIOS AMERICANA (AMERICAN POTATOEBEAN)	High	WI	Low	MIIH – short-term BI – Long-term
ATHYRIUM FILIX-FEMINA (NORTHERN LADY-FERN)	High	WI	Low	MIIH – short-term BI – Long-term
BOTRYCHUM MULTIFIDUM (LEATHERY GRAPE-FERN)	High	WI	Low	MIIH – short-term BI – Long-term
BOTRYCHUM SIMPLEX (SIMPLE GRAPE-FERN)	High	WI	Low	MIIH – short-term BI – Long-term
CAMPANULA APARINOIDES (MARSH BELLFLOWER)	High	WI	Low	MIIH – short-term BI – Long-term
CAREX ALOPECOIDEA (FOXTAIL SEDGE)	High	WI	Low	MIIH – short-term BI – Long-term
CAREX FORMOSA (HANDSOME SEDGE)	High	WI	Low	MIIH – short-term BI – Long-term
CAREX LEPTALEA (DELICATE SEDGE)	High	WI	Low	MIIH – short-term BI – Long-term
CYPERUS BIPARTITUS (BROOK FLATSEDGE)	High	WI	Low	MIIH – short-term BI – Long-term
CYPRIPEDIUM CANDIDUM (WHITE LADY'S-SLIPPER)	High	WI	Low	MIIH – short-term BI – Long-term
CYPRIPEDIUM REGINAE (SHOWY LADY'S-SLIPPER)	High	WI	Low	MIIH – short-term BI – Long-term
DRYOPTERIS CRISTATA (CRESTED WOODFERN)	High	WI	Low	MIIH – short-term BI – Long-term
EQUISETUM PALUSTRE (MARSH HORSETAIL)	High	WI	Low	MIIH – short-term BI – Long-term
EQUISETUM PRATENSE (MEADOW HORSETAIL)	High	WI	Low	MIIH – short-term BI – Long-term
ERIOPHORUM GRACILE (SLENDER COTTONGRASS)	High	WI	Low	MIIH – short-term BI – Long-term
EUONYMUS ATROPURPUREA (WAHOO)	High	WI	Low	MIIH – short-term BI – Long-term
GALIUM LABRADORICUM	High	WI	Low	MIIH – short-term

TEPS PLANT NAME	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 1¹	EFFECT DETERMINATION FOR ALTERNATIVE 1²	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 2¹	EFFECT DETERMINATION FOR ALTERNATIVE 2²
(BOG BEDSTRAW)				BI – Long-term
GYMNOCARPIUM DRYOPTERIS (OAKFERN)	High	WI	Low	MIIH – short-term BI – Long-term
HELIANTHEMUM BICKNELLII (BICKNELL’S SUNROSE)	High	WI	Low	MIIH – short-term BI – Long-term
HUDSONIA TOMENTOSA (WOOLY BEACH-HEATHER)	High	WI	Low	MIIH – short-term BI – Long-term
LECHEA STRICTA (PINWEED)	High	WI	Low	MIIH – short-term BI – Long-term
LIPARIS LOESELII (LOESEL’S TWAYBLADE)	High	WI	Low	MIIH – short-term BI – Long-term
MENYANTHES TRIFOLIATE (BUCKBEAN)		WI	Low	MIIH – short-term BI – Long-term
ONOCLEA SENSIBILIS (SENSITIVE FERN)	High	WI	Low	MIIH – short-term BI – Long-term
OPHIGLOSSUM PUSILLUM (ADDER’S-TONGUE FERN)	High	WI	Low	MIIH – short-term BI – Long-term
RIBES CYNOSBATI (PRICKLY GOOSEBERRY)	High	WI	Low	MIIH – short-term BI – Long-term
SALIX PEDICELLARIS (BOG WILLOW)	High	WI	Low	MIIH – short-term BI – Long-term
SOLIDAGO FLEXICAULIS (ZIGZAG GOLDENROD)	High	WI	Low	MIIH – short-term BI – Long-term
THELYPTERIS PALUSTRIS (MARSH FERN)	High	WI	Low	MIIH – short-term BI – Long-term
TRIPLASIS PURPUREA (PURPLE SANDGRASS)	High	WI	Low	MIIH – short-term BI – Long-term

1 Low means that negative effects to populations of the species would be unlikely to occur. Moderate means that negative effects to populations of the species could occur but the likelihood is uncertain. High means that negative effects to populations of the species would be likely to occur.

2 NI=No Impact, MIIH= May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing Or Cause a Loss of Viability To the Population or Species, BI=Beneficial Impact

FISH AND WILDLIFE

This section addresses effects of the alternatives to federally listed Threatened (T) and Endangered (E) species, Forest Service Sensitive (S) species, and Dakota Prairie Grasslands (DPG) Management Indicator Species (MIS). Other species are not addressed. Based on analyses of noxious weed control proposals on other Forest Service units and generally known information about noxious weed control, concern for other species is low and not considered an issue. Addressing the TES and MIS indirectly addresses affects to birds, mammals, invertebrates and fish. Potential effects of herbicide control were considered the most important to analyze.

Direct and indirect effects to TES and MIS fish and wildlife species and habitats are considered for National Forest System (NFS) lands across the DPG. Cumulative effects are considered for all lands within the administrative boundaries of the DPG, which includes some state and private land. Short-term effects would occur over approximately the first 5 – 10 years of implementation as initial control efforts occur to reduce the current acreage of noxious weed infestation; long-term effects would occur after that time.

Fish and wildlife information was gathered using existing information. This report tiers to the Final Environmental Impact Statement for the Northern Great Plains Management Plan Revisions (USDA Forest Service 2001a), including its Biological Evaluation in Appendix H. Data and information from each DPG district was used, as were other references as cited. Information was used to:

- Determine the existing condition of species and their habitats within the project area.
- Assess the effects of noxious weed infestation and spread on species and habitats.
- Assess the effects of herbicides via direct contact, ingestion, and habitat alteration on species.
- Assess the effects of non-herbicide weed control on species and habitats.

The Biological Evaluation (BE) for sensitive species is incorporated into this section, and BE determinations are made for each alternative. Biological Assessment (BA) determinations for T&E species are not required for all alternatives, only for the alternative chosen in the Record of Decision. BA determinations are provided here for the preferred alternative, which is Alternative 2, the Proposed Action.

Affected Environment

The Vegetation Section fully describes noxious weed infestations across the DPG. Information on wildlife species and habitats is provided here for the four grasslands that make up the DPG: Sheyenne National Grassland (SNG), Little Missouri National Grassland (LMNG) and Cedar and Grand River National Grasslands (CR/GRNG). Little information is available for the two small tracts of experimental forest, Denbigh and Souris Experimental Forests (DSEF). The experimental forests are small and consist of a large percentage of non-native vegetation.

Noxious weeds are a threat to many fish and wildlife species. Noxious weeds infestations can degrade suitable habitat by taking over a site and displacing native and preferred vegetation. On all DPG units other than the Sheyenne National Grassland (SNG) and Denbigh EF, noxious weed infestations are currently low and having little impact on wildlife species. On the SNG and

DEF, noxious weed infestations, particularly leafy spurge, may be impacting habitat of wildlife species. The existing condition of each analyzed wildlife and fish TES species and MIS in relation to noxious weeds on the four grasslands of the DPG is included in the accounts below.

Federally Listed, Forest Service Sensitive and Dakota Prairie Grasslands Management Indicator Species

Table 17 summarizes DPG TES and MIS habitats and existing conditions in relation to noxious weeds.

TABLE 17: SUMMARY OF DAKOTA PRAIRIE GRASSLANDS THREATENED, ENDANGERED, SENSITIVE AND MANAGEMENT INDICATOR SPECIES HABITAT AND POTENTIAL FOR OVERLAP WITH NOXIOUS WEED SITES

SPECIES	DESIGNATION¹	HABITAT ON OR NEAR DPG UNITS	OCCURRENCE ON DPG UNITS²	POTENTIAL FOR NOXIOUS WEED SITES/TREATMENT AREAS TO OVERLAP WITH HABITAT
WHOOPIING CRANE	E	Small ponds, upland grasslands and rivers. Use is rare and incidental during migration.	P-CR/GRNG K-LMNG	Small
BALD EAGLE	T	Trees for perching and roosting, areas with carrion, small mammals or fish. Use is primarily during migration.	K-CR/GRNG K-LMNG K-SNG	Small
PIPING PLOVER	T	Mid-stream sandbars of the Missouri and Yellowstone Rivers and along shorelines of saline wetlands.	None	None – No further analysis
INTERIOR LEAST TERN	E	Mid-stream sandbars of the Missouri and Yellowstone Rivers. There are no known nest records for the Little Missouri River or other sites within or adjacent to the project area.	None	None – No further analysis
GRAY WOLF	T	Areas of low human disturbance and adequate prey availability.	All-Incidental	Small
BLACK-FOOTED FERRET	E	Prairie dog colonies; large complexes of colonies required to support populations.	PSH- CR/GRNG PSH-LMNG	Small
PALLID STURGEON	E	Known from the Missouri and Yellowstone rivers where it requires turbid waters.	None	None – No further analysis
AMERICAN PEREGRINE FALCON	S	Peregrine falcons will use almost any habitat type that provides hunting opportunities. For nesting purposes, peregrine falcons prefer habitats with cliffs.	P-CR/GRNG K-LMNG P-SNG	Small
BAIRD'S SPARROW	S	Idle native or tame grasslands or lightly to moderately grazed pastures.	K-CR/GRNG K-LMNG P-SNG	Low on CR/GRNG and LMNG Moderate to High on SNG
BURROWING OWL	S	Well drained, gentle grassland with sparse vegetation; usually rely on burrowing mammals for nest sites; prairie dog colonies good habitat.	K-CR/GRNG K-LMNG P-SNG	Low
GREATER PRAIRIE CHICKEN	S MIS	Tallgrass sandhills and mixed grass prairies. Display grounds on slightly elevated open areas of short grass.	K-SNG	Moderate to High
SAGE GROUSE	S	Sagebrush shrubland.	K-LMNG	Low

SPECIES	DESIGNATION ¹	HABITAT ON OR NEAR DPG UNITS	OCCURRENCE ON DPG UNITS ²	POTENTIAL FOR NOXIOUS WEED SITES/TREATMENT AREAS TO OVERLAP WITH HABITAT
	MIS			
LOGGERHEAD SHRIKE	S	Open habitat with low stature grasses and forbs and shrubs or low trees.	K-CR/GRNG K-LMNG K-SNG	Low to Moderate
LONG-BILLED CURLEW	S	Expansive, open, gentle grassland with short vegetation.	P-CR/GRNG K-LMNG	Low
SPRAGUE'S PIPIT	S	Grasslands of intermediate height and sparse to intermediate vegetation.	K-CR/GRNG K-LMNG P-SNG	Low
BLACK-TAILED PRAIRIE DOG	S MIS	Gentle terrain; not forested or wet.	K-CR/GRNG K-LMNG	Low
CALIFORNIA BIGHORN SHEEP	S	Badlands and other steep grassland for escape cover, with shrubs, grasses, sedges and forbs for food.	K-LMNG	Low to Moderate
AROGOS SKIPPER	S	Relatively undisturbed bluestem prairie.	P-CR/GRNG P-SNG	Low on CR/GRNG Moderate to High on SNG
BROAD-WINGED SKIPPER	S	Freshwater sedge marshlands, in or very near woodlands (Sheyenne River Oxbows).	P-SNG	Low to Moderate
DAKOTA SKIPPER	S C	Undisturbed tallgrass to mixed grass prairies; East: low (wet) bluestem prairie; West: upland (dry) prairie dominated by bluestems and needlegrasses.	P-CR/GRNG K-LMNG K-SNG	Low to Moderate on CR/GRNG and LMNG Moderate to High on SNG
DION SKIPPER	S	Permanently wet sedge marshlands (Sheyenne River Oxbows).	K-SNG	Low to Moderate
MULBERRY WING	S	Permanently wet woodland sedge marshlands (Sheyenne River Oxbows).	K-SNG	Low to Moderate
OTTOE SKIPPER	S	Undisturbed mid-grass to tall grass prairie, drier sites/hilltops.	K-CR/GRNG K-LMNG	Low
POWESHEIK SKIPPER	S	Undisturbed prairie, particularly at grass/wetland ecotone.	K-SNG	Moderate to High
REGAL FRITILLARY	S	Tallgrass to mixed grass bluestem prairies.	K-CR/GRNG K-LMNG K-SNG	Low to Moderate on CR/GRNG and LMNG Moderate to High on SNG
TAWNY CRESCENT	S	North-facing or other mesic sites – green ash forest margins that border bluestem prairie.	P-CR/GRNG K-LMNG	Low to Moderate
STURGEON CHUB	S	Primarily inhabits large turbid rivers with rock or gravel bottoms; present in the Missouri River and potentially the Little Missouri River.	UQ- CR/GRNG UQ-LMNG	None – No further analysis
NORTHERN REDBELLY DACE	S	Requires slower and clearer waters with some vegetation. Can also be found in impoundments like beaver ponds and pools in headwaters. Has been found on the Cannonball River on the LMNG and	K-LMNG K-SNG	Low

SPECIES	DESIGNATION ¹	HABITAT ON OR NEAR DPG UNITS	OCCURRENCE ON DPG UNITS ²	POTENTIAL FOR NOXIOUS WEED SITES/TREATMENT AREAS TO OVERLAP WITH HABITAT
		Sheyenne River and tributaries on the SNG.		
PLAINS SHARP-TAILED GROUSE	MIS	Mixed grass prairies.	K-CR/GRNG K-LMNG K-SNG	Low to Moderate on CR/GRNG and LMNG Moderate to High on SNG

¹ E=Endangered, T=Threatened, S=Sensitive, C=Candidate MIS=Management Indicator Species

² K=Known, P=Possible, PSH=Potential Suitable Habitat, UQ=Unlikely or Questionable

Alternative 1 – No Weed Treatment

Direct and Indirect Effects

Numerous research studies have shown the negative effects that noxious weed infestations can have on native and desired, non-native fish and wildlife species. Noxious weeds can displace native, desired and necessary habitat for fish and wildlife species, causing fish and wildlife populations to decline or disappear.

The "Noxious Weed and Non-target Vegetation Section" describes some of the threats of noxious weeds, and the potential spread of noxious weeds if they are left untreated. It is estimated that without treatment, weeds increase about 14 percent a year under natural conditions. Historical information from the Medora Ranger District demonstrates that the size of leafy spurge infestations have expanded approximately 10 percent per year since 1969. From these trends, we expect the pattern of expansion to continue and infested acreages to increase on the DPG in the absence of aggressive control treatments.

While noxious weed infestations are currently relatively low on the LMNG, CR/GRNG and D/SEF and are having little impact on fish and wildlife species, if left uncontrolled they could easily spread to detrimental levels for several species. On the SNG where noxious weeds, particularly leafy spurge, are already abundant, uncontrolled spread could quickly take over much of the Grassland and significantly reduce or even eliminate wildlife habitat.

While some species would be affected more than others, most would experience negative effects through loss of habitat and competition for remaining habitat, particularly on the SNG. Population viability of some sensitive butterfly species on the SNG would be impacted because of the high impacts to habitat, small home ranges and low species vagility. Other species may experience high impacts to habitat on the SNG, but populations are less likely to be affected because of large home ranges and high vagility. Table 18 summarizes effects of Alternative 1.

TABLE 18: SUMMARY OF EFFECTS OF ALTERNATIVE 1 ON TES AND MIS SPECIES AND HABITATS.

Species	Potential for Negative Effects to Populations from Alternative 1¹	Biological Evaluation (BE) Determination for Sensitive Species²	Reason
Whooping Crane	Low to Moderate		Uncontrolled noxious weeds could take over some migration stops, reducing prey availability.
Bald Eagle	Low to Moderate		Uncontrolled saltcedar along waterways could eventually reduce potential nest and roost habitat; other noxious weed spread could affect prey availability to a small degree.
Gray Wolf	Low to Moderate		Uncontrolled noxious weed spread could affect potential prey availability, but probably not to a great degree for this wide-ranging, adaptable species.
Black-footed Ferret	Low to Moderate		Not likely to affect existing prairie dog colonies, but uncontrolled noxious weeds could spread into potential habitat, making it unsuitable for prairie dog colonization and ferret occupancy.
Baird's Sparrow	Moderate to High	MIIH	Uncontrolled weeds could spread into habitat, especially likely on the SNG.
Burrowing Owl	Low to Moderate	MIIH	Uncontrolled noxious weeds could spread into potential habitat, making it unsuitable for burrowing owls or their preferred hosts, prairie dogs.
Greater Prairie Chicken	High	MIIH	Uncontrolled noxious weeds are likely to invade all potential habitat on the SNG.
Sage Grouse	Low to Moderate	MIIH	While infestations in current habitat are low now, uncontrolled noxious weeds could spread into habitat.
Loggerhead Shrike	Low to Moderate	MIIH	Uncontrolled noxious weeds could reduce foraging habitat.
Long-billed Curlew	Low to Moderate	MIIH	While infestations in current habitat are low now, uncontrolled noxious weeds could spread into habitat.
Sprague's Pipit	Low to Moderate	MIIH	While infestations in current habitat are low now, uncontrolled noxious weeds could spread into habitat.
Black-tailed Prairie Dog	Low to Moderate	MIIH	Existing prairie dog colonies would probably not be affected because dogs keep the colonies clipped, but potential habitat could be invaded by uncontrolled noxious weeds, making it difficult for prairie dogs to colonize as they avoid tall structure (such as leafy spurge).
California Bighorn Sheep	Low to Moderate	MIIH	Uncontrolled noxious weeds could spread in bighorn sheep habitat, reducing forage.
Arogos Skipper	Moderate to High	MIIH, WI	Uncontrolled weeds could spread into habitat, especially likely on the SNG where population viability would be impacted.

Species	Potential for Negative Effects to Populations from Alternative 1¹	Biological Evaluation (BE) Determination for Sensitive Species²	Reason
Broad-winged Skipper	Moderate	MIIH	Uncontrolled weeds, such as thistles or purple loosestrife, could invade habitats.
Dakota Skipper	Moderate to High	MIIH, WI	Uncontrolled weeds could spread into habitat, especially likely on the SNG where population viability would be impacted.
Dion Skipper	Moderate	MIIH	Uncontrolled weeds, such as thistles or purple loosestrife, could invade habitats.
Mulberry Wing	Moderate	MIIH	Uncontrolled weeds, such as thistles or purple loosestrife, could invade habitats.
Ottoe Skipper	Moderate	MIIH	While infestations in current habitat are low now, uncontrolled noxious weeds could spread into habitat.
Powesheik Skipper	High	WI	Uncontrolled weeds could spread into habitat on the SNG where population viability would be impacted.
Regal Fritillary	Moderate to High	MIIH, WI	Uncontrolled weeds could spread into habitat, especially likely on the SNG where population viability would be impacted.
Tawny Crescent	Moderate	MIIH	Uncontrolled noxious weeds could develop into monocultures, which would be unsuitable habitat.
Northern Redbelly Dace	Low	MIIH	Noxious weeds are not likely to spread into aquatic habitat, although it is possible that with no control species such as purple loosestrife could invade.
Plains Sharp-tailed Grouse	Moderate to High		Uncontrolled weeds could spread into habitat, especially likely on the SNG.

1 Low means that negative effects to populations of the species would be unlikely to occur. Moderate means that negative effects to populations of the species could occur but the likelihood is uncertain. High means that negative effects to populations of the species would be likely to occur.

2 Biological Evaluation (BE) determinations: MIIH= May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing Or Cause a Loss of Viability To the Population or Species, WI= Will Impact Individuals Or Habitat With A Consequence That The Action Will Contribute To A Trend Towards Federal Listing Or Cause a Loss of Viability To the Population or Species

Cumulative Effects

Past, current and foreseeable activities on both NFS lands of the DPG and intermingled private lands that are most likely to combine with noxious weed effects include: past noxious weed control, livestock grazing, spread of invasive species (other than noxious weeds), and conversion of native prairie to other uses.

Conversion of native prairie to cropland, non-native pastures and other uses has had the greatest impact on most wildlife species as habitats have been drastically, and in many cases permanently, altered. Spread of non-noxious, invasive species such as smooth brome and

Kentucky bluegrass has also altered native habitats by creating monocultures of these nonnative species. Livestock grazing can have positive and negative affects on wildlife habitat; it is generally the grazing intensity that determines the impacts. Heavy grazing can reduce cover and change vegetation composition. Some wildlife species, such as black-tailed prairie dog and long-billed curlew, may benefit from such changes, but other species, such as Dakota skipper and Baird's sparrow, would be negatively affected. Past weed control has helped to limit the current extent of noxious weeds, but herbicides have probably impacted habitat for butterfly species in some areas by reducing desirable forbs. Remaining native prairie habitat on NFS, and private lands, is important to wildlife species, particularly those that have narrow habitat requirements. If these remaining habitats on the DPG are degraded by the uncontrolled spread of noxious weeds, it could have significant effects for some wildlife populations. Not only will habitat be further reduced and potentially eliminated in some areas, but also demands on remaining native prairie from different wildlife species and human uses, such as livestock grazing, will increase. While this would occur everywhere across the DPG as noxious weeds spread, it would be most degrading on the SNG because the tall grass prairie is already a scarce resource and noxious weeds are likely to spread most drastically on the SNG if left uncontrolled.

Alternative 2 – Proposed Action

Direct and Indirect Effects

General Direct Effects of Herbicides on Animal Groups

The Forest Service has prepared human health and ecological risk assessments for herbicides which characterize the risks of each herbicide to terrestrial and aquatic wildlife species (USDA Forest Service 1998, 2003a – 2003c, 2004a – 2004g). The risk assessments relate the expected direct effects of exposure and ingestion. They do not address the indirect effects of habitat alteration. In general, the risk assessments for herbicides included in the Proposed Action indicate that it is possible to have some adverse effects; however, effects are generally unlikely; would be at low toxicity levels that would cause discomfort or sickness, but not death; and would affect individuals, not populations. Two potential concerns are identified: 1) Use of the more toxic formulations of glyphosate near surface water is not prudent because of potential hazards to fish. 2) Use of triclopyr at high application rates is a concern for birds and mammals. Neither of these scenarios (high application rates and near water in the case of glyphosate) is likely under normal Forest Service applications, but are included as design criteria nevertheless.

The risk characterizations for both terrestrial and aquatic species are limited by the relatively few animal and plant species on which data are available compared to the large number of species that could potentially be exposed. This limitation and consequent uncertainty is common to most if not all ecological risk assessments. Given the information available, there is low concern for direct effects on any fish or wildlife species with proper use of herbicides.

General Effects of Herbicides on Habitat

The Vegetation section describes the general affects of herbicides on non-target vegetation. Herbicides can affect habitat by killing, injuring or suppressing non-target vegetation that is necessary or desirable habitat for wildlife species. On the DPG this is especially a concern for sensitive butterfly species that are associated with particular forbs during their life cycles, and

have low vagility to move into different areas when their habitats are impacted (USDI Fish and Wildlife Service 2005d). The degree to which herbicides affect non-target vegetation varies by specific herbicides, with some having more broad impacts than others (see Vegetation Report). Design criteria identified at the end of this document will reduce effects of herbicides on habitat to acceptable levels.

Aerial Application of Herbicides

In general, aerial application of herbicide is a concern because there is more potential for drift of herbicide into non-target areas than there is when ground-based equipment is used. On the DPG, aerial application would be limited to relative large, heavily infested areas or remote, inaccessible areas. Following herbicide label instructions should eliminate most concern. Additional design criteria identified in the “Design Criteria” section of Chapter 2 would protect sensitive habitats.

General Effects of Non-Herbicide Treatments on Wildlife and Fish

Bio-Controls

Bio-controls are permitted by the USDA Animal and Plant Health Inspection Services (APHIS) after rigorous screening and assessment to ensure their safety in the environment and the ability of the bio-control to limit its effects to target species (USDA APHIS PPQ 2000 and USDA APHIS 2006). The assessment includes environmental analysis, host specificity and other testing, consultation with the US Fish and Wildlife Service, and review by the Technical Advisory Group for Biological Control Agents of Weeds. Screening and assessment have become more comprehensive over time as concern for effects to native plants and animals has increased.

Even though control agents are reviewed and approved by APHIS prior to release in this country, there is a slight risk that an approved agent the Forest Service releases may unintentionally affect native plants or animals. There also remains the possibility that regardless of what the Forest Service does, unapproved agents or agents known to affect non-targets will spread from neighboring lands to NFS lands. Successful implementation of bio-controls would have beneficial impacts on native prairie habitat by restoring native vegetation and reducing or preventing spread of noxious weeds.

Revegetation

Cultural treatments could have short-term, site-specific impacts to wildlife through disturbance, but they would not be significant. Cultural treatments would have beneficial impacts on native prairie habitat by restoring native vegetation and reducing or preventing spread of noxious weeds. There would be no effect to fish.

Grazing with sheep or goats

Goats or sheep would not be used on the LMNG where bighorn sheep occur due to concern for spread of disease from domestic animals to wild bighorn sheep. In other areas, sheep and goat grazing would be concentrated on target noxious weeds. Sheep and goats, because they graze in concentrated herds, can destroy nests of ground-nesting birds. Most use of goats and sheep on

the SNG has been in woodland areas, which have fewer ground-nesting birds than open prairie, thereby reducing impacts. Sheep and goats used for leafy spurge control tend to graze primarily on spurge and have little impact on other plant species, thus improving overall plant species diversity which would be positive for wildlife (Dahl et al. unknown date and Hanson 1994). Overall, sheep and goats could have some disturbance impacts on individual wildlife species, particularly ground-nesting birds. However, sheep and goat grazing would have long-term beneficial impacts on native prairie habitat by restoring native vegetation and reducing or preventing spread of noxious weeds. There would be no effect to fish.

Mechanical

Mechanical treatments as proposed would occur over small areas. They could have short-term, site-specific impacts to wildlife through disturbance, but they would not be significant. They would have beneficial impacts on native prairie habitat by restoring native vegetation and reducing or preventing spread of noxious weeds. There would be no effect to fish.

Prescribed Burning

Prescribed burning could impact some individuals that occur in areas of noxious weeds through disturbance from burning, direct mortality in some cases, and temporary loss of habitat until burned areas recover. Generally, prescribed burning for noxious weed control would occur in areas where habitat suitability is already compromised by noxious weed invasion. Grasslands Plan standards and guidelines and project design criteria (see Design Criteria section) would limit effects to acceptable levels, protecting populations. Long-term effects would be beneficial by restoring native vegetation and reducing or preventing spread of noxious weeds.

Effects on TES and MIS Species

Effects of the Proposed Action on TES and MIS are summarized in Table 19.

TABLE 19: EFFECTS DETERMINATIONS FOR THREATENED, ENDANGERED, SENSITIVE AND MANAGEMENT INDICATOR SPECIES FOR ALTERNATIVE 2, THE PROPOSED ACTION

SPECIES	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 2 ¹	DETERMINATION FOR BIOLOGICAL ASSESSMENT (T&E) AND BIOLOGICAL EVALUATION (S) ²	REASON
WHOOPING CRANE	Low	No Effect	Transient, low use of DPG with few weeds in stopover sites.
BALD EAGLE	Low	No Effect	Low use of DPG; weeds not affecting, so habitat control will not affect animals.
GRAY WOLF	Low	No Effect	Transient, low use of DPG; weeds not affecting habitat, so control will not affect animals.
BLACK-FOOTED FERRET	Low	No Effect	Weeds not affecting potential habitat, so control measures will not affect it either.
BAIRD'S SPARROW	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
BURROWING OWL	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
GREATER PRAIRIE CHICKEN	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
SAGE GROUSE	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
LOGGERHEAD SHRIKE	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
LONG-BILLED CURLEW	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
SPRAGUE'S PIPIT	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
BLACK-TAILED PRAIRIE DOG	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.

SPECIES	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 2 ¹	DETERMINATION FOR BIOLOGICAL ASSESSMENT (T&E) AND BIOLOGICAL EVALUATION (S) ²	REASON
CALIFORNIA BIGHORN SHEEP	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
AROGOS SKIPPER	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals or habitat in the short-term, but would be minimized through design criteria; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
BROAD-WINGED SKIPPER	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals or habitat in the short-term, but would be minimized through design criteria; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
DAKOTA SKIPPER	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals or habitat in the short-term, but would be minimized through design criteria; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
DION SKIPPER	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals or habitat in the short-term, but would be minimized through design criteria; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
MULBERRY WING	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals or habitat in the short-term, but would be minimized through design criteria; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
OTTOE SKIPPER	Low	MIIH – short-term BI – long-term	Disturbance may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
POWESHEIK SKIPPER	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals or habitat in the short-term, but would be minimized through design criteria; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
REGAL FRITILLARY	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals or habitat in the short-term, but would be minimized through design criteria;

SPECIES	POTENTIAL FOR NEGATIVE EFFECTS TO POPULATIONS FROM ALTERNATIVE 2 ¹	DETERMINATION FOR BIOLOGICAL ASSESSMENT (T&E) AND BIOLOGICAL EVALUATION (S) ²	REASON
			restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
TAWNY CRESCENT	Low	MIIH – short-term BI – long-term	Disturbance and reduction of desirable forbs in some areas may affect individuals in the short-term, but would be minimized through woody draw management zone design criteria; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.
NORTHERN REDBELLY DACE	Low	NI	With design criteria, there should be no impact to northern redbelly dace.
PLAINS SHARP-TAILED GROUSE	Low		Disturbance and reduction of desirable forbs in some areas may affect individuals in the short-term; restoration of native vegetation and reduced/prevented spread of noxious weeds would be beneficial in the long-term.

1 Low means that negative effects to populations of the species would be unlikely to occur. Moderate means that negative effects to populations of the species could occur but the likelihood is uncertain. High means that negative effects to populations of the species would be likely to occur.

2 Biological Evaluation (BE) determinations: NI=No Impact, MIIH= May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Towards Federal Listing Or Cause a Loss of Viability To the Population or Species, BI=Beneficial Impact

Cumulative Effects

Past, current and foreseeable activities on both National Forest System lands of the DPG and intermingled private lands that are most likely to combine with noxious weed control effects are the same as those identified for Alternative 1, No Action. The overall effect of combining noxious weed control with these other activities would be beneficial in the long-term. As noxious weeds are controlled, there will be less competition between wildlife, livestock and other human uses for remaining native habitats.

HUMAN HEALTH

This section analyzes the potential for adverse health effects to workers and members of the public from the Alternatives, particularly Alternative 2, which includes treatment of noxious weeds using herbicides and other treatment methods. Most of the information and analysis used to estimate human health effects of herbicides is cited from Forest Service risk assessments prepared for each individual herbicide by Syracuse Environmental Research Associates, Inc. (SERA) (USDA Forest Service 1998, 2003a – 2003c, 2004a – 2004g). Specific methods used in preparing the Forest Service herbicide risk assessments are described in Preparation of Environmental Documentation and Risk Assessments (SERA 2001).

The following discussion summarizes the detailed information contained the Human Health Report which is located in the Project Record.

Human Health Affected Environment

The Dakota Prairie Grasslands (DPG) has approximately 57,000 acres of known noxious weeds located across approximately 1.3 million acres. The Forest Service, in conjunction with county governments, grazing associations and others, has been treating noxious weeds on the DPG since the late 1960s or early 1970s. Treatment methods have gradually developed over the years to embrace the current integrated treatment approach which includes tools such as herbicides, biological agents, seeding, species specific grazing by goats and sheep, and mechanical methods. Over the last five years the DPG has been treating between 8,100 and 13,000 acres annually utilizing a combination of the above noted treatment tools.

Noxious weeds can directly affect humans, and the control of weeds also has potential to affect human health. For weeds, concerns are related to the impacts from exposure to pollens and plant chemicals. For weed control, concerns are related to the exposure to toxicants found in the herbicides used in ground and aerial applications. Mechanical methods of control may expose workers to plant chemicals, which can cause a reaction in some workers. To date biological, revegetation, and grazing control methods have not been shown to be of concern from a human health standpoint.

Alternative 1 – No Weed Treatment

Direct and Indirect Effects

Alternative 1 would pose no human health risk from exposure to herbicides or other treatment methods because no noxious weed control activities would be initiated. Under this alternative, weeds would continue to spread on the DPG impacting individuals affected by allergies and minor skin irritations caused by certain noxious weed species.

Cumulative Effects

If no control measure were enacted, noxious weeds would continue to spread. As noxious weeds continued to spread they would threaten ecosystem health by displacing native species. The continued spread of noxious weeds would reduce biological diversity, impact threatened and endangered species, degrade wildlife habitat, modifies vegetative structure and species composition, changes fire and nutrient cycles, and degrade soil structure.

To say no control activities would occur is not entirely accurate. Herbicide treatment of National Forest System lands under road right-of-way (ROW) agreements with the different counties within the DPG would continue. In these situations, the authority to undertake treatments is vested within those agencies. Biological controls would be allowed to progress naturally, but no supplementation would occur. Ongoing weed prevention and education would still continue, but additional measures would not. Despite these activities the cumulative effect would be the continued expansion of noxious weeds.

The unchecked expansion of noxious weeds would provide an abundance of pollen and toxic plant chemicals which could affect the health of that portion of the public that is allergic to these substances. Also some portion of the public may be exposed to herbicide treatments completed under county or state authorities along ROWs. Despite these possibilities there would be no significant cumulative effect on human health under this alternative.

Alternative 2 – Proposed Action

Direct and Indirect Effects

Herbicides

According to the SERA (2003-2004) herbicide risk assessments, herbicides applicators are at a higher risk than the general public from herbicide use. Risks associated with backpack, boom, and aerial application of herbicides were estimated to be the highest, due to workers receiving repeated exposures that may remain on the worker's skin for an extended time period.

Length of Exposure

The magnitude of a dose that is hazardous to health depends on whether a single dose is given all at once (acute exposure), multiple doses are given over longer periods (chronic exposure), or regularly repeated doses or exposures over periods ranging from several days to months (sub-chronic). The EPA develops reference doses, which are an estimate of a daily dose over a 70-year life span that a human can receive without an appreciable risk of deleterious effects. The reference dose is a conservative threshold of toxicity relative to this analysis because it assumes daily exposure over a 70-year life span. Actual worker exposure for herbicide treatments in this project would typically be between 20 to 80 days each year for substantially less than 70 years.

Route of Exposure

The usual exposure routes for chemicals are ingestion, inhalation and direct contact with the skin or eyes. Adsorption of chemicals from the small intestine is quicker and more complete than from the skin.

Skin acts as a protective barrier to limit and slow down movement of a chemical into the body. Studies of pesticides applied to the skin of humans indicate that for many people, only about ten percent or less passes into the blood. In contrast, adsorption of chemicals from the small intestine is quicker and more complete than from the skin.

Required personal protective equipment used by workers during herbicide application (gloves, waterproof boots, long sleeved shirts and pants) is designed to reduce exposure to sensitive areas on the body.

Herbicide Toxicity

Herbicides are not risk-free. They have potential for toxicity from both acute (short-term) and chronic (long-term) exposure. The reason EPA allows the use of products with the potential to cause toxicity is that “when used according to label instructions” the risks of the herbicide are outweighed by the benefits. Reading and following instructions on labels is the best way to insure personal safety.

Acute toxicity can be a function of the amount of toxicant received and the route of administration. Table 20 identifies the acute reactions of the herbicides proposed for use.

TABLE 20. ACUTE REACTIONS OF THE HERBICIDES PROPOSED FOR USE IN THIS ANALYSIS. (INFORMATION VENTURES INC., PESTICIDE FACT SHEET AND EXTOTOXNET, PESTICIDE INFORMATION PROFILES, OREGON STATE UNIVERSITY)

HERBICIDE	ACUTE ORAL TOXICITY	ACUTE DERMAL TOXICITY	ACUTE INHALATION	PRIMARY EYE IRRITATION	PRIMARY SKIN IRRITATION
DICHLOROPHENOXYACETIC ACID (2,4-D)	Caution	Caution	Caution	Danger-Poison	Caution
CHLORSULFURON	None	Caution	Caution	Caution	None
CLOPYRALID METHYL	Caution	Caution	Caution	Warning	None
DICAMBA	Caution	None	None	Danger-Poison	None
GLYPHOSATE	None	None	Caution	Warning	None
IMAZAPIC	None	Caution	Caution	None	None
IMAZAPYR	None	Caution	Caution	Caution	Caution
METSULFURON METHYL	None	Caution	Caution	Warning	Caution
PICLORAM	Caution	Caution	None	Caution	None
SULFOMETURON METHYL	Caution	Caution	Caution	None	None
TRICLOPYR	Caution	Caution	Caution	Caution/Danger	Caution

Chronic toxicity results from prolonged, repeated, or continuous exposure to a chemical, typically at levels lower than necessary to cause acute toxicity. It often demonstrates a delayed response. Public concerns toward herbicides generally focus on potential chronic toxicity. Sublethal poisoning or exposure may be expressed by any of the following: skin/eye irritation; nervous system disorders; reproduction system disorders; damage to other organ systems (liver, kidney, lungs, etc.); birth defects; mutations; and cancer.

The EPA evaluates carcinogenicity (cancer), teratology (birth defects), reproductive, and mutagenicity (gene mutation) study results of herbicide effects to animals during the herbicide registration process. The study data is used to make inferences relative to human health. From these studies, chronic toxicity of herbicides proposed for use on the DPG can be summarized. Appendix D compares chronic effects between various herbicides.

There is considerable information on sub-chronic and chronic effects due to exposure to herbicides in controlled animal studies. The information provided in Appendix D suggests that the herbicides proposed for use by the DPG are not carcinogenic, and there is no evidence to suggest that herbicides proposed for use by the DPG would result in carcinogenic, mutagenic, teratogenic, neurological or reproductive effects based on anticipated exposure levels to the worker and the public. Appendix D, however, indicates that there is some possible concern associated with 2,4-D related to carcinogenic, reproductive and mutagenic effects. The EPA is currently reviewing 2,4-D and will develop a final position related to cancer, reproduction, and mutagenic effects.

Herbicide Toxicity Hazard Quotients

A Hazard Quotient (HQ) is the ratio between the estimated dose (the amount of herbicide received from a particular exposure scenario) and the Reference Dose (RfD). An RfD is a dose level determined to be safe by the EPA over a lifetime of daily exposure. When a predicted dose is less than the RfD, then the HQ (estimated dose/RfD) is less than 1, and toxic effects are unlikely for that specific herbicide application. A comparison of herbicide toxicity hazard quotients for workers and the general public, at typical levels of exposure, are shown in Tables 21 and 22.

TABLE 21. COMPARISON OF HERBICIDE TOXICITY HAZARD QUOTIENTS FOR WORKERS AT TYPICAL LEVELS OF EXPOSURE.

HERBICIDE	REFERENCE DOSE (RfD) ² (MG/KG/DAY)	ACUTE / ACCIDENTAL EXPOSURE ¹	CHRONIC/ LONG-TERM EXPOSURE		
	Acute/Chronic	Hands, Gloves, Spills –Hands & Legs	Ground Spray (Backpack)	Broadcast Spray (Boom Spray)	Aerial Application
DICHLOROPHOXYACETIC ACID (2,4-D)	.01/.01	.1725	1.3125	2.24	1.47
CHLORSULFURON	.25/.02	.00002	.04	.06	.04
CLOPYRALID	.75/.15	.0008	.03	.05	.03
DICAMBA	0.1/.045	.0130	.5833	.9956	N/A for Forest Service applications
GLYPHOSATE	2/2	.001	.01	.02	.01
IMAZAPIC	.5/.5	.1	.003	.001	.003
IMAZAPYR	2.5/2.5	.001	.002	.004	.0003
METSULFURON METHYL	.25/.25	.000008	.002	.003	.002
PICLORAM	.2/.2	.005	.02	.04	.03
SULFOMETURON METHYL	.87/.02	.00003	.03	.05	.03
TRICLOPYR	1/.05	.02	.3	.4	.3

Information for Table 21 was taken from SERA (2003-2004) Risk Assessment herbicide worksheets located on the world wide web at <http://www.fs.fed.us/foresthealth/pesticide/risk.shtml>. Copies of the relevant worksheets are located in the Project Record.

¹Typical acute exposure is modeled for four different situations i.e., immersion of hands for duration of one minute, contaminated gloves, spills on hands, and spills on lower leg. The last three are all for a duration of one hour. The value identified in the table is for the category with the highest hazard quotient of the four categories.

²RfDs are set by the EPA.

TABLE 22. COMPARISON OF HERBICIDE HAZARD QUOTIENTS FOR THE GENERAL PUBLIC AT TYPICAL LEVELS OF EXPOSURE.

TYPE OF EXPOSURE	*	2,4-D	CHLOR-SULFURON	CLOPYRALID	DICAMBA	GLYPHOSATE	IMAZAPIC	IMAZAPYR	MET-SULFURON METHYL	PICLORAM	SULFOMETUR ON METHYL	TRICLOPYR
ACUTE/ACCIDENTAL EXPOSURE												
DIRECT SPRAY, ENTIRE BODY	C	2.6055	.0003	.01	.1986	.02	.05	.009	.0001	.004	.0004	.2
DIRECT SPRAY, LOWER LEGS	W	.2618	.00003	.001	.0200	.002	.005	.0009	.00001	.0004	.00004	.5
DERMAL, CONTAMINATED VEGETATION	W	.2988	.00008	.0007	.0171	.001	.001	.0005	.00002	.0006	.00002	.6
CONTAMINATED FRUIT	W	1.1760	.003	.005	.2352	.004	.002	.002	.001	.02	.0006	.06
CONTAMINATED WATER, SPILL	C	34.0935	.02	.3	9.7410	.7	.2	.1	.02	.4	.03	.3
CONTAMINATED WATER, STREAM	C	1.1278	.002	.0007	.0557	.002	.000008	.00003	.00002	.007	.000004	.007
CONSUMPTION OF FISH, GENERAL PUBLIC	M	10.2349	.0007	.01	.2924	.008	.0008	.002	.00005	.01	.002	.0005
SUBSISTENCE POPULATIONS	M	49.8787	.003	.05	1.4251	.04	.004	.009	.0002	.06	.01	.002
CHRONIC/ LONG-TERM EXPOSURE												
CONTAMINATED FRUIT	W	.2609	.01	.01	.0778	.002	.0002	.0008	.0006	.003	.004	.03
CONSUMPTION OF WATER	M	.0057	.00005	.0005	.0036	.00003	.0000001	.0000005	.0000007	.00005	.000003	.02
CONSUMPTION OF FISH, GENERAL PUBLIC	M	.0003	.0000004	.000002	.00002	.00000005	6×10^{-11}	1×10^{-9}	2×10^{-9}	.0000003	.00000005	.000006
SUBSISTENCE POPULATIONS	M	.0023	.000003	.00002	.00014	.0000004	5×10^{-10}	.00000001	.00000002	.000002	.0000004	.00004

*C=child, W=woman, M=man

Tables 21 and 22 indicate that most of the herbicides included in this analysis have modeled HQs of less than 1 and do not pose acute or chronic health risks to workers or the general public, assuming label directions are followed and personal protective equipment is utilized. However, two herbicides, 2,4-D and Dicamba, modeled at 1 and 2 lbs/acre, respectively, do show potential effects from toxicity modeling. 2,4-D, may have chronic effects to workers and acute/chronic effects to the general public. Chronic exposure to workers is related to ground (backpack and boom sprayers) and aerial application. Acute exposure to the public is associated with consumption of contaminated water and fish, and direct application of 2,4-D to the entire unclothed body. Chronic exposure is associated with the long-term consumption of contaminated fruit. Dicamba may have an acute effect on subsistence populations if contaminated water is consumed by the public.

2,4-D Worker Effects

The hazard quotient for 2,4-D in both Tables 21 and 22 is based on the RfD of 0.01 mg/kg/day, which is derived from EPA. An RfD is an estimate of daily exposure (mg/kg/day) to the human population that is likely to be without risk of deleterious effects during a lifetime. As discussed on page 3-55 of the SERA (1999) risk assessment for 2,4-D, there is no evidence that overt signs of toxicity are plausible at exposures to dose levels less than 1 mg/kg/day of 2,4-D. This assessment is supported by the categorical regression analysis of the animal toxicity data on 2,4-D. Thus, overt signs of toxicity are not expected to occur in workers involved in ground or aerial applications of 2,4-D for which central (typical) estimates of the absorbed dose range from 0.013 to 0.022 mg/kg/day. This assessment is consistent with data regarding human experience with the use of 2,4-D. Even at the upper limits of exposure (i.e., 0.08-0.15 mg/kg/day) there are not likely to be overt signs of toxicity. For workers involved in ground or aerial applications of 2,4-D, all of the exposure assessments are based on an application rate of 1 lb a.e./acre. Nonetheless, even at the highest anticipated application rate of 2 lbs a.e./acre, no overt signs of toxicity would be expected.

The 2,4-D risk assessment on page 3-57 (USDA Forest Service 1998) states that “the best interpretation of the somewhat complex risk characterization for workers is that 2,4-D can be applied safely if thorough and effective methods are used to protect workers and minimize exposure. If effective measures of hygiene are not employed, occupational exposure to 2,4-D could result in adverse but probably not overtly toxic effects. For workers involved in the aquatic application of 2,4-D additional protective measures may be necessary including limitations on the amount of 2,4-D that is handled”.

2,4-D General Public

Table 22 presents modeled information identifying different types of exposure scenarios that might involve the general public. This information indicates a possible concern with acute short-term exposure of the public to 2,4-D through consumption of contaminated water and fish, and direct application of 2,4-D to the entire unclothed body. The modeling also identifies a possible chronic long-term effect with the consumption of contaminated fruit.

The 1999 SERA report states “Like the worker exposure scenarios, some accidental public exposures are at doses that substantially exceed the RfD (i.e., direct spray, consumption of contaminated water, fish, or fruit shortly after application). These exposures, however, would be relatively short-term. In addition, many of the exposure scenarios associated with these higher levels of exposure are dominated by *arbitrary uncertainty*. In other words, the amount of

exposure is dependent on the magnitude of a spill or some other accidental event. These arbitrary assessments are included in the risk assessment to illustrate the potential consequences of such accidents but the likelihood of such event occurring is probably very low” (SERA 1999).

The SERA report goes on to identify that “the exposures associated with the longer-term consumption of contaminated water are much more plausible and based on modest modeling extrapolations from monitoring studies. Although 2,4-D is not a highly persistent chemical in water, compared with compounds like PCBs, it is persistent enough that it might contaminate groundwater and surface waters. As illustrated in Table Y, however, the plausible levels of longer term (chronic) exposures—based on conservative assumptions—are substantially below a level a concern” (SERA, 1999, p. 3-59).

The concern about chronic effects related to long-term consumption of fruit contaminated with 2,4-D is not relevant to this analysis. There are no commercial or private fruit orchards located on or adjacent to the DPG. Also herbicide application, at the closest, will occur a mile or more from the nearest population center.

The Forest Service risk assessment (USDA Forest Service 1998), on page 3-60, concludes that “The most reasonable verbal interpretation for these conflicting risk characterizations is that, except for accidental exposures or extremely atypical and perhaps implausible ambient exposures to 2,4-D in vegetation, the risk assessment suggests that the normal use of 2,4-D will not pose any identifiable risk to the general public”.

Dicamba Workers and General Public

Typical application rates of Dicamba pose no long-term chronic exposure, to either workers or the public. Dicamba may be irritating to the eyes and cause mild and transient skin irritation, which are likely to be the most common effects as a consequence of mishandling dicamba. These effects can be minimized or avoided by prudent industrial hygiene practices during the handling of dicamba.

The greatest risk of dicamba appears to be associated with acute or accidental exposure of the public to contaminated water resulting from a spill. Keeping the public away from an accident scene, which resulted in contamination of water, until time and dilution can render a spill harmless, is the most likely mitigation for this situation. Subsistence populations may also be at risk from consumption of contaminated water and fish.

Synergistic Interactions

Several of the herbicides considered in this Alternative can be combined with other herbicides to increase the range of effective control. Synergistic effects (multiplicative) are those effects resulting from exposure to a combination of two or more chemicals that are greater than the sum of the effects of each chemical alone (additive). Instances of chemical combinations that cause synergistic effects are relatively rare. Reviews of the scientific literature on toxicological effects and toxicological interactions of agricultural chemicals indicate that exposure to a mixture of herbicides is more likely to lead to additive rather than synergistic effects.

The Forest Service risk assessments indicate that the kind and amount of inert material and adjuvants included in the different herbicides proposed for use would not likely result in adverse health effects to workers or the general public. The toxicity assessments, which are thought to cover the impurities in the technical grade herbicides, also seem to indicate a lack of health

concerns. This assumes that herbicide labels are followed and that correct personal protective equipment is available and used.

Herbicide Drift

Spray drift is largely a function of droplet particle size, release height, and wind speed. Other factors that control drift, to a lesser degree, include the type of spray nozzle used, the angle of the spray nozzle, and the length of the boom. The largest particles, being the heaviest, would fall to the ground sooner than smaller sizes upon exiting the sprayer. Medium size particles can be carried beyond the sprayer swath (the fan shape spray under a nozzle), but all particles would deposit within a short distance of the release point. The physics of sprayers dictates that there would always be a small percentage of spray droplets small enough to be carried in wind currents to varying distances beyond the target area. Because the small droplets are a minor proportion of the total spray volume, their significance beyond field boundary rapidly declines as they are diluted in increasing volumes of air.

Drift deposition on surfaces measured downwind from aerial spray sites is typically less than one percent, and often less than 0.1 percent, of on site deposition. Drift deposition from ground equipment can be one-tenth of that from aerial application at comparable distances from a spray site.

Less information is available on the concentrations of herbicides that remain airborne at greater distances from application sites. Robinson and Fox (1978) measured airborne concentrations of herbicides at various distances from aerial spray plots. Under conditions designed to reduce drift, these researchers did not detect airborne levels of herbicides beyond 100 feet downwind of 500 foot wide spray plots (detection limit of 0.1 microgram – there are about 28 million micrograms in an ounce).

Herbicide drift associated with boom or aerial application would have short-term, very localized impacts as a result of drift. Most of the aerial drift would settle to within 100-200 feet and boom applications would settle within a fraction of those distances. Herbicide spray drift from ground or aerial treatments under Alternative 2 would not significantly affect the health of the general public or adversely affect water quality, provided environmental protection measures are implemented to avoid drift toward persons and sensitive resources. Application should be made when there is an organized wind less than 6 mph blowing away from sensitive areas. This practice combined with a buffer adjacent to sensitive areas and a drift reduction agent would likely result in no significant offsite drift. Significance in this context refers to concentrations above EPA established RfDs.

Herbicide Summary

While risks to human health exist under this alternative, they would be below a level considered safe by the EPA for all herbicides proposed for use by the DPG.

Health risks to workers are greatest for ground application of herbicides. Of those areas treated by backpack, OHV, and truck mounted delivery systems, backpack applications have the greatest potential for worker exposure to herbicides. Potential for public exposure to herbicides under Alternative 2 is low since most project areas are generally remote and away from population centers. Herbicide application will generally be a mile or more from the closest population centers within the DPG administrative areas. Both aerial and ground applications would occur

infrequently (i.e., once per year) and neither workers nor the public would receive daily exposures above the EPA reference doses, a dose considered safe by the EPA over a lifetime of daily exposure.

Also, once an herbicide dries on the plant, there is little risk that the chemical will transfer to people or animals who do not consume the treated vegetation. When applied to vegetation, the herbicides are very dilute, below the toxicity level of the chemical.

The more time spent applying herbicides increases the risk of a spill, accident, or mishap. Risk of an herbicide spill or accident is present under Alternatives 2. In such a case, workers may be directly exposed to acute concentrations of an herbicide and the general public may be secondarily exposed to a spill or release should it reach surface or groundwater. The indirect effects in the form of public exposure and disruption would be commensurate with the proximity of the spill area to the public, the amount and concentration of the herbicide, and dilution factors should the herbicide reach water. In both situations the potential effects can be mitigated through such actions as thorough washing, diluting with water, and restricting access to a spill area.

The human health analysis reveals that the herbicides in this analysis will have neither acute nor chronic health effects if 1) EPA herbicide label directions are followed, 2) personal protective equipment is used, and 3) the appropriate design criteria, identified in (Chapter 2), are implemented. Implementation of these measures will ensure that workers and the general public are not exposed to doses of herbicide that are above the reference dose (RfD) identified by the EPA. The EPA develops RfDs, which are an estimate of a daily dose over a 70-year life span that a human can receive without an appreciable risk of deleterious effects.

Mechanical Control

While there is some potential for health effects associated with mechanical treatment of weeds, required personal protective equipment such as gloves, long sleeved shirts, boots and safety glasses along with personal hygiene, would prevent injuries or irritation, and therefore no significant human health effects are anticipated by mechanical removal of weeds.

Revegetation

Potential human health risks associated with revegetation methods include exposure to dust and chaff during seeding operations. Allergic reaction can result from exposure of seed and chaff when handling seeds; however, gloves, long sleeved shirts, boots, and other personal protective equipment, as needed, would prevent injuries or irritations. Therefore, no significant human health effects are anticipated by seeding.

Biological Treatments and Grazing

The collection, transport, release, and monitoring of biocontrol organisms involves no specific human health hazards except those hazards involved in general field work and vehicle transportation.

Grazing goats and sheep is another control treatment utilized on the DPG to control leafy spurge. There are no known risks to human health resulting from the use of goats and sheep.

Prescribed Fire

Prescribed burns are associated with hazards from smoke and heat to workers and the public. Hazards to workers range from eye irritation, coughing, and shortness of breath, to severe burns that can leave permanent scars or cause mortality. Chronic exposure to smoke could lead emphysema or lung cancer.

Workers are most at risk of adverse health effects from smoke, but sensitive members of the public may also experience health effects. Prescribed burns may “escape” control and endanger the public. To reduce the risks of burn escapes and lingering smoke, the Forest Service has special requirements for planning and implementing prescribed burns. All prescribed burn projects require a Burn Plan, which includes a burning prescription, a description and discussion of fuels, weather, and timing; how to conduct the burn; and safeguards. The safeguards section of the plan addresses all precautions needed to confine the burn to the prescribed area. In addition, the Forest Service has established qualification standards and training requirements for personnel involved in prescribed burning.

CUMULATIVE EFFECTS

To date there are no readily available statistics of any adverse health effects being reported as a result of the use of or exposure to herbicides used for treating noxious weeds on the DPG. It is not known if application of herbicides on adjacent private or federal lands has had an additive effect on human health for people utilizing Forest Service lands, however, if label instruction were followed this seems unlikely.

With respect to herbicide applications, the SERA risk assessments specifically considered the effect of repeated exposure in that the chronic (long-term) RfD is used as an index of acceptable exposure. The daily dose rather than the duration of exposure determines the toxicological response. Consequently, repeated exposure to levels below the toxic threshold should not be associated with cumulative effects. If EPA labels are followed the dose a worker or a person of the general public would be exposed to would be below the RfD. Exceptions to this could include acute exposure through an accidental spill or improper handling of an herbicide. Even in these situations immediate mitigation such as washing, prohibiting use or consumption of contaminated water or vegetable matter can be used to reduce or eliminate potential acute effects.

CONSISTENCY WITH GRASSLANDS PLAN

The Proposed Action is consistent with the goals, objectives, standards and guidelines of the Dakota Prairie Grasslands Land and Resource Management Plan (USDA Forest Service 2001b). Noxious weed management direction from the Grasslands Plan is identified in Chapter 1 of this document.

SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by the Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Implementation of the Proposed Action may result in the short-term loss of non-target species and localized biodiversity in areas where herbicides, some mechanical, and fire treatment methods are used. Grazing and some mechanical treatments may affect non-target species through temporary loss of biomass but these plants are generally not killed by these types of treatment actions. Biological agents are host specific and do not have an effect on non-target species. Overall the long-term effect of all identified noxious weed treatments, in this analysis, is increased biodiversity and restoration of the natural productivity for the DPG through the eradication of noxious weeds.

The No Action alternative may result in losses in biodiversity, forage production, and wildlife habitat due to the anticipated continued spread of noxious weed species. Some species of sensitive plant and wildlife species may be affected by this loss of habitat. The SNG supports one of three metapopulations of the orchid remaining in North America. If noxious weed treatment were to cease, this species could be imperiled to the point of listing it as endangered.

UNAVOIDABLE ADVERSE EFFECTS

Treatment methods in the Proposed Action bring with them the likelihood of some unavoidable environmental impacts. As discussed in this chapter, adverse effects would primarily involve localized, short-term impacts to non-target plants. Although it is possible that minute amounts of herbicide would migrate from treatment sites, alternative design criteria would prevent environmentally significant concentrations of herbicide from reaching surface or groundwater. Following label instructions and the use of prescribed personal protection equipment would protect applicators and the public from unacceptable exposure to herbicides and threats to human health. The other identified treatment actions under the Proposed Action have no known unavoidable adverse effects. Thus, under reasonably foreseeable circumstances, there would be no significant environmental effects.

No unavoidable adverse effects, except those discussed above, are anticipated from the No Action alternative.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Irreversible commitments of resources are those that cannot be regained, such as the extinction of a species or the removal of mined ore. Irretrievable commitments are those that are lost for a period of time such as the temporary loss of timber productivity in forested areas that are kept clear for use as a power line rights-of-way or road.

The Proposed Action may result in some short-term irretrievable commitments of resources as some non-target species of vegetation are likely to be affected in the short-term, but would be regained in the long-term. These commitments would be localized and would not have significant effects on biodiversity, wildlife habitat or forage production.

Alternative 1 would result in an irretrievable loss of biodiversity, wildlife habitat, and forage production.

OTHER REQUIRED DISCLOSURES

NEPA at 40 CFR 1502.25(a) directs “to the fullest extent possible, agencies shall prepare draft environmental impact statements concurrently with and integrated with ...other environmental review laws and executive orders.”

This Proposed Action is consistent with the Endangered Species Act of 1973.

The Forest Service will consult with the North Dakota State Historic Preservation Office (NDSHPO) and the South Dakota State Historic Preservation Office (SDSHPO) to ensure compliance with the National Historic Preservation Act of 1966, as amended in 1999.

The Proposed Action is consistent with The Clean Water Act of 1972 as amended in 1977 and 1987. Consistency with the Act is assured through the application of the design criteria identified in Chapter 2.

Executive Order 12898, issued in 1994, ordered federal agencies to identify and address the issues of environmental justice (i.e. adverse human health and environmental effects of agency programs that disproportionately impact minority and low income populations). The Environmental Justice analysis conducted for this FEIS determined that the Proposed Action will not have a disproportional impact on minority or low income populations. The Environmental Justice analysis is contained in the Project Record.

All alternatives are consistent with Environmental Protection Agency, Occupational Health and Safety Administration, State and Federal water and air quality regulations, and Forest Service regulations (FSM 2080) regarding pesticide use and worker safety.

CHAPTER 4. CONSULTATION AND COORDINATION

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The following Dakota Prairie Grasslands employees contributed to this environmental impact statement:

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DISTRIBUTION OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT

This final environmental impact statement has been distributed to agencies, organizations, and individuals who provided comments during the comment period and to individuals or organizations who specifically requested a copy of the document. The FEIS was made available on the Internet to any interested party.

REFERENCES

Note to readers: Not all the references may be cited in the FEIS – some were used or cited in the specialists reports supporting this document.

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GLOSSARY

Abbreviations

Ae: Acid equivalent

Ai: Active ingredient

APHIS: Animal and Plant Health Inspection Service (aka USDA APHIS)

AEL: Adverse-effect level

BE/BA: Biological evaluation/ biological assessment

BMP: Best management practice

CFR: Code of Federal Regulations

CRNG: Cedar River National Grassland

CR/GRNG: Cedar River and Grand River National Grasslands

DEIS: Draft environmental impact statement

DEF: Denbigh Experimental Forest

D/SEF: Denbigh and Souris Experimental Forests

DFC: Desired future condition

DPG: Dakota Prairie Grasslands

DRASTIC: Depth to water table, net Recharge, Aquifer media, Soil media, Topography (percent slope), Impact of the vadose zone, and hydraulic Conductivity (see Terms)

EIS: Environmental impact statement

EPA: Environmental Protection Agency

FEIS: Final environmental impact statement

FSH: Forest Service Handbook

FSM: Forest Service Manual

GIS: Geographic information system

GRNG: Grand River National Grassland

GVZ: Groundwater vulnerable zone

HAL: Health advisory level

HQ: Hazard quotient

Koc: Soil sorption coefficient

LD50: Lethal dose for 50 percent of population

LOAEL: Lowest observed adverse effects level

LOEL: Lowest observed effects level

LRMP: Land and Resource Management Plan (aka Grasslands Plan)

LMNG: Little Missouri National Grassland

MCL: Maximum contamination level

mg/kg: Milligrams per kilogram

mg/l: Milligram per liter

MIS: Management indicator species
Mph: Miles per hour
µg: Microgram
NEPA: National Environmental Policy Act
NFS: National Forest System
NFMA: National Forest Management Act
NOA: Notice of Availability
NOAEL: No observed adverse effects level
NOEL: No observed effects level
NOI: Notice of intent
NRIS: Natural Resource Information System
NTMB: Neotropical Migratory Bird
OHV: Off-Highway Vehicle
ppb: Parts per billion
ppm: Parts per million
RD: Ranger District
RfD: Reference dose
ROD: Record of Decision
SEF: Souris Experimental Forest
SNG: Sheyenne National Grassland
SMZ: Streamside management zone
SERA: Syracuse Environmental Research Associates
TE: Threatened and Endangered species
TEPS: Threatened, Endangered, Proposed and Sensitive species
USDA: United State Department of Agriculture
WPA: Wellhead protection area
WMZ: Wetland management zone:
WDMZ: Woodland management zone

Terms

Absorption: The process by which the agent is able to pass through the body membranes and enter the bloodstream. The main routes by which toxic agents are absorbed are the gastrointestinal tract, lungs, and skin.

Acid equivalent (a.e.): The acid equivalent of a salt or ester form of the active ingredient of an herbicide is that portion of the molecule that represents the parent acid form of the molecule

Active ingredient: The main ingredient which produces the desired effect.

Acute exposure: A single exposure or multiple exposures occurring within a short time (24 hours or less).

Additive effect: A situation in which the combined effects of two herbicides is equal to the sum of the effect of each herbicide given alone. The effect most commonly observed when two herbicides are given together is an additive effect.

Adjuvant(s): Formulation factors used to enhance the pharmacological or toxic agent effect of the active ingredient.

Adsorption: The tendency of one herbicide to adhere to another material.

Affected Environment: The physical, biological, social, and economic environment where human activity is proposed.

Aquatic ecosystems: The stream channel, lake, or estuary bed, water, biotic communities, and habitat features that occur therein.

Assay: A kind of test (noun); to test (verb).

Best Management Practices (BMPs): United States Environmental Protection Agency and State of California approved management practices designed to protect, maintain, or improve water quality by preventative rather than corrective means.

Candidate Species: Species for which the U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposed rule to list the species for protection under the Endangered Species Act.

Carcinogen: An herbicide capable of inducing cancer.

Chronic exposure: Long-term exposure studies often used to determine the carcinogenic potential of herbicides. These studies are usually performed in rats, mice, or dogs and extend over the average lifetime of the species (for a rat, exposure is 2 years).

Contaminants: For herbicides, impurities present in a commercial grade herbicide. For biological agents, other agents that may be present in a commercial product.

Cumulative effects: Changes as a result of more than one action that may enhance or degrade a specific site.

Cumulative exposures: Exposures that may last for several days to several months or exposures resulting from program activities that are repeated more than once during a year or for several consecutive years.

Dermal Toxicity: Toxicity of a material as tested on the skin, usually on the shaved belly of a rabbit; the property of a pesticide to poison an animal or human when absorbed through the skin.

DRASTIC: This is a model developed by the Environmental Protection Agency, to evaluate the potential for ground-water pollution.

Draft Environmental Impact Statement: The statement of environmental effects required for major Federal actions under Section 102 of the National Environmental Policy Act (NEPA), and released to the public and other agencies for comment and review.

Drift: That portion of a sprayed herbicide that is moved by wind off a target site.

Endangered Species: Any species listed in the *Federal Register* as being in danger of extinction throughout all or a significant portion of its range.

Endocrine: The system in the body consisting of organs that generates compounds that are transported elsewhere in the body and used for regulation of some other part of the body. Examples are the thyroid, the adrenals, and the pituitary glands.

Ephemeral stream: A shallow, trough-like depression in the landscape that may be hydraulically connected to stream channels down slope. Swales are sometimes referred to as those ephemeral channels having an indefinable channel and no evidence of scour or deposition. Upslope precipitation, as rainfall or snowmelt, is generally concentrated in swales and directed towards definable stream channels as subsurface flow.

Forage: Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.

Forbs: Any herbaceous plant other than a grass.

Fragmentation: The process of reducing the size and continuity of patches of habitat. For purposes of this FEIS, fragmentation is used in reference to the grasslands.

Grasslands Plan: The Dakota Prairie Grasslands Land and Resource Management Plan.

Groundwater Vulnerable Zone: Shallow groundwater underlying permeable soils are especially vulnerable to contamination from some herbicides and constitute Groundwater Vulnerable Zones (GVZs). These areas are roughly coincident with those that have a high Pesticide DRASTIC score (≥ 160).

Half time or half-life: For compounds that are eliminated by first-order kinetics, the time required for the concentration of the herbicide to decrease by one-half.

Hazard Quotient: A Hazard Quotient (HQ) is the ratio between the estimated dose (the amount of herbicide received from a particular exposure scenario) and the Reference Dose (RfD).

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

Intermittent stream: Any non-permanent flowing drainage feature having a definable channel and evidence of annual scour and deposition, including ephemeral streams with a definable channel and evidence of annual scour or deposition.

In vivo: Occurring in the living organism.

In vitro: Isolated from the living organism and artificially maintained, as in a test tube.

Inerts: Adjuvants or additives in commercial formulations that are not readily active with the other components of the mixture.

Irretrievable: Typically used to describe renewable resources that are lost for a period of time such as forage production from land that has been converted to another use such as an oil well pad.

Irreversible: Usually used to describe use of nonrenewable resources such as extraction of minerals or removal of cultural resources where the resource is, for all intents and purposes, lost. This term is also applicable to loss of future options or alternatives based on present decisions.

Lethal Dose 50 (LD50): The dose of an herbicide calculated to cause death in 50 percent of a defined experimental animal population over a specified observation period. The observation period is typically 14 days.

Lowest-Observed-Adverse-Effect Level (LOAEL): The lowest dose of an herbicide in a study, or group of studies, that produces statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control.

Management Indicator Species (MIS): A plant or animal species selected because their status is believed to (1) be indicative of the status of a larger functional group of species, (2) be reflective of the status of a key habitat type, or (3) act as an early warning of an anticipated stressor to ecological integrity. The key characteristic of a MIS is that its status and trend provide insights to the integrity of the larger ecological system to which it belongs.

Mesic: Moderately moist environmental conditions such as those found in draws and swales.

Mutagenic: Adverse effects on genes that may result from exposure to an herbicide or biological agent.

National Environmental Policy Act (NEPA): An Act passed in 1969 to declare a national policy encouraging productive and enjoyable harmony between humankind and the environment. This Act promotes efforts that prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humanity, while enriching the understanding of ecological systems and natural resources important to the nation. The Act established the Council on Environmental Quality.

No-Observed-Adverse-Effect Level (NOAEL): The dose of an herbicide at which no statistically or biologically significant increases in frequency or severity of adverse effects were observed between the exposed population and its appropriate control. Effects may be produced at this dose, but they are not considered to be adverse.

Noxious weeds: Refer to plants in the project area whose presence does or is likely to cause economic or environmental harm or harm to human health.

Perennial stream: A stream or portion of a stream that flows throughout the year. The groundwater table lies above the bed of the stream at all times.

pH: The negative log of the hydrogen ion concentration. A high pH (>7) is alkaline or basic and a low pH (<7) is acidic.

Reference dose: Oral dose (mg/kg/day) not likely to be associated with adverse effects over a lifetime of exposure, in the general population, including sensitive subgroups.

Reproductive effects: Adverse effects on the reproductive system that may result from exposure to an herbicide or biological agent. The toxicity of the agents may be directed to the reproductive organs or the related endocrine system. The manifestations of these effects may be noted as alterations in sexual behavior, fertility, pregnancy outcomes, or modifications in other functions dependent on the integrity of this system.

RfD: An RfD is an estimate of daily exposure (mg/kg/day) to the human population that is likely to be without risk of deleterious effects during a lifetime. The U.S. EPA derives these values.

Riparian: Situated on or pertaining to the bank of a river, stream, or other body of water. Riparian is normally used to refer to plants of all types that grow along streams, rivers, or at spring and seep sites.

Route of exposure: The way in which an herbicide or biological agent enters the body. Most typical routes include oral (eating or drinking), dermal (contact of the agent with the skin), and inhalation.

Sensitive Species: Those plant and animal species identified by Regional Foresters for which population viability is a concern, as evidenced by the following: Significant current or predicted downward trends in population numbers or density. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

Streamside Management Zone: A streamside management zone is defined as the area containing and adjacent to stream channels and floodplains. For the purposes of this project, seeps and springs that feed linear depressions or drainageways are considered part of a SMZ. Streamside management zones are generally distinguished by landforms (e.g., stream channels, point bars, natural levees, floodplains, low stream terraces) and commonly by the presence of obligate and/or facultative riparian vegetation.

Surfactant: A specific type of additive to a pesticide formulation that is intended to reduce the surface tension of the carrier, to allow for greater efficacy of the pesticide.

Synergistic effect: A situation in which the combined effects of two herbicides is much greater than the sum of the effect of each agent given alone.

Teratogenic: Causing structural defects that affect the development of an organism; causing birth defects.

Threatened Species: Any species likely to become endangered within the foreseeable future throughout all or a significant portion of its range and that has been designated in the Federal Register by the Secretary of Interior as such.

Toxicity: The inherent ability of an agent to affect living organisms adversely.

Vadose Zone: is the zone of negative water pressures above the water table. This region is generally recognized as extending from the ground surface down to the water table, which marks the upper surface of saturated conditions.

Vagility: An organism's capacity or tendency to become widely dispersed.

Viable/viability: A population that has the estimated numbers and distribution of reproductive individuals to ensure the continued existence of the species throughout its existing range (or range required to meet recovery for listed species) within the planning area.

Wellhead Protection Area: Area surrounding a municipal groundwater supply well where surface activities may be restricted or limited to protect the quality of the groundwater.

Wetland Management Zone: Wetlands are defined as areas that are inundated by surface water with a frequency sufficient to support a prevalence of obligate and/or facultative wetland vegetation and/or aquatic life that require saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, oxbow lakes, mudflats, and natural ponds. Manmade reservoirs and stock ponds are included in wetland management zones.

Woodland Management Zone: The WDMZ includes all forests, stands, copses, savannas or other areas dominated by trees and/or woody shrubs, including but not limited to green ash, American elm, Plains cottonwood, bur oak, willows, buffaloberry, chokecherry, limber pine, ponderosa pine, and Rocky Mountain juniper.

APPENDIX A

HERBICIDES, BRAND NAMES AND TARGET WEED SPECIES.

HERBICIDE NAME	PARTIAL LIST OF TRADE NAMES	TARGET WEEDS SPECIES
DICHLOROPHENOXYACETIC (2,4-D)	Hi-Dep, 40A, 2,4-D (Amines)	Leafy spurge, Canada thistle, Absinth Wormwood, Houndstongue, Hoary Cress, Buckthorn, Hemp, Perennial Sowthistle
CLOPYRALID	Transline, Stinger	Bull, Musk, Plumeless Thistle, Canada Thistle, Absinth Wormwood, Spotted and Diffuse Knapweed, Yellow Starthistle, Russian Thistle, Perennial Sowthistle
CLOPYRALID + 2,4-D	Curtail	Diffuse, Russian, and Spotted Knapweed; Bull, Canada, and Musk Thistles
SULFOMETURON METHYL	Oust	All Noxious weed species
GLYPHOSATE	Roundup, Rodeo, Glypro, Aquamaster	Leafy Spurge, Absinth Wormwood, Purple Loosestrife, St. Johnswort, Black Henbane, Buckthorn, Canada Thistle, Saltcedar
IMAZAPIC	Plateau	Leafy spurge, Russian Knapweed, Canada thistle, Hoary Cress, Dalmation toadflax, Houndstongue, Diffuse Knapweed,
IMAZAPYR	Habitat, Arsenal	Saltcedar, Purple loosestrife, Hoary cress
PICLORAM	Tordon 22K	Leafy Spurge, Bull Thistle, Musk Thistle, Plumeless Thistle, Canada Thistle, Dalmation Toadflax, Yellow Toadflax, Spotted and Diffuse Knapweed, Russian Knapweed, Yellow Starthistle, Field Bindweed, Houndstongue, St. Johnswort, Buckthorn, Perennial Sowthistle, Black Henbane, Absinth Wormwood
TRICLOPYR	Garlon 3A,	Purple Loosestrife, Bull, Musk, Plumeless thistle, Canada thistle, Spotted and Diffuse Knapweed, Russian knapweed, Yellow Starthistle, Saltcedar
TRICLOPYR + CLOPYRALID	Redeem R&P	Diffuse, Russian, and Spotted Knapweed; Bull, Canada, Plumeless, Musk, and Perennial Sow Thistles; Absinth Wormwood, Common Burdock
DICAMBA	Banvel, Dicamba, Clarity	Leafy spurge, Musk, Bull and Plumeless thistle, Canada thistle, Absinth Wormwood, Spotted and Diffuse Knapweed, Field Bindweed, Perennial Sowthistle, Yellow Starthistle, Russian Knapweed, Dalmation Toadflax
DICAMBA + 2,4-D	Weedmaster	Common Burdock, Russian and Spotted Knapweed, Leafy Spurge, Yellow Starthistle, Perennial Sow Thistle
METSULFURON METHYL	Escort XP supplemental labeling	Bull, Musk, Plumeless thistle, Canada Thistle, Dalmation and Yellow Toadflax, Hoary Cress, Russian Knapweed,, Field Bindweed, Houndstongue,
CHLORSULFURON	Telar (supplemental label)	Dalmation Toadflax, Canada Thistle, Bull, Musk Thistle, Hoary Cress

APPENDIX B

MANAGEMENT ZONES: BEST MANAGEMENT PRACTICES

Introduction

The guidance and recommendations made below are designed *to minimize* contamination of water resources and to minimize injury to non-target desired plants. These recommendations will not guarantee complete abatement of contamination in all areas at all times. Such a guarantee could only be made if the application of all herbicides was banned from the project area.

Herbicides that are approved for rangeland use are generally benign to soil and soil microorganisms in most soil types. Nevertheless, the specific properties of the herbicides considered here do require special attention, particularly when used near surface waters, shallow groundwater, domestic well-water supply, woodlands, and sensitive plant species (i.e., those that are included on Federal lists as rare, threatened, or endangered). Special considerations, best management practices, and mitigation measures are outlined for these environmentally sensitive sites, including (1) streamside management zone (SMZ) for perennial and intermittent streams; (2) wetland management zone (WMZ) for seasonal and permanent wetlands that are included in the National Wetland Inventory and for manmade reservoirs and stock ponds; (3) groundwater vulnerable zone (GVZ) for shallow groundwater beneath permeable soils; (4) wellhead protection areas (WPA); (5) woodland management zone (WDMZ); and (6) sensitive plant habitat.

In this section, we provide a description of each management zone; prohibitions, restrictions, or limitations on the use of each herbicide within each management zone; summary of best management practices in each zone; summary of any mitigation efforts that apply in a zone; and any other considerations for other treatment methods. Adherence to label directions applies to all herbicides in all management zones.

Based on the properties and behavior of the herbicides studied in this exercise, we recommend segregating the herbicides into three classes for each management zone: (i) those that are expressly prohibited, (ii) those that are limited in some defined way, and (iii) those that are generally permitted with no or minor restrictions.

Streamside Management Zone (SMZ)

A streamside management zone is defined as the area containing and adjacent to stream channels and floodplains. For the purposes of this project, SMZs also include perennial or intermittent seeps and springs. Streamside management zones are generally distinguished by landforms (e.g., stream channels, point bars, natural levees, floodplains, low stream terraces) and commonly by the presence of obligate and/or facultative riparian vegetation.

(i) Prohibited Herbicides. Herbicides that are prohibited within a streamside management zone (i.e., within 100 feet of live water in a stream channel) include clopyralid, dicamba, and metsulfuron methyl. Clopyralid is very mobile and persistent. Triclopyr targets the same noxious weeds as clopyralid and has been formulated for use near water. Consequently triclopyr is a more acceptable alternative than clopyralid or metsulfuron methyl in a SMZ. Dicamba is very mobile, easily leached, and breaks down slowly in water or in water-saturated soil. Also, the noxious weeds, which dicamba targets, generally do not occur in wetland or riparian settings. Therefore, the prohibition of dicamba has little bearing on management options. Metsulfuron methyl is stable in surface water, especially alkaline waters. Therefore, it is not desirable to use it near water.

(ii) *Limited Herbicides.* Herbicides that have limited use in SMZs include 2,4-D, chlorsulfuron, glyphosate, imazapic, imazapyr, picloram, and sulfometuron methyl. Limitations are imposed based on persistence, transportation pathways, application rates, modes of chemical degradation, and environmental properties of various formulations.

2,4-D, glyphosate (e.g., Glypro and Rodeo) and imazapyr (e.g. Habitat, Arsenal) are limited to those formulations that are approved for use in or near water and are compatible with use in SMZs. Glyphosate is injurious to some desired riparian plants, so it must be applied by spot treatments to target plants within a riparian area.

Chlorsulfuron generally targets those plants that prefer upland sites and are not in SMZs. Use of chlorsulfuron must avoid flooded areas and anaerobic conditions, which commonly occur in saturated soils. The risk of flooding along some perennial streams is seasonal; therefore, use of chlorsulfuron may be restricted temporally during periods when there is a high probability of flooding.

The use of imazapic is desirable because it acts on a narrow spectrum of plants and is generally non-injurious to non-target forbs, including western prairie fringed orchid, at low application rates and when applied after seed-set has occurred. Furthermore, imazapic is rapidly photodegraded by sunlight in surface waters.

Imazapic, imazapyr, metsulfuron methyl are limited to reaches where a well vegetated buffer zone exists and ground slopes are less than 6 percent between the application site and surface water. These requirements are imposed to keep these herbicides from entering surface water via runoff from overland flow.

Picloram and imazapic are highly persistent in the soil environment; therefore, their use within a SMZ is permitted only once every two years. In addition, within a SMZ the maximum application rate for imazapic is 0.188 lb acid equivalent/acre, based on studies that demonstrate limited mobility at this and lower application rates (BASF Corporation, 2005, p. 6).

(iii) *Permitted Herbicides.* Only those formulations of 2,4-D and triclopyr that have been approved for use near water are permitted within SMZs. All other formulations (e.g., Garlon 4) are prohibited in a SMZ. Follow all label directions.

Setback distances/vegetative buffers. For those herbicides that are limited within SMZs, set-back distances, or vegetative buffers, are recommended (see labels for additional information).

- Aerial spraying will be permitted with a **200-foot** set-back from channels of perennial and intermittent streams.
- Spraying with booms from any ground-based vehicle (all-terrain or off-highway vehicle, pickup truck, etc.) is permitted with a **50-foot** set-back from channels of perennial and intermittent streams.
- Picloram and sulfometuron methyl may be applied from manually pressurized backpack sprayer or equivalent hand wands provided a **25-foot** vegetative buffer strip is maintained between the treatment area and the edge of water. In addition, the ground slope must be less than 6 percent in the buffer strip. These limitations are designed to prevent these herbicides from being transported to surface water by overland flow.
- Chlorsulfuron, clopyralid, imazapic, imazapyr, picloram, and sulfometuron methyl are not permitted within an irrigation ditch even if the ditch is dry (see Cox 1996, p. 16, and 2003 p. 10; and Melnicoe 2004). Clopyralid is not permitted within 100 feet of an irrigation ditch even if the

ditch is dry. At present, there are no known irrigation ditches on National Forest System lands in the project area.

- Spot-treatment application of chlorsulfuron, and imazapic from manually pressurized backpack sprayer and equivalent hand wands is permitted with a **5-foot** set-back from the edge of water.
- Spot-treatment application of imazapyr from manually pressurized backpack sprayer and equivalent hand wands is permitted with a **5-foot** set-back from the edge of water. However, imazapyr may be transported on eroded soil particles. Therefore, to minimize soil transport when imazapyr is applied near water, there must be a vegetative buffer strip around perennial and intermittent stream channels at least 25-feet wide with no more than 10 percent bare ground and ground slope less than 6 percent in the buffer.
- Water-approved formulations of 2,4-D, triclopyr and glyphosate are the only herbicides that can be applied within **5 feet** of the edge of water or within the banks of a channel. Alternative treatments within 5 feet of water's edge will include: biocontrols, mechanical options, and herbivory by goats, sheep, and/or weed-habituated cattle.

Equipment limitations. All aerial spraying must be conducted with ground-based support staff to monitor aerial drift cards and wind-speed measurements at 6-foot (2-m) height above ground surface. Aerial spraying will be discontinued if herbicide is drifting within the set-back zone and/or wind speed exceeds those recommended on the product's label. If the label does not specify, then aerial spraying is not permitted within 200 feet of surface water. Equipment must become more site and/or plant specific as distance to water decreases. Ground-based vehicles with booms longer than 10 feet are not permitted within 100 feet of surface water. Booms 10 feet long or shorter may be used from 100 to 50 feet of surface water. Only spot-treatment methods may be used to apply permitted herbicides in areas less than 50 feet from surface water.

Wetland Management Zone (WMZ)

Wetlands are defined as areas that are inundated by surface water with a frequency sufficient to support a prevalence of obligate and/or facultative wetland vegetation and/or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, oxbow lakes, mudflats, and natural ponds. Manmade reservoirs and stock ponds are included in wetland management zones.

Herbicide Uses. The same chemical prohibitions, limitations, and uses listed under SMZs apply to WMZs with the following differences:

- Chlorsulfuron may be used provided a vegetative buffer zone 25 feet wide with surface slopes <6 percent is established.

Setback distances/vegetative buffers. The set-back distances for use of herbicides in or near WMZs are similar to those established for SMZs, except chlorsulfuron may not be applied within 25 feet of surface water. The more restrictive setback distance in WMZs than SMZs reflects the persistence of chlorsulfuron in anaerobic conditions, which are more likely to exist in lentic water systems (wetlands) and wetland soils than in lotic (riverine) environments.

Equipment limitations. All equipment limitations established for SMZs apply to WMZs.

Groundwater Vulnerable Zone (GVZ)

Shallow groundwater underlying permeable soils are especially vulnerable to contamination from some herbicides and constitute Groundwater Vulnerable Zones (GVZs). These areas are roughly coincident with those that have a high Pesticide DRASTIC score (≥ 160 ; see Map of Pesticide DRASTIC Scores

for the Sheyenne NG). The same chemical prohibitions, limitations, and uses listed under the SMZs and WMZs apply to GVZs with the following differences.

- First, the slope restrictions on imazapic and imazapyr do not apply within a GVZ because physical translocation of soil-adsorbed herbicides will not affect the groundwater.
- Second, chlorsulfuron, imazapic, imazapyr, and triclopyr should not be used where surface soils and underlying geologic material are highly permeable and the depth to water table is less than 10 feet below the ground surface, or less than 6 feet below the ground surface where geologic materials are fine-textured (i.e., silt and clay).
- Third, picloram should not be used: (i) where surface soils and underlying geologic material are highly permeable and the depth to water table is less than 25 (7.5 m) feet below the ground surface, or (ii) less than 15 feet (4.5 m) below the ground surface in intermediate or mixed-textured materials, or (iii) less than 10 feet (3 m) below the ground surface in fine-textured materials. The greater depths to water table for picloram than for the other herbicides are established due to the greater persistence and greater mobility of picloram, and due to existing data, which indicate it has been detected in roughly 10 percent to 20 percent of all groundwater samples collected from the Sheyenne Delta aquifer by the U.S. Geological Survey, ND Department of Health, and the U.S. Forest Service.

Water tables can shift seasonally and annually; therefore, the depth to water table should be monitored prior to application of a restricted herbicide within a GVZ. For example, areas that customarily have high water tables early in the growing season may be suitable for herbicide treatment by the fall if antecedent precipitation is low.

Wellhead Protection Area (WPA)

2,4-D and glyphosate (see specific formulations) will be the only herbicides approved for use within a WPA. These chemicals have low to intermediate leaching potential. 2,4-D has been applied throughout the Sheyenne NG for decades, but it is not being detected in the wellhead protection areas. Groundwater will be monitored annually by the North Dakota Department of Health to ensure that 2,4-D does not enter the drinking supply or exceed MCL. If 2,4-D is detected in any water sample collected within a WPA, its use will be immediately suspended within the WPA until subsequent water samples indicate that it is no longer present.

Biological controls (bugs), herbivory by sheep, goats, and weed-habituated cattle, and mechanical options will be emphasized within WPAs. Off-highway vehicles (OHVs) will be prohibited within WPAs to prevent the spread of noxious weeds, except for individuals that hold a special-use permit (e.g., grazing permittee, or well operator). The special-use permit may specify conditions affecting off-road travel within a WPA.

Woodland Management Zone (WDMZ)

Woodlands include woody draws, stands of ponderosa pine, stands of juniper, oak savannas, aspen groves, and riparian forest stands. Woody draws are a habitat type found throughout the Little Missouri, Grand River, and Cedar River National Grasslands. Woody draws are typically dominated by green ash, but also support populations of chokecherry, American elm, June berry, wild plum, and other small trees and bushes. Woody draws commonly occur along upland drainageways or areas where soils are subirrigated. Though woody draws constitute 1 percent or a bit more of the landscape, they are valuable to wildlife and for their ability to check overland flow and to maintain the hydrologic integrity of small watersheds. The same guidance outlined below will apply to desired woody plants in the oak savannas and aspen groves of the Sheyenne NG and to desired woody plants in coniferous stands and riparian forest stands in the DPG.

The woody plants within woodlands are highly susceptible to many broadleaf herbicides. The following restrictions and limitations are suggested to minimize damage to woodlands and to provide control of noxious weeds, which can cause irreparable damage to woodlands if left unfettered.

Herbicides Uses.

- (i) *Prohibited herbicides.* Chlorsulfuron and metsulfuron methyl are prohibited within 100 feet and 50 feet, respectively, of woodlands.
- (ii) *Limited herbicides.* Clopyralid, imazapyr, picloram, sulfometuron methyl, and triclopyr may be applied by spot treatment only within 50 feet of a woody draw. When these herbicides are applied under the canopy of desired woody plants, apply the herbicide directly to the foliage of target plants and avoid direct or indirect application to non-target plants or soil, because these herbicides are generally taken up by roots. The spatial extent of the root system of most woody plants is roughly coincident with the aerial extent of their canopy.
- (iii) *Permitted herbicides.* Dicamba, glyphosate, and imazapic are approved for use by spot treatment only within 50 feet of woodlands.

Other Treatments. Biological controls, herbivory by sheep, goats, and other weed-habituated livestock, and mechanical methods will be emphasized within and near woodlands to the extent possible. For example, sheep and goats will not be introduced into or near areas that contain Bighorn Sheep as outlined in the Land and Resource Management Plan.

Fire may be used in an integrated noxious weed program in woodlands too. The timing, frequency, and intensity of fire will be studied as a management tool to setback noxious weeds and to enhance the effectiveness of other treatment methods.

APPENDIX C

SUMMARY OF DESIGN CRITERIA FOR USE OF HERBICIDES IN MANAGEMENT ZONES

Summary Of Design Criteria For Use Of Herbicides in Management Zones											
Management Zone/General Design Criteria	2,4D (amine)	Chlorsulfuron	Clopyralid	Dicamba	Glyphosate	Imazapic	Imazapyr	Metsulfuron methyl	Picloram	Sulfometuron methyl	Triclopyr
<p>Streamside Management Zone (SMZ) is the area containing and adjacent to stream channels and floodplains</p> <ul style="list-style-type: none"> • Aerial application allowed up to 200 feet from water's edge and must be monitored with drift cards • Ground based boom application allowed up to 50 feet from water's edge • Application within 50 feet must be done with hand application (hand-held wand, backpack sprayer, etc.) • Emphasize non-herbicide alternatives 	<p>Limited Use</p> <ul style="list-style-type: none"> • Use only once per growing season • Use only formulations approved for use in or near water 	<p>Limited Use</p> <ul style="list-style-type: none"> • Do not use in flooded areas or on saturated soils • Allowed up to 5 feet from water's edge • Use only once per growing season on alkaline soils 	<p>Use Prohibited</p> <ul style="list-style-type: none"> • Do not use within 100 feet of water's edge • Do not apply within 100 feet of a channel even if channel is dry 	<p>Use Prohibited</p> <ul style="list-style-type: none"> • Do not use within 100 feet of water's edge 	<p>Limited Use</p> <ul style="list-style-type: none"> • Use only formulations approved for use in or near water (e.g., Glypro & Rodeo) • Allowed up to water's edge • Spot treat target plants only within riparian area to avoid injury to non-target riparian plants 	<p>Limited Use</p> <ul style="list-style-type: none"> • Use only every other year • Maximum of 0.188 lb a.e./ac • Allowed up to 5 feet from water's edge if there is a vegetative buffer that has slopes <6% 	<p>Limited Use</p> <ul style="list-style-type: none"> • (Habitat & Arsenal) • Allowed up to 5 feet from water's edge if there is a 25-ft wide vegetative buffer that has slopes <6% 	<p>Use Prohibited</p> <ul style="list-style-type: none"> • Do not use within 100 feet of water's edge 	<p>Limited Use</p> <ul style="list-style-type: none"> • Use only every other year • Allowed up to 25 feet from water's edge if there is a vegetative buffer with slopes <6% 	<p>Limited Use</p> <ul style="list-style-type: none"> • Allowed up to 25 feet from water's edge if there is a vegetative buffer with slopes <6% 	<p>Use Permitted</p> <p>Up to water's edge and within the banks of a channel – follow label direction</p> <ul style="list-style-type: none"> • Use only formulations approved for use in or near water

Summary Of Design Criteria For Use Of Herbicides in Management Zones

Management Zone/General Design Criteria	2,4D (amine)	Chlorsulfuron	Clopyralid	Dicamba	Glyphosate	Imazapic	Imazapyr	Metsulfuron methyl	Picloram	Sulfometuron methyl	Triclopyr
<p>Wetland Management Zone (WMZ) is the area containing and adjacent to wetlands, i.e., those areas support mostly wetland vegetation and/or aquatic life; includes swamps, bogs, potholes, lakes, ponds, etc.</p> <p>Same Design Criteria as SMZ</p>	Same as SMZ	<p>Same as SMZ except:</p> <ul style="list-style-type: none"> Allowed up to 25 feet from water's edge if there is a vegetative buffer with slopes <6% 	Same as SMZ	Same as SMZ	Same as SMZ	Same as SMZ	Same as SMZ	Same as SMZ	Same as SMZ	Same as SMZ	Same as SMZ
<p>Wellhead Protection Zone (WPZ) is the area surrounding a well that supplies a public water system</p> <ul style="list-style-type: none"> OHV restriction Special-use permit required for any off-road travel within WPZ 	Limited Use Same as SMZ and GVZ	Use Prohibited	Use Prohibited	Use Prohibited	<p>Use Permitted</p> <ul style="list-style-type: none"> Follow label directions Use only formulations approved for use in or near water 	Use Prohibited	Use Prohibited	Use Prohibited	Use Prohibited	Use Prohibited	Use Prohibited

Summary Of Design Criteria For Use Of Herbicides in Management Zones

Management Zone/General Design Criteria	2,4D (amine)	Chlorsulfuron	Clopyralid	Dicamba	Glyphosate	Imazapic	Imazapyr	Metsulfuron methyl	Picloram	Sulfometuron methyl	Triclopyr
Groundwater Vulnerable Zone (GVZ) • Follow all design criteria of SMZs and WMZs plus those unique to GVZ. • GVZ applies to Shyenenne NG and is the area where the Pesticide DRASTIC model score is 160 or greater (see DRASTIC map) • Water tables can shift seasonally and annually, so depth to water table should be monitored prior to application of restricted herbicides within a GVZ	Limited Use • Use only formulations approved for use in or near water	Limited Use • Do not use where permeable soils overlie a water table <10 feet below ground surface • Do not use where fine-textured soils overlie a water table <6 feet below ground surface	Use Prohibited	Use Prohibited	Use Permitted: • Use only formulations approved for use in or near water (e.g., Glypro & Rodeo)	Limited Use • Maximum of 0.188 lb a.e./ac Do not use where the water table is: • <10 feet below ground surface in highly permeable soils • <6 feet below ground surface in fine-textured soils	Limited Use • Do not use where permeable soils overlie a water table <10 feet below ground surface • Do not use where fine-textured soils overlie a water table <6 feet below ground surface	Use Prohibited	Limited Use Do not use where the water table is: • <25 feet below ground surface in highly permeable soils • <15 feet below ground surface in intermediate or mixed-textured • <10 feet below ground surface in fine-textured soils	Use Permitted – follow label direction	Limited Use • Do not use where permeable soils overlie a water table <10 feet below ground surface • Do not use where fine-textured soils overlie a water table <6 feet below ground surface

Summary Of Design Criteria For Use Of Herbicides in Management Zones

Management Zone/General Design Criteria	2,4D (amine)	Chlorsulfuron	Clopyralid	Dicamba	Glyphosate	Imazapic	Imazapyr	Metsulfuron methyl	Picloram	Sulfometuron methyl	Triclopyr
Woodland Management Zone (WDMZ) The edge of woodland is where woody plants (shrubs and trees) begin to dominate – buffer distances should be measured from that point	Limited Use • Use only once per growing season • Spot treatment only within 50 feet of woodlands • Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil	Use Prohibited • Within 100 feet of woodlands	Limited Use • Spot treatment only within 50 feet of woodlands • Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil	Limited Use • Spot treatment only within 50 feet of woodlands	Limited Use • Spot treatment only within 50 feet of woodlands	Limited Use • Spot treatment only within 50 feet of woodlands	Limited Use • Spot treatment only within 50 feet of woodlands • Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil	Use Prohibited • Within 50 feet of woodlands	Limited Use • Spot treatment only within 50 feet of woodlands • Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil	Limited Use • Spot treatment only within 50 feet of woodlands • Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil	Limited Use • Spot treatment only within 50 feet of woodlands • Under canopy of desired woody plants, spot apply to foliage of target plants and avoid direct or indirect application to non-target plants or soil
Other • Consult with biologist or botanist prior to any aerial application for site-specific restrictions		• Spot treatment only with low-pressure backpack sprayer • No aerial spraying						• Stable in alkaline soils; not recommended where soil pH is ≥ 7.9			• Do not use high (10 lbs a.e./acre) application rates in order to avoid potential hazards to birds and mammals

APPENDIX D

SUMMARY OF CHRONIC EFFECTS OF PROPOSED HERBICIDES

The following table provides a brief summary of chronic effects for proposed herbicides. Information was taken from the SERA (1999, 2003-2004) risk assessments, <http://www.fs.fed.us/foresthealth/pesticide.shtml>.

HERBICIDE ACTIVE INGREDIENT	*POTENTIAL CHRONIC EFFECTS			
	CARCINOGENIC (CANCER)	TERATOGENIC (BIRTH DEFECTS)	REPRODUCTIVE	MUTAGENIC (GENE MUTATION)
DICHLOROPHENOXYACETIC ACID (2,4-D) CHRONIC RFD 0.01 MG/KG/DAY	Some evidence exists for causal relationship. During re-registration EPA will develop final position. Page 3-20	Malformations are likely to occur only at doses that are fetotoxic or maternally toxic. 2,4-D is not teratogenic Page 3-13	2,4-D may adversely affect male reproductive capacity, not definitive. Page 3-13	During re-registration EPA will develop final position. Page 3-20
CHLORSULFURON CHRONIC RFD 0.02 MG/KG/DAY	No evidence of carcinogenic activity was found in any of the chronic toxicity studies conducted on chlorsulfuron. Page 3-7	Chlorsulfuron is not teratogenic, but is embryo toxic at high exposure levels. Page 3-6	Does not appear to have significant adverse effects on reproductive function. Page 3-6	Not mutagenic, either with or without metabolic activation. Page 3-7
CLOPYRALID METHYL CHRONIC RFD 0.15 MG/KG/DAY	Studies in rats, mice and dogs revealed no evidence of carcinogenic activity has been detected. Page 3-6	At doses that cause no signs of maternal toxicity (i.e., doses below about 100 mg/kg/day) no teratogenic effects are apparent. Page 3-6	At doses that cause no signs of maternal toxicity (i.e., doses below about 100 mg/kg/day) no reproductive effects are apparent. Page 3-6	Clopyralid was found to be inactive in three different standard bioassays of mutagenicity. Page 3-6
DICAMBA CHRONIC RFD 0.03 MG/KG/DAY	There are no epidemiology studies or case reports that demonstrate or suggest that exposure to dicamba leads to cancer in humans. Page 3-9	Pregnant rats and rabbits indicated no evidence of birth defects. Page 3-9	Three multi-generational studies of rats produced no adverse effects on reproduction with doses up to 25 mg/kg/day. Page 3-9	Negative in tests for genetic damage Page 3-10
GLYPHOSATE CHRONIC RFD 2MG/KG/DAY	EPA classified as "Evidence of non-carcinogenicity for humans". Page 3-16	Pregnant rats (up to 3,500 mg/kg/day) and rabbits (up to 350 mg/kg/day) indicated no evidence of birth	Multi-generational studies of rats, no adverse effects on fertility or reproduction with doses up to 30	No <i>in vivo</i> studies using mammalian species or mammalian cell lines have reported

HERBICIDE ACTIVE INGREDIENT	*POTENTIAL CHRONIC EFFECTS			
	CARCINOGENIC (CANCER)	TERATOGENIC (BIRTH DEFECTS)	REPRODUCTIVE	MUTAGENIC (GENE MUTATION)
		defects. Page 3-13	mg/kg/day. Page 3-13	mutagenic activity. Page 3-17
IMAZAPIC RFD 0.05 MG/KG/DAY	EPA classified as not likely to be carcinogenic for humans. Page 3-5	Two rat studies showed no signs of teratogenicity at the highest dose tested (i.e., 1000 mg/kg/day). Page 3-4	Multi-generational rat study showed no indication of any effect on reproductive performance. Page 3-5	Four assays produced negative results for mutagenicity. Page 3-5
IMAZAPYR CHRONIC RFD 2.5 MG/KG/DAY	EPA has categorized imazapyr as Class Evidence of non-carcinogenicity. Page 3-7	Five studies show imazapyr does not cause adverse developmental effects. Page 3-6	Five studies reveal that imazapyr does not cause adverse reproductive effects. Page 3-6	Three studies have shown negative potential for potential mutagenic activity. Page 3-7
METSULFURON METHYL CHRONIC RFD 0.25 MG/KG/DAY	EPA concluded that: "Metsulfuron methyl was not oncogenic in the chronic rat and mouse bioassays". Page 3-7	EPA – "The results of a series of studies indicated that there were no teratogenic hazards associated with the use of metsulfuron methyl. ..." Page 3-6	EPA- "The results of a series of studies indicated that there were no reproductive, hazards associated with the use of metsulfuron methyl. ..." Page 3-6	EPA concluded that "Metsulfuron methyl was not mutagenic in the chronic rat and mouse bioassays". Page 3-7
PICLORAM CHRONIC RFD 0.2 MG/KG/DAY	EPA has categorized picloram as Group E (no evidence of carcinogenicity) based on the lack of carcinogenic activity in rats and mice. Page 3-8	Signs of kidney damage were noted at 1000 mg/kg/day. Page 3-7	No effects on reproductive performance in studies with 298 to 1,000 mg/kg/day doses Page 3-7	EPA- in reviewing mutagenicity assays determined that "No compelling evidence of a mutagenic effect in relevant biological systems was uncovered". Page 3-7
SULFOMETURON METHYL CHRONIC RFD 0.02 MG/KG/DAY	Four studies find that exposure to sulfometuron poses no carcinogenic risk to humans. Page 3-8	The No Observable Adverse Effect Level for teratogenic effects is 300 mg/kg/day. Page 3-7	No adverse effects on reproductive parameters were observed in rats exposed to dietary sulfometuron methyl at dietary concentrations up to 5000 ppm. Page 3-8	Four studies show no mutagenic activity. Page 3-8

HERBICIDE ACTIVE INGREDIENT	*POTENTIAL CHRONIC EFFECTS			
	CARCINOGENIC (CANCER)	TERATOGENIC (BIRTH DEFECTS)	REPRODUCTIVE	MUTAGENIC (GENE MUTATION)
TRICLOPYR CHRONIC RFD 0.05 MG/KG/DAY	EPA classified as Group D chemical (not classifiable as to human carcinogenicity) because of increase tumors in mice and rats. Page 3-9	Studies show that teratogenic effects occur only at doses that are maternally toxic. At doses which do not cause maternal toxicity, there is not apparent concern for teratogenic effects. Page 3-8	Studies show that reproductive effects occur only at doses that are maternally toxic. At doses which do not cause maternal toxicity, there is not apparent concern for teratogenic effects. Page 3-8	Negative in several tests, but weakly positive in a test in rats. Page 3-10

*Page cites are to the individual herbicide reports completed for the Forest Service by SERA (1999, 2003-2004). Each report is located at <http://www.fs.fed.us/foresthealth/pesticide.shtml>. The Human Health Risk Assessment portion of each herbicide report is located in the Project Record.

APPENDIX E

BEST MANAGEMENT PRACTICES FOR WEED CONTROL AS OUTLINED IN FOREST SERVICE MANUAL 2080

FSM 2000 – NATIONAL FOREST RESOURCE MANAGEMENT ZERO CODE 2080 – NOXIOUS WEED MANAGEMENT

Supplement No.: R1 2000-2001-1

Effective Date: May 14, 2001

Duration: Effective until superseded or removed

Approved: KATHY A. MCALLISTER
Acting Regional Forester

Date Approved: 04/27/2001

Posting Instructions: Supplements are numbered consecutively by Title and calendar year. Post by document name. Remove entire document and replace with this supplement. Retain this transmittal as the first page of this document.

New Document(s):	2080	16 Pages
Superseded Document(s):	None. (This is the first supplement to this Manual.)	0 Pages

Digest:

	<ul style="list-style-type: none"> This supplement implements an Integrated Weed Management approach for management of noxious weeds on National Forest System lands in Region 1.
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2080.4 - Responsibility.

Encourage weed awareness and education in employee development and training plans and orientation for both field and administrative work.

2080.43 - Forest Supervisor.

Forest Supervisors are responsible for:

- 1. Emphasizing weed awareness and weed prevention in all fire training, especially resource advisors, fire management teams, guard school, and district orientation.*
- 2. Adding weed awareness and prevention education to Fire Effects and Prescribed Fire training.*

3. *Giving helicopter managers training in weed prevention and mitigation measures.*
4. *Resource Advisors should provide briefings to identify operational practices to reduce weed spread.*
5. *Providing Field Observers with weed identification aids and striving to avoid weed infestations in fire line location.*

2080.44 - District Rangers.

District Rangers are responsible for:

1. *Providing weed prevention briefings for helibase staff.*
2. *Ensuring at least one permanent staff member per District is trained and proficient in weed management.*
3. *Applying weed treatment and prevention on all Forest Service administrative sites including Ranger Stations, trailheads, campgrounds, pastures, interpretive and historic sites.*

2081.2 - Prevention and Control Measures.

1. Roads.

a. Required Objectives and Associated Practices.

(1) Incorporate weed prevention into road layout, design, and alternative evaluation. Environmental analysis for road construction and reconstruction will include weed risk assessment.

(2) Remove the seed source that could be picked up by passing vehicles and limit seed transport in new and reconstruction areas.

(a) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.

(b) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders as determined by the Forest Weed Specialist. Reference Contract Provision C/CT 6.626.

(3) Re-establish vegetation on bare ground due to construction and reconstruction activity to minimize weed spread.

(a) Revegetate all disturbed soil, except the travel way on surfaced roads, in a manner that optimizes plant establishment for that specific site, unless ongoing disturbance at the site will prevent weed establishment. Use native material where

appropriate and available. Use a seed mix that includes fast, early season species to provide quick, dense revegetation. To avoid weed contaminated seed, each lot must be tested by a certified seed laboratory against the all State noxious weed lists and documentation of the seed inspection test provided.

(b) Use local seeding guidelines for detailed procedures and appropriate mixes. Use native material where appropriate and available. Revegetation may include planting, seeding, fertilization, and weed-free mulching as indicated by local prescriptions.

(c) Monitor and evaluate success of revegetation in relation to project plan. Repeat as indicated by local prescriptions.

(4) Minimize the movement of existing and new weed species caused by moving infested gravel and fill material. The borrow pit will not be used if new invaders, defined by the Forest Weed Specialist, are found on site.

(5) Minimize sources of weed seed in areas not yet revegetated. If straw is used for road stabilization and erosion control, it must be certified weed-free or weed-seed free.

(6) Minimize roadside sources of weed seed that could be transported to other areas during maintenance.

(a) Look for priority weed species during road maintenance and report back to District Weed Specialist.

(b) Do not blade roads or pull ditches where new invaders are found.

(c) Maintain desirable roadside vegetation. If desirable vegetation is removed during blading or other ground disturbing activities, area must be revegetated according to section (3) (a), (b), (c) above.

(d) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

(e) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders, as determined by the Forest Weed Specialist. Reference Contract Provision C/CT 6.626.

(f) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.

(7) Reduce weed establishment in road obliteration/reclamation projects. Revegetate according to section (3) (a), (b), (c) above.

b. Recommended Objectives and Associated Practices.

- (1) Retain shade to suppress weeds. Consider minimizing the removal of trees and other roadside vegetation during construction, reconstruction, and maintenance, particularly on southerly aspects.
- (2) Consider re-establishing vegetation on bare ground due to construction and reconstruction activity to minimize weed spread. Road maintenance programs should include scheduled fertilization to maintain vigor of competitive vegetation (3-year period suggested).
- (3) Minimize the movement of existing and new weed species caused by moving infested gravel and fill material. All gravel and borrow sources should be inspected and approved before use and transport. The source will not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they must be treated before transport and use.
- (4) Minimize roadside sources of weed seed that could be transported to other areas. Weed infestations should be inventoried and scheduled for treatment.
- (5) Ensure that weed prevention and related resource protection are considered in travel management. Consider weed risk and spread factors in travel plan (road closure) decisions.
- (6) Reduce weed establishment in road obliteration/reclamation projects. Consider treating weeds in road obliteration and reclamation projects before roads are made undriveable. Monitor and retreat as indicated by local analysis and prescription.
- (7) Evaluate and prioritize noxious weeds along existing Forest Service access roads leading to project area and treat as indicated by local analysis and prescriptions, before construction equipment moves into project area. New road construction must be revegetated as described in Weed Prevention measure, see Roads Required Objectives and Associated Practices section (3) (a), (b), (c) above.

2. Recreation, Wilderness, Roadless Areas.

a. Required Objectives and Associated Practices.

- (1) Minimize transport and establishment of weeds on National Forest Service lands.
 - (a) Include environmental analysis for recreation and trail projects in weed risk assessment.
 - (b) Post and enforce statewide weed-free feed orders.
 - (c) Seed only when necessary at backcountry sites to minimize introduction of nonnative species and weeds. Reseed according to Roads (3) (a), (b), (c) above.
- (2) Reduce weed establishment and spread from activities covered by Recreation Special Use Permits.

(a) Include Clause R1-D4, (or subsequent approved direction), in all new and reissued recreation special use permits, authorizations, or other grants involving ground-disturbing activities. Include this provision in existing ground-disturbing authorizations, which are being amended for other reasons.

(b) Revegetate bare soil resulting from special use activity according to Roads (3) (a), (b), (c) above.

(3) Prevent weed establishment resulting from land and float trail use, construction, reconstruction and maintenance activities.

(a) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).

b. Recommended Objectives and Associated Practices.

(1) Minimize transport and establishment of weeds on National Forest System (NFS) lands.

(a) Encourage backcountry pack and saddle stock users to feed only weed-free feed for several days prior to traveling off roads in the Forest. Before entering NFS land, animals should be brushed to remove any weed seed.

(b) Stock should be tied and/or held in the backcountry in such a way as to minimize soil disturbance and avoid loss of native/desirable vegetation.

(c) Maintain trailheads, boat launches, outfitter and public camps, airstrips, roads leading to trailheads, and other areas of concentrated public use in a weed-free condition.

(d) Motorized and/or mechanized (such as mountain bikes) trail users should inspect and clean their vehicles prior to using NFS lands.

(2) Consider reducing weed establishment and spread from activities covered by recreation, special use permits. Consider including Clause R1-D4, (or subsequent approved direction), by amending existing ground-disturbing authorizations as indicated by local prescriptions.

(3) Prevent weed establishment resulting from land and float trail use, construction, reconstruction, and maintenance activities.

(a) All trail crews should inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.

(b) Inspect and approve all gravel and borrow sources before use and transport. The source will not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they must be treated before transport and use.

3. Cultural Resources.

Required Objectives and Associated Practices. *Reduce weed establishment and spread at archeological excavations.*

Revegetate bare soil resulting from cultural resource excavation activity according to the Roads (3) (a), (b), (c) section above.

4. Wildlife, Fisheries, and Botany.

Required Objectives and Associated Practices. Incorporate weed prevention into wildlife, fisheries, and botany project design.

- a. Include weed risk assessment in environmental analysis for wildlife, fish and botany projects with ground disturbing actions.
- b. Revegetate bare soil resulting from wildlife and fish project activity according to the Roads (3) (a), (b), (c) section above.
- c. Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
- d. Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).

5. Range.

- a. Required Objectives and Associated Practices.
 - (1) Ensure weed prevention and control are considered in management of all grazing allotments.
 - (a) Include weed risk assessment in environmental analysis for rangeland projects.
 - (b) When other plans do not already address noxious weeds, include practices and control measures in Annual Operating Plans.
 - (2) Minimize ground disturbance and bare soil.
 - (a) Revegetate, where applicable, bare soil from grazing activities according to the Roads (3) (a), (b), (c) section above.
 - (b) Check areas of concentrated livestock use for weed establishment and treat new infestations.
 - (3) Minimize transport of weed seed into and within allotments.

(a) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

(b) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as determined by the Forest Weed Specialist).

(c) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.

b. Recommended Objectives and Associated Practices.

(1) Transport of weed seed into and within allotments should be minimized.

(a) Avoid driving vehicles through off-road weed infestations.

(b) Feed certified weed-free feed to livestock for several days prior to moving them onto the allotment to reduce the introduction of new invaders and spread of existing weed species. Consider using transitional pastures when moving animals from weed infested areas to the National Forest. (Transitional pastures are designated fenced areas that can be logistically and economically maintained.)

(c) Consider excluding livestock from sites with new invaders or treat new invaders in these areas before entry by livestock.

(2) Maintain healthy desirable vegetation that is resistant to noxious weed establishment.

(a) Consider managing forage utilization to maintain the vigor of desirable plant species as described in the Allotment Management Plan.

(b) Minimize or exclude grazing on restoration areas until vegetation is well established.

6. Timber.

a. Required Objectives and Associated Practices.

(1) Ensure that weed prevention is considered in all pre-harvest timber projects.

(a) Include weed risk assessment in environmental analysis for timber harvest projects.

(b) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.) Reference Contract Provision C/CT6.26

(c) Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders (as designated by the Forest Weed Specialist). Reference Contract Provision C/CT6.261

(2) Minimize the creation of sites suitable for weed establishment. Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above.

b. Recommended Objectives and Associated Practices.

(1) Ensure that weed prevention is considered in all timber projects.

(a) Consider treating weeds on roads used by timber sale purchasers. Reference Contract Provision C/CT6.26.

(b) Treat weeds on landings, skid trails and helibases that are weed infested before logging activities, where practical.

(2) Minimize the creation of sites suitable for weed establishment. Soil disturbance should be minimized to meet harvest project objectives.

(3) Consider monitoring for weeds after sale activity and treat weeds as indicated by local prescriptions.

(a) Consider trust, stewardship, or other funds to treat soil disturbance or weeds as needed after timber harvest and regeneration activities.

(b) Consider monitoring and treating weed infestations at landings and on skid trails after harvest.

7. Minerals.

a. Required Objectives and Associated Practices.

(1) Minimize weed establishment in mining, oil and gas operations, and reclamation.

(a) Include weed risk assessment in environmental analysis for minerals and oil and gas projects.

(b) Include weed prevention measures in operation and/or reclamation plans.

(c) Retain bonds until reclamation requirements are completed.

(d) Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above.

(2) Remove seed source and limit seed transport into new or existing mining and oil and gas operations. Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

- (3) Minimize weed spread caused by moving infested gravel and fill material.
 - (a) The borrow pit will not be used if new invaders (as defined by the Forest Weed Specialist) are found on the site.
 - (b) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)
 - (c) Do not establish new gravel and fill material sources in areas where new invaders are present on National Forest Service lands. Where widespread weeds occur at new pit sites strip at least the top 8" and stockpile contaminated material. Treat weeds at new pits where widespread weeds are present.

b. Recommended Objectives and Associated Practices.

- (1) Consider removing seed source and limiting seed transport into new or existing mining and oil and gas operations. Where applicable, treat weeds on project access routes. Reference Contract Provision C/CT6.27.
- (2) Minimize weed spread caused by moving infested gravel and fill material.
 - (a) Inspect and approve all gravel and borrow sources before use and transport. The source should not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they should be treated before transport and use.
 - (b) Consider maintaining stockpiled material in a weed-free condition.
 - (c) Check the area where pit material is used to ensure that no weed seeds are transported to the use site.

8. Soil and Water.

a. Required Objectives and Associated Practices.

- (1) It is required that integrated weed prevention and management be used in all soil, watershed, and stream restoration projects.
 - (a) Include weed risk assessment in environmental analysis for soil, watershed, and stream restoration projects with ground disturbing actions.
 - (b) Revegetate bare soil resulting from excavation activity according to the Roads (3) (a), (b), (c) section above.
 - (c) Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not

apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

(d) Clean all equipment prior to leaving the project site, if operation in areas infested with new invaders (as designated by the Forest Weed Specialist).

(e) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.

b. Recommended Objectives and Associated Practices.

Integrate weed prevention and management in all soil, watershed, and stream restoration projects by considering treating weeds in road obliteration and reclamation projects before roads are made undriveable. Monitor and retreat as indicated by local prescriptions.

9. Lands and Special Uses.

a. Required Objectives and Associated Practices.

(1) Incorporate weed prevention provisions in all special use permits, road use permits, and easements.

(a) Include weed risk assessment in environmental analysis for land projects with ground disturbing actions.

(b) Revegetate bare soil as described in the Roads (3) (a), (b), (c) section above, as a condition of the authorization.

(c) Include approved special use provision R1-D4, see FSH 2709.11, chapter 50, (or subsequent approved direction) in all new and reissued special use permits, authorizations, or other grants involving ground disturbing activities. Include this provision in existing ground disturbing authorizations, which are being amended for other reasons .

(d) Include noxious weed prevention and control measures as indicated by local prescriptions in new or reissued road permits or easements granted pursuant to FLPMA (P.L. 94579 0/2/76), FRTA (P.L. 88657 0/3/64) or subsequent authorities. This includes FLPMA Private and Forest Road Permits and Easements; FRTA Private and Forest Road Easements; Cost Share Easements; and Road Use (commercial haul) Permits (7730). (While the approved terms and conditions of certain permits or easements may not provide for modification, the necessary weed prevention and control provisions may be included in written plans, specifications, stipulations and /or operation and maintenance plans attached to and made a part of the authorization.)

(e) Clean all equipment prior to leaving the project site, if operating in areas infested with New Invaders (as designated by the Forest Weed Specialist).

- (2) Minimize weed spread caused by moving infested gravel and fill material.
 - (a) Do not establish new gravel and fill material sources on National Forest Service lands in areas where new invaders are present. Where widespread weeds occur at new pit sites strip at least the top 8" and stockpile contaminated material. Treat weeds at new pits where widespread weeds are present.
 - (b) Remove all mud, dirt, and plant parts from all off-road equipment before moving into project area. Cleaning must occur off National Forest lands. (This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area.)

b. Recommended Objectives and Associated Practices.

- (1) Incorporate weed prevention provisions in all special use permits, road use permits and easements.
 - (a) Consider including special use provision R1-D4 by amending existing ground disturbing authorizations as indicated by local prescriptions.
 - (b) Consider including noxious weed prevention and control provisions by amending existing ground disturbing authorizations when determined to be necessary by the authorized officer. (While the approved terms and conditions of certain permits or easements may not provide for modification, the necessary weed prevention and control provisions may be included in written plans, specifications, stipulations and/or operation and maintenance plans attached to and made a part of the authorization.)
- (2) Minimize weed spread caused by moving infested gravel and fill material. All gravel and borrow sources should be inspected and approved before use and transport. The source should not be used if the weeds present at the pit are not found at the site of intended use. If weeds are present, they should be treated before transport and use.

10. Fire.

a. Required Objectives and Associated Practices.

- (1) Increase weed awareness among all fire personnel. Include weed risk factors and weed prevention considerations in the Resource Advisor duties on all Incident Management Teams and Fire Rehabilitation Teams during pre-fire, pre-incident training.
- (2) Mitigate and reduce weed spread during wild fire activities
 - (a) Initiate establishment of a network of helibases, camps and staging areas that will be maintained in a noxious weed-free condition.

- (b) Minimize weed spread in camps by incorporating weed prevention and containment practices such as mowing, flagging or fencing weed patches, designating weed-free travel routes and washing equipment.
- (c) Inspect all fire going vehicles regularly to assure that undercarriages and grill works are kept weed seed free. All vehicles sent off Forest for fire assistance will be cleaned before they leave or return to their home.
- (3) Minimize weed spread during smoke jumper operations.
 - (a) Inspect, remove, and properly dispose of weed seed and plant parts found on clothing and equipment.
 - (b) Coordinate with Weed Specialist(s) to locate and/or treat practice jump areas.
- (4) Mitigate and reduce weed spread in Air Operations.
 - (a) Initiate establishment of a network of helibases that will be maintained in a noxious weed-free condition.
 - (b) Minimize weed spread at helibases by incorporating weed prevention and containment practices such as mowing, flagging or fencing weed patches, designating weed-free travel routes.
 - (c) Provide weed prevention briefings for helibase staff.
 - (d) Inspect, and if necessary clean, contract fuel and support vehicles before and after each incident when traveling off road or through weed infestations.
 - (e) Inspect and remove weed seed and plant parts from all cargo nets.
- (5) Mitigate and reduce weed spread from Logistics Operations activities.
 - (a) Look for weed-free camps, staging, drop points and parking areas.
 - (b) Regularly inspect and clean fire vehicles as necessary to assure that undercarriages and grill works are kept weed seed free.
- (6) Integrate weed prevention and management in all prescribed burning. Mitigate and reduce weed spread during prescribed fire activities.
 - (a) Include weed risk assessment in environmental analysis for prescribed fire projects.
 - (b) Coordinate with local Noxious Weed Management Specialist to utilize helibases that are maintained in a weed-free condition, whenever possible.
 - (c) All crews should inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.

(d) Add weed awareness and prevention education to Fire Effects and Prescribed Fire training.

(7) Encourage desirable vegetation during rehabilitation activities.

(a) Revegetate only erosion susceptible and high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) as described in the Roads (3) (a), (b), (c) section above.

(b) Straw used for road stabilization and erosion control will be certified weed-free or weed-seed-free.

b. Recommended Objectives and Associated Practices.

(1) Mitigate and reduce weed spread during fire activities.

(a) Initiate establishment of a network of helibases, camps, and staging areas on private land that will be maintained in a noxious weed-free condition.

(b) Consider checking and treating weeds that establish at cleaning sites after fire incidents, during rehabilitation.

(c) Emphasize Minimum Impact Suppression Tactics (M.I.S.T.) to reduce soil and vegetation disturbance.

(2) Minimize weed spread during smokejumper operations. Travel through weed infested areas should be avoided or minimized.

(3) Mitigate and reduced weed spread from Logistics Operations activities. Traffic should be routed through camps to avoid weed infested areas.

(4) Integrate weed prevention and management in all prescribed burning. Mitigate and reduce weed spread during prescribed fire activities.

(a) Consider treating high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) with weed infestations (such as roads, disturbed ground) before burning and check and retreat after burning if necessary.

(b) Consider avoiding ignition and burning in high risk areas (as defined in Regional Risk Assessment Factors and Rating protocol) that cannot be treated before or after prescribed fire.

(5) Encourage desirable vegetation during rehabilitation activities.

(a) Check and treat weeds at cleaning sites and all disturbed staging areas.

(b) Treat weeds within the burned area as part of rehabilitation plan to reduce weed spread.

- (c) Check weed spread resulting from fire and fire suppression activities.
- (d) Consider applying for restoration funding for treatment of weed infestations within the fire area.

11. Administration.

a. Required Objectives and Associated Practices.

(1) Ensure all Forest Service employees are aware of and knowledgeable about noxious weeds.

(a) Train Line Officers in noxious weed management principles and practices.

(b) Each unit will have access to Weed Specialist at the Ranger District or Supervisor's Office.

(2) Ensure all Forest workers are reducing the chance of spreading noxious weeds. All Forest workers will inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment including Forest Service vehicles.

b. Recommended Objectives and Associated Practices.

Consider a reward program for weed awareness, reporting, and beating new invaders.

2082 - COOPERATION.

1. Required Objectives and Associated Practices. Coordinate road maintenance activities with herbicide applications to maximize efficacy. Ensure road blading and roadside herbicide applications are coordinated chronologically to minimize herbicide use and increase effectiveness.

2. Recommended Objectives and Associated Practices. Consider providing Plans Section with weed control contact familiar with weeds in the fire area.

2082.2 - Methods of Cooperation.

6. Region 1 Required Objectives and Associated Practices.

a. Reduce weed establishment and spread at archeological excavations. Passports In Time programs and other Cultural Resource workers shall be given weed briefings and will inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment.

b. Promote weed awareness and prevention efforts among range permittees. Discuss weed awareness and prevention practices at annual permittee meetings.

Sample Special Use Supplemental Clause; USDA-Forest Service, Northern Region

Include a weed prevention and control provision, such as the following supplemental clause example, in all new special-use authorizations such as, permits, easements, and leases, or when those authorizations are amended, when there are ground-disturbing activities.

The following is a weed prevention and control supplemental clause approved for use in Region 1. **(Reminder: Supplemental clauses used in a special use authorization must be reviewed and approved by the Regional Forester, after review by the local Office of the General Counsel.)**

R1 SUPPLEMENT 2709.11-2000-1

2709.11, 50

EFFECTIVE 02/08/2000

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R1-D4 - Noxious Weed/Exotic Plant Prevention and Control. Use this clause in all authorizations involving ground disturbance which could result in the introduction or spread of noxious weeds and/or exotic plants. This clause may also be used where cooperative Agreements for noxious weed control are in place with state and local governments.

The holder shall be responsible for the prevention and control of noxious weeds and/or exotic plants of concern on the area authorized by this authorization and shall provide prevention and control measures prescribed by the Forest Service. Noxious weeds and exotic plants of concern are defined as those species recognized by *(insert county weed authority and/or national forest)* in which the authorized use is located.

The holder shall also be responsible for prevention and control of noxious weed and exotic plant infestations which are not within the authorized area, but which are determined by the Forest Service to have originated within the authorized area.

When determined to be necessary by the authorized officer, the holder shall develop a site-specific plan for noxious weed and exotic plant prevention and control. Such plan shall be subject to Forest Service approval. Upon Forest Service approval, the noxious weed and exotic plant prevention and control plan shall become a part of this authorization, and its provisions shall be enforceable under the terms of this authorization.

With respect to the second paragraph of the above provision, the intent is to apply this provision only for a well defined confined area such as a narrow linear right-of-way where it can be determined without a doubt that the noxious weeds resulted from the activities of the holder.

Best Management Practices Soil and Water Conservation Practices FS Handbook 2509.22

The following BMPs for this project were selected from the Soil and Water Conservation Handbook (2509.22). Application of the BMPs will ensure compliance with the requirements of the Federal Water Pollution Control Act.

13.08: Pesticide Application According to Label Directions and Applicable Legal Requirements – All approved herbicides will be applied according to label instructions to avoid water contamination. Directions found on the label of each herbicide are detailed and specific, and include legal requirements for use. These constraints will be incorporated into the individual project plans and contracts. Responsibility for in-service projects rests with the Forest Service’s project supervisor who shall be a certified applicator. For contracted projects, it is the responsibility of the contracting officer or the contracting officer’s representative to ensure that label instructions and other applicable legal requirements are followed.

13.09: Pesticide Application Monitoring and Evaluation – The objective of this BMP is to determine whether pesticides were applied safely, restricted to intended target areas, and deposited at the right rates. It is also designed to evaluate if non-target species were impacted. Another component is also to provide early warning of possible hazardous conditions and determine the extent, severity, and duration of any potential hazard that might exist. Monitoring methods include spray cards, dye tracing, and direct measurements of herbicides on plants or near water. Monitoring of existing herbicide concentrations will be conducted prior to any treatments in riparian corridors where perennial water is found.

13.10: Pesticide Spill Contingency Plan – The objective of this BMP is to eliminate contamination of water or the soil resource that may occur from accidental spills. A plan has been developed and is found in Appendix G of this FEIS.

13.11: Cleaning and Disposal of Herbicide Containers – This BMP is designed to prevent water contamination from cleaning or disposal of herbicide containers. The cleaning and disposal of these items will be done in accordance with Federal, State, and local laws. The forest or district pesticide use coordinator will approve proper rinsing procedures in accordance with State and local laws and regulations, and arrange disposal of containers when in-service personnel apply the product. When a contractor applies the herbicide, the contractor is responsible for proper container disposal in accordance with label instructions.

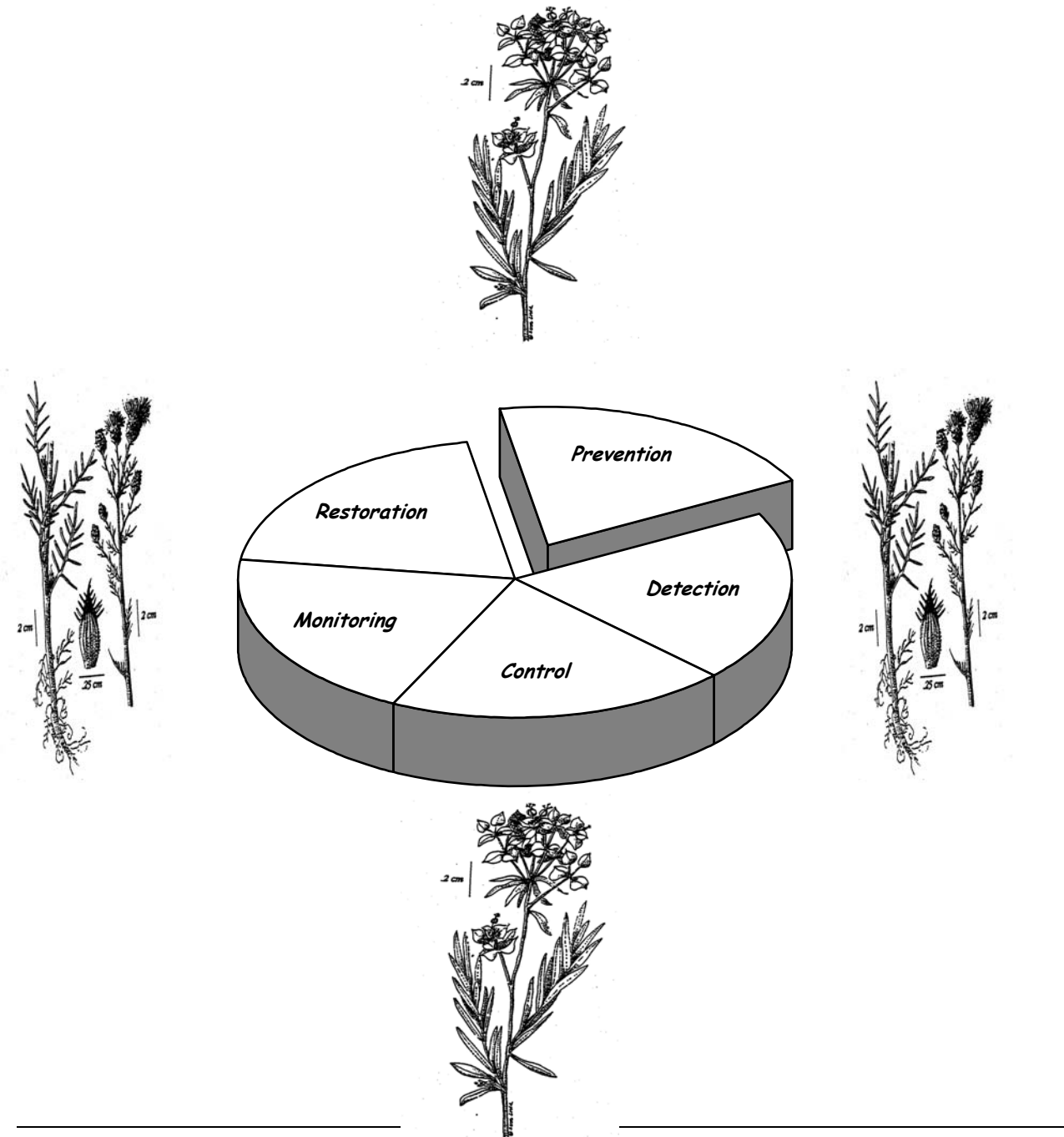
13.12: Protection of Water, Wetlands, and Riparian Areas During Pesticide Spraying. The objective of this BMP is to minimize the risk of pesticide entering surface or subsurface waters or affecting riparian areas, wetlands, and other non-target areas. Untreated buffer strips will be left alongside surface waters, wetlands and riparian areas. Protection of untreated areas is the responsibility of Forest Service project supervisor for In-service projects and the COR for contracted projects.

13.13: – Controlling Pesticide Drift During Spray Application – The objective of this BMP is to minimize risk of pesticides falling directly into water or non-target areas. The spray application of herbicides is accomplished according to a prescription which accounts for terrain, and that specifies the following: spray exclusion areas, buffer zones, and factors such as formulation, equipment, droplet size, spray height, application pattern, flow rate, and the limiting factors of wind speed and direction, temperature, and relative humidity. On in-service projects, the Forest Service project manager supervisor is responsible for ensuring the prescription is followed, whereas if contracted, the contracting officer is delegated the responsibility.

APPENDIX F

USDA – FOREST SERVICE

GUIDE TO NOXIOUS WEED PREVENTION PRACTICES



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USDA-Forest Service

Guide To Noxious Weed Prevention Practices

Introduction

Preventing the introduction and spread of noxious weeds is one objective of Integrated Weed Management Programs on National Forest System lands throughout the United States. This Guide to Noxious Weed Prevention Practices (Guide) provides a comprehensive directory of weed prevention practices for use in Forest Service planning and wildland resource management activities and operations. This Guide will help National Forest and Grassland managers and cooperators identify weed prevention practices that mitigate identified risks of weed introduction and spread for a project or program.

This Guide uses the term “*weed*” to include all plants defined as “*noxious weeds*” by Forest Service policy:

“ . . .plants designated as noxious weeds by the Secretary of Agriculture or by the responsible State official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being native or new to or not common to the United States or parts thereof.” (FSM 2080.5)

For National Forests and Grasslands that use a State-defined noxious weed list, the listed weed species are the priority for implementing weed prevention practices in cooperation with neighbors and partners. National forests and grasslands that do not have a State-defined noxious weed list need to determine local weed prevention priorities using weed lists created by other State or local organizations. At line officer’s discretion, the practices described in this Guide may also be applied to non-native invasive plants that are not defined as “noxious”.

Supporting Direction

This Guide to Noxious Weed Prevention Practices supports implementation of the February 3, 1999 Executive Order on Invasive Species. Federal agencies are expected to follow the direction in the Executive Order.

Development of weed prevention practices is supported by Forest Service noxious weed policy and strategy. Forest Service policy identifies prevention of the introduction and establishment of noxious weed infestations as an agency objective. This policy directs the Forest Service to: (1) determine the factors that favor establishment and spread of noxious weeds, (2) analyze weed risks in resource management projects, and (3) design management practices to reduce these risks. The Forest Service Noxious Weed Strategy identifies development of practices for prevention and mitigation during ground-disturbing activities as a long-term emphasis item. The February 1999 Executive Order on Invasive Species requires Federal agencies to use relevant

programs and authorities to prevent the introduction of invasive species and not authorize or carry out actions that are likely to cause the introduction or spread of invasive species unless the agency has determined, and made public, documentation that shows that the benefits of such actions clearly outweigh the potential harm, and all feasible and prudent measures to minimize risk of harm will need to be taken in conjunction with the actions.

Using This Guide

All resource management projects need to analyze weed risks in the planning stage. Risk includes identifying the likelihood of weeds spreading to the project area and determining the consequence of weed establishment in the project area. Resource programs undertaking maintenance operations need to analyze weed risks when preparing operating plans. A finding of risk is the basis for identifying the appropriate weed prevention practices from the Guide, which are likely to be effective in a particular project situation.

The Guide to Noxious Weed Prevention Practices provides a toolbox of ideas for use in mitigating identified weed risks in resource management operations. The Guide adds no new requirements or regulations.

In 2001 two weed prevention practices are required by Forest Service policy:

- 1. For forested vegetation management operations, use equipment cleaning contract provisions WO-C/CT 6.36 (see Appendix 1)**
- 2. Post and enforce weed-free feed orders, where they exist. (FSM 2081.03).**

All other weed prevention practices in this Guide are optional for use based upon an analysis of weed risks. This list of practices, if applied, is considered to be good overall direction. however. not all of these practices can be implemented in every project.

When considering the use of a weed prevention practice for a specific project or resource program, evaluate the efficacy of the weed prevention practice to meet the goal, its feasibility to implement in the specific situation, and its cost-effectiveness. A determination of cost-effectiveness may consider the probability and cost of weed control if a weed prevention practice is not used and the relative contribution of the project or activity to the overall weed risk at the site.

The Guide identifies weed prevention practices that can be applied to specific site-disturbing projects and that may also be applicable for maintenance activities. These weed prevention practices are listed in the first section: “*General Weed Prevention Practices for Site-disturbing Projects and Maintenance Activities.*” The remaining sections list weed prevention practices that are more uniquely applicable to particular resource management programs, listed by type of resource activity. The intent of this Guide is for managers to first identify and apply the General Weed Prevention practices and then supplement those practices with the appropriate resource activity specific guidance.

General Weed Prevention Practices for Site-disturbing

Projects and Maintenance Programs

Goal 1: Incorporate weed prevention and control into project layout, design, alternative evaluation, and project decisions.

- **Practice 1:** Environmental analysis for projects and maintenance programs will need to assess weed risks, analyze potential treatment of high-risk sites for weed establishment and spread, and identify prevention practices. Determine prevention and maintenance needs, to include the use of herbicides, if needed, at the onset of project planning.

Goal 2. Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- **Practice 2.** Before ground-disturbing activities begin, inventory and prioritize weed infestations for treatment in project operating areas and along access routes. Identify what weeds are on site, or within reasonably expected potential invasion vicinity, and do a risk assessment accordingly. Control weeds as necessary.
- **Practice 3.** After completing “Practice 2” above, to reduce risk of spreading weed infestations, begin project operations in uninfested areas before operating in weed-infested areas.
- **Practice 4.** Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict to those periods when spread of seed or propagules are least likely.
- **Practice 5.** Determine the need for, and when appropriate, identify sites where equipment can be cleaned. Clean equipment before entering National Forest System lands; a Forest Officer, in coordination with the Unit Invasive Species Coordinator, needs to approve use of on-Forest cleaning sites in advance. This practice does not apply to service vehicles traveling frequently in and out of the project area that will remain on the roadway. Seeds and plant parts need to be collected when practical and incinerated. Remove mud, dirt, and plant parts from project equipment before moving it into a project area.
- **Practice 6.** Clean all equipment, before leaving the project site, if operating in areas infested with weeds. Determine the need for, and when appropriate, identify sites where equipment can be cleaned. Seeds and plant parts need to be collected when practical and incinerated.
- **Practice 7.** Workers need to inspect, remove, and properly dispose of weed seed and plant parts found on their clothing and equipment. Proper disposal means bagging the seeds and plant parts and incinerating them.

- Practice 8. Coordinate project activities with any nearby herbicide application to maximize cost effectiveness of weed treatments.
- Practice 9. Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail rights-of-way, and other areas of disturbed soils.

Goal 3. Prevent the introduction and spread of weeds caused by moving infested sand, gravel, borrow, and fill material in Forest Service, contractor and cooperator operations. For practices 10 through 12 below, work with the responsible transportation agencies to voluntarily adopt these practices where county and state governments have responsibility for maintenance of roads that cross National Forest System lands.

- Practice 10. Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources for eradication, and strip and stockpile contaminated material before any use of pit material.
- Practice 11. Inspect and document the area where material from treated weed-infested sources is used, annually for at least three years after project completion, to ensure that any weeds transported to the site are promptly detected and controlled.
- Practice 12. Maintain stockpiled, uninfested material in a weed-free condition.

Goal 4. In those vegetation types with relatively closed canopies, retain shade to the extent possible to suppress weeds and prevent their establishment and growth.

- Practice 13. Retain native vegetation in and around project activity to the maximum extent possible consistent with project objectives.

Goal 5. Avoid creating soil conditions that promote weed germination and establishment.

- Practice 14. Minimize soil disturbance to the extent practical, consistent with project objectives.

Goal 6. Where project disturbance creates bare ground, consistent with project objectives, re-establish vegetation to prevent conditions to establish weeds.

- Practice 15. Revegetate disturbed soil (except travelways on surfaced projects) in a manner that optimizes plant establishment for that specific site. Define for each project what constitutes disturbed soil and objectives for plant cover revegetation.
- Practice 16. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching as necessary. Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. Always use certified

materials in areas closed by administrative order; refer to Appendix 3 for a sample closure order. Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g. road embankments or landings)

- Practice 17. Use local seeding guidelines to determine detailed procedures and appropriate mixes. To avoid weed-contamination, a certified seed laboratory needs to test each lot against the all-State noxious weed list to Association of Seed Technologists and Analysts (AOSTA) standards, and provide documentation of the seed inspection test. There are plant species not on State and Federal noxious weed lists that the Forest Service would consider non-native invasive weeds. Check State and Federal lists to see if any local weeds need to be added prior to testing. Seed lots labeled as certified weed free at time of sale may still contain some weed seed contamination. Non-certified seed should first be tested before use.
- Practice 18. Inspect and document all limited term ground-disturbing operations in noxious weed infested areas for at least three (5) growing seasons following completion of the project. For on-going projects, continue to monitor until reasonable certainty is obtained that no weeds have occurred. Provide for follow-up treatments based on inspection results.

Goal 7. Improve effectiveness of prevention practices through weed awareness and education.

- Practice 19. Provide information, training and appropriate weed identification materials to people potentially involved in weed introduction, establishment, and spread on National Forest System lands, including agency managers, employees, forest workers, permit holders, and recreational visitors. Educate them to an appropriate level in weed identification, biology, impacts, and effective prevention measures.
- Practice 20. Provide proficient weed management expertise at each administrative unit. Expertise means that necessary skills are available and corporate knowledge is maintained.
- Practice 21. Develop incentive programs encouraging weed awareness detection, reporting, and for locating new invaders.

Goal 8. Set the example; maintain weed-free administrative sites.

- Practice 22. Treat weeds at administrative sites and use weed prevention practices to maintain sites in a weed-free condition.

Aquatic Weed Prevention Practices

Goal 1. To prevent new weed infestations and the spread of existing weeds, avoid or remove sources of weed seed and propagules.

- Aquatic 1. Provide outreach to state fish and game departments, counties, and other agencies concerning the unique prevention measures and control practices associated with aquatic weeds.
- Aquatic 2. Inspect boats (including air boats), trailers, and other boating equipment and remove any visible plants, animals, or mud before leaving any waters or boat launching facilities. Drain water from motor, live well, bilge, and transom wells while on land before leaving the vicinity. Wash and dry boats, tackle, downriggers, anchors, nets, floors of boats, props, axles, trailers, and other boating equipment to kill weeds not visible at the boat launch.
- Aquatic 3. Before transporting to new waters, rinse boat and boating equipment with hot (40°C or 104°F) clean water, spray boat or trailer with high-pressure water, or dry boat and equipment for at least 5 days.
- Aquatic 4. Inspect seaplanes and remove weeds from floats, wires, cables, water rudders, and pump floats; wash with hot water or spray with high-pressure water, or dry for at least 5 days.
- Aquatic 5. Before take-off – avoid taxiing through heavy surface growths of weeds before takeoff; raise and lower water rudders several times to clear off plants. If weeds were picked up during landing, clean off the water rudders before take-off and leave the water rudders up during take-off. After take-off – if water rudders were down during take-off, raise and lower water rudders several times to free weed plant fragments while over original body of water or over land. If weeds remain visible on floats or water rudders, the pilot may return to flight origin and remove plants if an extra landing and takeoff is not a safety concern.
- Aquatic 6. Maintain a 100 feet buffer of aquatic weed-free clearance around boat launches and docks.
- Aquatic 7. Promptly post sites if aquatic invasives are found. Confine infestation; where prevention is infeasible or ineffective, close facility until infestation is contained.
- Aquatic 8. Wash and dry tackle, downriggers, float tubes, waders, and other equipment to remove or kill harmful species not visible at the boat launch.
- Aquatic 9. Avoid moving weed plants from one body of water to another.
- Aquatic 10. Avoid running personal watercraft through aquatic plants near boat access locations. Instead, push or winch watercraft onto the trailer without running the engine. After the watercraft is out of the water, start the engine for 5-10 seconds to blow out any excess water and vegetation. After engine has stopped, pull weeds out of the steering nozzle. Inspect trailer and any other sporting equipment for weed fragments and remove

them before leaving the access area. Wash or dry watercraft before transporting to another body of water.

- Aquatic 11. Waterfowl hunters may use elliptical, bulb-shaped, or strap anchors on decoys, because these types of anchors avoid collecting submersed and floating aquatic plants. Inspect waders and hip boots, removing any aquatic plants, and where possible, rinse mud from them before leaving the water. Remove aquatic plants, animals, and mud attached to decoy lines and anchors.
- Aquatic 12. Construct new boat launches and ramps at deep-water sites. Restrict motorized boats in lakes near areas that are infested with weeds. Move sediment to upland or quarantine areas when cleaning around culverts, canals, or irrigation sites. Clean equipment before moving to new sites. Inspect and clean equipment before moving from one project area to another.

Cultural Resources

- Use the General weed prevention practices.

Fire Management

Pre-fire, Pre-incident Training

Goal 1. Improve effectiveness of prevention practices through weed awareness and education.

- Fire 1. Increase weed awareness and weed prevention in all fire training.
- Fire 2. Include weed risk factors and weed prevention practices in Resource Advisor duties on all Incident Management Teams and Burn Rehabilitation Teams.

Plans

Goal 2. Improve effectiveness of prevention practices through weed awareness and education.

- Fire 3. Assign a local weed specialist or include in Resource Advisor duties to the Incident Management Team when wildfire or control operations occur in or near a noxious weed area.

- Fire 4. Resource Advisors need to provide briefings that identify operational practices to reduce weed spread, (for example: avoiding known weed infestation areas when locating fire lines). Include this information in shift briefings.
- Fire 5. Provide weed identification aids to Field Observers.

Wildfires – General

All wildfire weed prevention goals apply except in instances where human life or property is at risk.

Goal 3. Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Fire 6. Ensure that rental equipment is free of weed seed and propagules before the contracting officers representative accepts it.
- Fire 7. Maintain a network of airports, helibases, camps, and staging areas in a noxious weed-free condition.
- Fire 8. Coordinate with local weed specialists to locate and treat practice jump areas to make them weed-free.
- Fire 9. Inspect and treat weeds that establish at equipment cleaning sites after fire incidents.

Goal 4. Avoid creating soil conditions that promote weed germination and establishment.

- Fire 10. Use appropriate suppression tactics to reduce suppression-induced disturbances to soil and vegetation while minimizing seedbed creation due to disturbance from fire effects. .
- Fire 11. Avoid moving water buckets from infested lakes to lakes that are not infested prior to inspection and cleaning. There is no hazard in using water infested with aquatic weeds on terrestrial sites.

Prescribed Fire

Goal 5. To prevent new weed infestations and the spread of existing weeds, avoid or remove sources of weed seed and propagules or manage fire as an aid in control of weeds.

- Fire 12. Ensure that rental equipment is free of weed seed and propagules before the contracting officers representative accepts it.
- Fire 13. Avoid ignition and burning in areas at high risk for weed establishment or spread due to fire effects. Treat weeds that establish or spread because of unplanned burning of weed infestations.
- Fire 14. When possible use staging areas and helibases that are maintained in a weed-free condition.
- Fire 15. Pre-inventory project area and evaluate weeds present with regard to the effects on the weed spread relative to the fire prescription.

Goal 6. Avoid creating soil conditions that promote weed germination and establishment.

- Fire 16. Use appropriate preparation and suppression tactics to reduce disturbances to soil and vegetation.

Fire Rehabilitation

Goal 7. Incorporate weed prevention into project layout, design, alternative evaluation, and decisions.

- Fire 17. Evaluate weed status and risks in Burned Area Emergency Rehabilitation plans. When appropriate, apply for Burned Area Emergency Rehabilitation and restoration funding.

Goal 8. To prevent conditions favoring weed establishment, re-establish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques as appropriate to the site objectives.

- Fire 18. To prevent weed spread, treat weeds in burned areas as part of the Burned Area Emergency Rehabilitation plan. For known infestations that will likely increase, the first preference is prevention, such as planting species to compete with unwanted plants.
- Fire 19. Inspect and document weed establishment at fire access roads, cleaning sites, all disturbed staging areas, and within burned areas; control infestations to prevent spread within burned areas. If you suspect the presence of noxious weeds, request BAER funds to inspect and document for emergence in the spring. Request BAER funds for control if noxious weeds are present and NEPA has already been approved.
- Fire 20. Seed and straw mulch to be used for burn rehabilitation (for wattles, straw bales, dams, etc.) all need to be inspected and certified that they are free of weed seed and propagules.

- Fire 21. Regulate human, pack animal, and livestock entry into burned areas at risk for weed invasion until desirable site vegetation has recovered sufficiently to resist weed invasion.

Forest Vegetation Management

Timber Harvest Operations & Stewardship Contracting

Goal 1. Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Forest Veg 1. Treat weeds on projects used by contractors, emphasizing treatment of weed infestations on existing landings, skid trails, and helibases before activities commence.
- Forest Veg 2. Train contract administrators to identify noxious weeds and select lower risk sites for landings and skid trails.
- Forest Veg 3. Encourage operators to maintain weed-free mill yards, equipment parking, and staging areas.
- Forest Veg 4. Use standard timber sale contract provisions such as WO-C/CT 6.36 to ensure appropriate equipment cleaning (reference Appendix 1).

Goal 2. To prevent weed germination and establishment, retain native vegetation in and around project activity and keep soil disturbance to a minimum consistent with project objectives.

- Forest Veg 5. Minimize soil disturbance to no more than needed to meet project objectives. Logging practices to reduce soil disturbance include, but are not limited to:
 - Over-snow logging
 - Skyline or helicopter logging
 - Reuse landings, skid trails and helibases when they are weed free
- Forest Veg 6. Minimize period from end of logging to site preparation, revegetation, and contract closure.

Post Vegetation Management Operations

Goal 3. To prevent weed germination and establishment, retain native vegetation in and around project activity and keep soil disturbance to a minimum consistent with project objectives.

- Forest Veg 7. Minimize soil disturbance to no more than needed to meet vegetation management objectives. Prevention practices to reduce soil disturbance include, but are not limited to:
 - Treating fuels in place instead of piling
 - Minimizing heat transfer to soil in burning
 - Minimizing fireline construction

Goal 4. To prevent favorable conditions for weed establishment, re-establish vegetation on bare ground caused by project disturbance.

- Forest Veg 8. For long-term restoration and weed suppression where forested vegetation management has created openings, recognize the need for prompt reforestation.

Grazing Management

Goal 1. Consider noxious weed prevention and control practices in the management of grazing allotments.

- Grazing 1. Include weed prevention practices, inspection and reporting direction, and provisions for inspection of livestock concentration areas in allotment management plans and annual operating instructions for active grazing allotments.
- Grazing 2. For each grazing allotment containing existing weed infestations, include prevention practices focused on preventing weed spread and cooperative management of weeds in the annual operating instructions. Prevention practices may include, but are not limited to:
 - Altering season of use
 - Exclusion
 - Activities to minimize potential ground disturbance
 - Preventing weed seed transportation
 - Maintaining healthy vegetation
 - Weed control methods
 - Revegetation
 - Inspection
 - Reporting
 - Education

Goal 2. Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds. Minimize transport of weed seed into and within allotments.

- **Grazing 3.** If livestock are potentially a contributing factor to seed spread, schedule use by livestock in units with existing weed infestations which are known to be susceptible to spread by livestock, to be prior to seed-set or after seed has fallen.
- **Grazing 4.** If livestock were transported from a weed-infested area, annually inspect and treat allotment entry units for new weed infestations.
- **Grazing 5.** Close pastures to livestock grazing when the pastures are infested to the degree that livestock grazing will continue to either exacerbate the condition on site or contribute to weed seed spread. Designate those pastures as unsuitable range until weed infestations are controlled.

Goal 3. Maintain healthy, desirable vegetation that is resistant to weed establishment.

- **Grazing 6.** Through the allotment management plan or annual operating instructions, manage the timing, intensity (utilization), duration, and frequency of livestock activities associated with harvest of forage and browse resources to maintain the vigor of desirable plant species and retain live plant cover and litter.
- **Grazing 7.** Manage livestock grazing on restoration areas to ensure that vegetation is well established. This may involve exclusion for a period of time consistent with site objectives and conditions. Consider practices to minimize wildlife grazing on the areas if needed.

Goal 4. Minimize disturbed ground conditions favorable for weed establishment in the management of livestock grazing.

- **Grazing 8.** Include weed prevention practices that reduce ground disturbance in allotment management plans and annual operating instructions. Consider for example: changes in the timing, intensity, duration, or frequency of livestock use; location and changes in salt grounds; restoration or protection of watering sites; and restoration of yarding/loafing areas, corrals, and other areas of concentrated livestock use.
- **Grazing 9.** Inspect known areas of concentrated livestock use for weed invasion. Inventory and manage new infestations.

Goal 5. Improve effectiveness of weed prevention practices through awareness programs and education. Promote weed awareness and prevention efforts among range permittees.

- **Grazing 10.** Use education programs or annual operating instructions to increase weed awareness and prevent weed spread associated with permittees' livestock management practices.

- Grazing 11. To aid in their participation in allotment weed control programs, encourage permittees to become certified pesticide use applicators.

Lands and Special Uses

Goal 1. Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Lands 1. Consider weed status of lands when making land adjustment decisions.
- Lands 2. Conduct weed inventories of all lands considered for acquisition.
- Lands 3. As a condition of land adjustment decisions, the Forest Service may require the nonfederal proponent to treat weeds, to federal standards, on the land proposed for federal acquisition.
- Lands 4. Include a weed prevention and control provision in all new special-use authorizations such as, permits, easements or leases involving ground-disturbing activities when authorized activities present a high risk for weed infestation or the location of the activity is vulnerable to weed introduction or spread. Include a weed prevention and control provision in existing authorizations that authorize ground-disturbing activities when the authorization is amended for other reasons; consider the need to amend an authorization directly, when ground-disturbing activities are involved. These provisions can be accomplished through the development and incorporation of a supplemental clause (reference sample clause R1-D4 in Appendix 2) or as a requirement in an associated operation and maintenance plan.

Minerals

Goal 1. Incorporate weed prevention into project layout, design, alternative evaluation, and decisions.

- Minerals 1. Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans.

Goal 2. To prevent conditions favoring weed establishment, minimize bare soil conditions and re-establish vegetation on bare ground caused by project disturbance.

- Minerals 2. Retain bonds until reclamation requirements are completed, including weed treatments, based on inspection and documentation.

Recreation, Wilderness, and Special Management Areas

Goal 1. To prevent new weed infestations and the spread of existing weeds, avoid or remove sources of weed seed and propagules.

- Recreation 1. Encourage public land users before recreating on public lands, to inspect and clean motorized and mechanized trail vehicles of weeds and their seeds.
- Recreation 2. On designated public lands, issue closure orders that specify the use of weed free or weed-seed-free feed, hay, straw, and mulch. Refer to 36 CFR 251.50 and Appendix 3. Cooperate with State, County, Tribal governments, and other agencies to develop and support publicly available weed-free materials.
- Recreation 3. Where they exist, post and enforce weed-free feed orders. (FSM 2081.03)
- Recreation 4. Encourage backcountry pack and saddle stock users to feed stock only weed-free feed for several days before travel on National Forest System lands.
- Recreation 5. Inspect, brush, and clean animals, especially hooves and legs before entering public land. Inspect and clean tack and equipment.
- Recreation 6. Tie or hold stock in ways that minimize soil disturbance and avoid loss of desirable native vegetation.
- Recreation 7. Annually inspect all campgrounds, trailheads, and recreation areas that are open to public vehicle use for weeds; treat new infestations.
- Recreation 8. Maintain trailheads, boat launches, outfitter and public camps, picnic areas, airstrips, roads leading to trailheads, and other areas of concentrated public use in a weed-free condition. Consider high use recreation areas as high priority for weed eradication.
- Recreation 9. Consider seasonal or full time closure to campgrounds, picnic areas, and other recreation use areas until weeds are reduced to levels that minimize potentials for spread.
- Recreation 10. In areas susceptible to weed infestation, limit vehicles to designated, maintained travel routes. Inspect and document inspections on travelways for weeds and treat as necessary.

Goal 2. Improve effectiveness of prevention practices through weed awareness and education.

- Recreation 11. Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and forest portals.
- Recreation 12. In weed-infested areas, post weed awareness messages and prevention practices at roadsides.

Research Activities

Goal 1. Incorporate weed prevention into research project design, layout, installation, and decisions.

Research 1. Address weed establishment risk and spread in research project study plans and decisions.

Road Management

New and Reconstruction

Goal 1. Incorporate weed prevention into project layout, design, alternative evaluation, and decisions.

- Road 1. For timber sale purchaser road maintenance and decommissioning, use standard timber sale contract provisions such as WO-C/CT 6.36 to ensure appropriate equipment cleaning (reference Appendix 1).
- Road 2. For road new and reconstruction conducted as part of public works (construction) contracts and service contracts include contract language for equipment cleaning such as is in WO-C/CT 6.36 (Appendix 1).

Road Maintenance and Decommissioning

Goal 2. Minimize roadside sources of weed seed that could be transported to other areas.

- Road 3. Periodically inspect system roads and rights-of-way for invasion of noxious weeds. Train road maintenance staff to recognize weeds and report locations to the local weed specialist. Inventory weed infestations and schedule them for treatment.
- Road 4. Schedule and coordinate blading or pulling of noxious weed-infested roadsides or ditches in consultation with the local weed specialist. Do not blade or pull roadsides

and ditches that are infested with noxious weeds unless doing so is required for public safety or protection of the roadway. If the ditch must be pulled, ensure the weeds remain on-site. Blade from least infested to most infested areas. When it is necessary to blade noxious weed-infested roadsides or ditches, schedule activity when seeds or propagules are least likely to be viable and to be spread. Minimize soil surface disturbance and contain bladed material on the infested site.

- Road 5. Avoid acquiring water for dust abatement where access to the water is through weed-infested sites.
- Road 6. For timber sale purchaser road maintenance and decommissioning, use contract provisions for equipment cleaning such as WO-C/CT 6.36 (Appendix 1).
- Road 7. For road maintenance and decommissioning conducted as part of public works (construction) contracts and service contracts include contract language for equipment cleaning such as is in WO-C/CT 6.36 (Appendix 1).
- Road 8. Treat weeds in road decommissioning and reclamation projects before roads are made impassable. Reinspect and follow-up based on initial inspection and documentation.

Watershed Management

Goal 1. Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

- Watershed 1. Inspect and document for early detection of noxious weed establishment and spread in riparian areas and wetlands. Eradicate new infestations before they become established.
- Watershed 2. Address noxious weed risks in watershed restoration projects and water quality management plans.
- Watershed 3. Pay particular attention to practices listed under “General Weed Prevention Practices for Site-disturbing Projects and Maintenance Programs” and Aquatic Weed Prevention Practices”.

Wildlife, Fisheries, and Botany

Goal 1. Avoid creating soil conditions that promote weed germination and establishment.

- Wildlife 1. Periodically inspect and document those areas where wildlife concentrate in the winter and spring resulting in overuse or soil scarification.
- Wildlife 2. Use weed-free materials at big game baiting stations.
- Wildlife 3. For wildlife openings and habitat improvement projects, follow the practices outlined in General Weed Prevention Practices--Goal 4; Forest Vegetation Management, Timber Harvest Operations & Stewardship Contracting.

APPENDIX 1

Forest Service Timber Sale Contract Provisions

WO-C6.36

C6.36 – EQUIPMENT CLEANING. (5/01) Unless the entire Sale Area is already infested with specific noxious weed species of concern, Purchaser shall ensure that prior to moving on to the Sale Area all off-road equipment, which last operated in areas known by Forest Service to be infested with specific noxious weeds of concern, is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds. Purchaser shall certify in writing that off-road equipment is free of noxious weeds prior to each start-up of timber sale operations and for subsequent moves of equipment to Sale Area. The certification shall indicate the measures taken to ensure that off-road equipment is free of noxious weeds will be identified. “Off-road equipment” includes all logging and construction machinery, except for log trucks, chip vans, service vehicles, water trucks, pickup trucks, cars, and similar vehicles. A current list of noxious weeds of concern to Forest Service is available at the Forest Supervisor’s Office.

Purchaser must clean off-road equipment prior to moving between cutting units on this timber sale that are known to be infested with noxious weeds and other units, if any, that are free of such weeds. Sale Area Map shows areas, known by Forest Service prior to timber sale advertisement, that are infested with specific noxious weed species of concern.

Purchaser shall employ whatever cleaning methods are necessary to ensure that off-road equipment is free of noxious weeds. Equipment shall be considered free of soil, seeds, and other such debris when a visual inspection does not disclose such material. Disassembly of equipment components or specialized inspection tools is not required.

Purchaser shall notify Forest Service at least 5 days prior to moving each piece of off-road equipment on to the Sale Area, unless otherwise agreed. Notification will include identifying the location of the equipment's most recent operations. If the prior location of the off-road equipment cannot be identified, Forest Service may assume that it was infested with noxious weed seeds. Upon request of Forest Service, Purchaser must arrange for Forest Service to inspect each piece of off-road equipment prior to it being placed in service.

If Purchaser desires to clean off-road equipment on National Forest land, such as at the end of a project or prior to moving to a new unit that is free of noxious weeds, Purchaser and Forest Service shall agree on methods of cleaning, locations for the cleaning, and control of off-site impacts, if any.

New infestations of noxious weeds, of concern to Forest Service and identified by either Purchaser or Forest Service on the Sale Area, shall be promptly reported to the other party. Purchaser and Forest Service shall agree on treatment methods to reduce or stop the spread of noxious weeds when new infestations are found. In the event of contract modification under this

Subsection, Purchaser shall be reimbursed for any additional protection required, provided that any work or extra protection required shall be subject to prior approval by Forest Service. Amount of reimbursement shall be determined by Forest Service and shall be in the form of a reduction in stumpage rates, unless agreed otherwise in writing. However, in no event may stumpage rates be reduced below Base Rates.

INSTRUCTIONS: Include in all new contracts.

The Forest Service must identify on the sale area map units that are infested with specific noxious weeds species of concern.

The prospectus for the sale must notify prospective purchasers that maps of these known locations are available from the local Forest Supervisor's Office or District Ranger Station. A list of noxious weeds of concern to the Forest Service (normally included in the Noxious Weed Program Guide) must be available for the purchaser's inspection. The current National Forest Noxious Weed Program Guide, noxious weed atlas, or other data sources, as needed, will be used to determine locations of known infestation.

Significant changes in the status of noxious weed infestations on the sale may require contract modifications to deal with changed conditions. An example might be where new noxious weed infestations are discovered after contract award, which require costly additional methods to prevent the spread of such infestations.

WO-CT6.36

CT6.36 – EQUIPMENT CLEANING. (5/01) Unless the entire Sale Area is already infested with specific noxious weed species of concern, Purchaser shall ensure that prior to moving on to the Sale Area all off-road equipment, which last operated in areas known by Forest Service to be infested with specific noxious weeds of concern, is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds. Purchaser shall certify in writing that off-road equipment is free of noxious weeds prior to each start-up of timber sale operations and for subsequent moves of equipment to Sale Area. The certification shall indicate the measures taken to ensure that off-road equipment is free of noxious weeds will be identified. "Off-road equipment" includes all logging and construction machinery, except for log trucks, chip vans, service vehicles, water trucks, pickup trucks, cars, and similar vehicles. A current list of noxious weeds of concern to Forest Service is available at the Forest Supervisor's Office.

Purchaser must clean off-road equipment prior to moving between cutting units on this timber sale that are known to be infested with noxious weeds and other units, if any, that are free of such weeds. Sale Area Map shows areas, known by Forest Service prior to timber sale advertisement, that are infested with specific noxious weed species of concern.

Purchaser shall employ whatever cleaning methods are necessary to ensure that off-road equipment is free of noxious weeds. Equipment shall be considered free of soil, seeds, and other

such debris when a visual inspection does not disclose such material. Disassembly of equipment components or specialized inspection tools is not required.

Purchaser shall notify Forest Service at least 5 days prior to moving each piece of off-road equipment on to the Sale Area, unless otherwise agreed. Notification will include identifying the location of the equipment's most recent operations. If the prior location of the off-road equipment cannot be identified, Forest Service may assume that it was infested with noxious weed seeds. Upon request of Forest Service, Purchaser must arrange for Forest Service to inspect each piece of off-road equipment prior to it being placed in service.

If Purchaser desires to clean off-road equipment on National Forest land, such as at the end of a project or prior to moving to a new unit that is free of noxious weeds, Purchaser and Forest Service shall agree on methods of cleaning, locations for the cleaning, and control of off-site impacts, if any.

New infestations of noxious weeds, of concern to Forest Service and identified by either Purchaser or Forest Service on the Sale Area, shall be promptly reported to the other party. Purchaser and Forest Service shall agree on treatment methods to reduce or stop the spread of noxious weeds when new infestations are found. In the event of contract modification under this Subsection, Purchaser shall be reimbursed for any additional protection required, provided that any work or extra protection required shall be subject to prior approval by Forest Service. Amount of reimbursement shall be determined by Forest Service and shall be in the form of a reduction in stumpage rates, unless agreed otherwise in writing. However, in no event may stumpage rates be reduced below Base Rates.

INSTRUCTIONS: Include in all new contracts.

The Forest Service must identify on the sale area map units that are infested with specific noxious weeds species of concern.

The prospectus for the sale must notify prospective purchasers that maps of these known locations are available from the local Forest Supervisor's Office or District Ranger Station. A list of noxious weeds of concern to the Forest Service (normally included in the Noxious Weed Program Guide) must be available for the purchaser's inspection. The current National Forest Noxious Weed Program Guide, noxious weed atlas, or other data sources, as needed, will be used to determine locations of known infestation.

Significant changes in the status of noxious weed infestations on the sale may require contract modifications to deal with changed conditions. An example might be where new noxious weed infestations are discovered after contract award, which require costly additional methods to prevent the spread of such infestations.

APPENDIX 2

Sample Special Use Supplemental Clause USDA-Forest Service Northern region

Include a weed prevention and control provision, such as the following supplemental clause example, in all new special-use authorizations such as, permits, easements, and leases, or when those authorizations are amended, when there are ground-disturbing activities.

The following is a weed prevention and control supplemental clause approved for use in Region 1. **(Reminder: Supplemental clauses used in a special use authorization must be reviewed and approved by the Regional Forester, after review by the local Office of the General Counsel.)**

R1 SUPPLEMENT 2709.11-2000-1
EFFECTIVE 02/08/2000

2709.11, 50
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R1-D4 - Noxious Weed/Exotic Plant Prevention and Control. Use this clause in all authorizations involving ground disturbance which could result in the introduction or spread of noxious weeds and/or exotic plants. This clause may also be used where cooperative agreements for noxious weed control are in place with state and local governments.

The holder shall be responsible for the prevention and control of noxious weeds and/or exotic plants of concern on the area authorized by this authorization and shall provide prevention and control measures prescribed by the Forest Service. Noxious weeds and exotic plants of concern are defined as those species recognized by (*insert county weed authority and/or national forest*) in which the authorized use is located.

The holder shall also be responsible for prevention and control of noxious weed and exotic plant infestations which are not within the authorized area, but which are determined by the Forest Service to have originated within the authorized area.

When determined to be necessary by the authorized officer, the holder shall develop a site-specific plan for noxious weed and exotic plant prevention and control. Such plan shall be subject to Forest Service approval. Upon Forest Service approval, the noxious weed and exotic plant prevention and control plan shall become a part of this

authorization, and its provisions shall be enforceable under the terms of this authorization.

With respect to the second paragraph of the above provision, the intent is to apply this provision only for a well defined confined area such as a narrow linear right-of-way where it can be determined without a doubt that the noxious weeds resulted from the activities of the holder.

APPENDIX 3

Example of a Closure Order

Closure Order

SPECIAL ORDER
OCCUPANCY AND USE
ON NATIONAL FOREST SYSTEM LANDS
IN THE STATE OF MONTANA

Pursuant to the Regulations of the Secretary of Agriculture, Title 36 CFS 261.50 (a) and (b), the following acts are prohibited within all National Forest System lands within the State of Montana.

These restrictions are in addition to those enumerated in Subpart A, part 261, Title 36 of the Code of Federal Regulations and will remain in effect from October 6, 1997, until rescinded or revoked.

1. The possession or storage of hay, grain, straw, cubes, palletized feed or mulch that is not certified as being noxious weed free or noxious weed seed free by an authorized State Department of Agriculture official or designated county official; each individual bale or container must be tagged or marked as weed free and reference the written certification (36 CFR 261.58 (t)).

Pursuant to 36 CFR 261.50 (e), the following are exempt from this Order:

- A. Persons with a permit specifically authorizing the action or omission.
- B. Transporting feeds, straw, or hay on Federal, State, and county roads that are not Forest Development Roads or Trails.

The above restrictions are necessary to prevent the spread of noxious weeds on National Forest Systems lands (16 USC 551). Upon issuance of this order, all previous orders requiring the use of certified noxious weed free or noxious weed seed free forage on NFS lands in Montana shall be superceded.

Violation is punishable by a fine of up to \$5,000 and/or up to six months imprisonment (16 U.S.C. 551 and 18 U.S.C. 3571 (b) (6)).

/S/ Kathleen A. McAllister

10-8-97

HAL SALWASSER
Regional Forester
Northern Region

Date

APPENDIX G

HERBICIDE SPILL PLAN

Information and Equipment

An emergency spill kit, with directions for use, will be present when herbicides are being mixed, transported, and applied. Employees/contractors will be trained in the use of the spill kit prior to initiation of operations.

The spill kit will contain the following equipment:

1. A shovel
2. A broom
3. 10 pounds of absorbent material or the equivalent in absorbent pillows
4. A box of large plastic garbage bags
5. Rubber gloves
6. Protective overalls
7. Rubber boots

The appropriate Material Safety Data Sheets (MSDSs) will be reviewed with all personnel involved in the handling of herbicides.

The following material from the U.S. EPA document entitled *Applying Pesticides Correctly: A Guide for Private and Commercial Applicators* will be reviewed with all personnel involved in handling herbicides.

Procedures for Herbicide Spill Containment

Notify the Safety Officer at Supervisors Office and relevant District Office of an incident or spill. Identify the nature of the incident and extent of the spill. Include the following information:

Product Name:

Herbicide Name:

EPA Registration Number:

Remove any injured or contaminated person to a safe area. Remove contaminated clothing and follow instructions on the MSDSs. Do not leave an injured person alone. Obtain medical help for any injured employee.

Contain the spilled herbicide as much as possible on the site. Prevent the herbicide from entering ditches, gullies, wells, or water systems.

MINOR SPILLS

Minor spills are defined as one gallon or less of herbicide formulation or less than ten gallons of herbicide mixture.

- Keep people away from spilled herbicides. Rope off the area and flag it to warn people. Do not leave unless someone is there to confine the spill and warn of the danger. If the herbicide was spilled on anyone, wash it off immediately.
- Confine the spill. If it starts to spread, dike it up with sand or soil. Use absorbent material such as soil, sawdust, or absorbent clay to soak up the spill. Shovel all contaminated material into a leak-proof container for disposal. Dispose of it as you would excess herbicides. Do not hose down the area, because this spreads the chemical. Always work carefully and do not hurry.
- Do not let anyone enter the area until the spill is completely cleaned up.

MAJOR SPILLS

Major spills are defined as greater than one gallon of herbicide formulation or greater than ten gallons of herbicide mixture.

The cleanup of a major spill may be too difficult for you to handle, or you may not be sure of what to do. In either case, keep people away, give first aid if needed, and confine the spill. Then call Chemtrec, the local fire department, and State herbicide authorities for help. Chemtrec stands for Chemical Transportation Emergency Center, a public service of the Manufacturing Chemicals Association. Its offices are located in Washington, D.C. Chemtrec provides immediate advice for those at the scene of emergencies.

Chemtrec operates 24 hours a day, seven days a week, to receive calls for emergency assistance.

For help in chemical emergencies involving spills, leaks, fire, or explosions, call toll-free 800-424-9300 day or night. This number is for emergencies only.

If a major herbicide spill occurs on a highway, have someone call the highway patrol or the sheriff for help (carry these phone numbers with you). Do not leave until responsible help arrives. In addition, the section from the Northern Region Emergency and Disaster Plan entitled "Hazardous Materials Releases and Oil Spills" will be reviewed with all appropriate personnel (see following pages). Notification and reporting requirements as outlined in this section will be followed in the unlikely event of a serious spill.

HAZARDOUS MATERIALS RELEASES AND OIL SPILLS

(Excerpted from the Northern Region Emergency and Disaster Plan)

AUTHORITY: Comprehensive Environmental Response, Compensation, and Liability Act (CER-CLA); and Superfund Amendments and Reauthorization Act of 1986 (SARA). Other statutes that may apply include Resource Conservation and Recovery Act (RCRA); Hazardous and Solid Waste Amendments (HSWA); Toxic Substances Control Act (TSCA); Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); Clean Water Act (CWA); and Clean Air Act (CAA).

DEFINITION: A hazardous materials emergency or oil spill is defined as any release or threat of release of a hazardous substance or petroleum product that presents an imminent and substantial risk of injury to health or the environment.

A release is defined as any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment. Releases that do not

constitute an immediate threat, occur entirely within the work place, are federally permitted, or are a routine herbicide application, are not considered to be an emergency and are not covered by this direction.

RESPONSIBILITY: The first person who knows of a release and is capable of appreciating the significance of that release has the responsibility to report the release.

Only emergency release response and reporting is covered by this direction. Appropriate RO staff specialists who should be notified directly of all non-emergency releases will accomplish non-emergency reporting.

An emergency release of a hazardous substance or petroleum product may be from a Forest Service operation or facility; from an operation on National Forest land by a permit holder, contractor, or other third party; or from a transportation-related vehicle, boat, pipeline, aircraft, etc., crossing over, on, or under Forest Lands. Response and/or reporting by Forest Service employees will differ in each situation:

1. If the release is from a Forest Service facility or operation, the Forest Service and its employee(s) is clearly the “person in charge”, and is fully responsible for all reporting. Immediate response action is limited to that outlined in emergency plans and only to the extent that personal safety is not threatened.
2. If the release is from a third party operation, the Forest Service will only respond and/or report the emergency if the third party fails to take appropriate action.
3. If the release is from a transportation related incident, the Forest Service will only respond and/or report the emergency if the driver or other responsible party is unable or fails to take appropriate action.

RESPONSE ACTION GUIDE: THE PRIMARY RESPONSIBILITY OF ANY FOREST EMPLOYEE(S) ENCOUNTERING A HAZARDOUS MATERIALS EMERGENCY OR OIL SPILL IS COMPLETE AND ACCURATE REPORTING TO APPROPRIATE AUTHORITIES IN A TIMELY MANNER. Forest Service employee(s) will not assume an incident command role for any hazardous materials emergency or spill, but may provide support services as directed by an authorized Federal On-Scene Coordinator (OSC) or other State or local authorized authority.

Within the limits of personal safety, common sense, and recognition of the dangers associated with any hazardous materials emergency or spill, Forest Service employee(s) may provide necessary and immediate response action until an authorized OSC or other authority can take charge. These actions may include:

- Public warning and crowd control;
- Retrieval of appropriate information for reporting purposes.

Additionally, and only after verification of the type of hazardous material involved and its associated hazards, a Forest Service employee(s) may also take actions including:

- Rescue of persons in imminent danger;
- Limited action to mitigate the consequences of the emergency.

Under no condition shall a Forest Service employee(s):

- Place themselves or others in imminent danger.
- Perform or direct actions that will incur liability for the Forest Service

IF THERE IS ANY QUESTION THAT THE EMERGENCY MAY CONSTITUTE A THREAT TO PERSONAL SAFETY. LIMIT YOUR RESPONSE TO PUBLIC WARNING AND REPORTING OF THE INCIDENT.

PRECAUTIONS: When approaching the scene of an accident involving cargo, or other unknown or suspected hazardous material emergency including oil spills:

- Approach incident from an upwind direction, if possible;
- Move and keep people away from the incident scene;
- Do not walk into or touch any spilled material;
- Avoid inhaling fumes, smoke, and vapors even if no hazardous materials are involved;
- Do not assume that gases or vapors are harmless because of lack of smell; and,
- Do not smoke, and remove all ignition sources.

ORGANIZATIONS FOR EMERGENCY AND TECHNICAL ASSISTANCE

- CHEMTREC – Chemical Transportation Emergency Center – 800-424-9300 (24 hour) (For assistance in any transportation emergency involving chemicals).
- Rocky Mountain Poison Control Center – 800-525-5042 (24 hour); 303-629-1123 (24 hour).
- National Agricultural Chemicals Association –202-296-1585 (for herbicide technical assistance and information referral).
- Bureau of Explosives – 202-293-4048 (For explosives technical assistance).
- Centers for Disease Control – 404-633-5313 (For technical assistance regarding etiologic agents).
- EPA Region 8 (MT, ND, SD) Emergency Response Branch – 3030293-1723
- EPA Region 10 (ID) Superfund Removal and Invest Section – 206-442-1196
- Montana Department of Health and Environmental Sciences (24 hour) 406-444-6911
Water Quality Bureau – 406-444-2406
Solid Waste Management Bureau – 406-444-2821
- North Dakota State Health Department
Environmental Engineering – 701-224-2348
Hazardous Waste Division –701-224-2366
Radiological Hazardous Substances – 701-224-2348
- South Dakota Division of Environmental Quality
Office of Water Quality- 605-773-3296
Office of Solid Waste Management – 605-773-5047

- Idaho Department of Health and Welfare
Water Quality Bureau – 208-334-5867
Solid Waste Bureau – 208-334-5879

HAZARDOUS MATERIALS RELEASES AND OIL SPILLS

CONTACT LIST AND IMMEDIATE ACTION GUIDE

Individual

Actions	Contacts
<ul style="list-style-type: none"> • Do not expose yourself or others to any unknown material. • Do not attempt rescue or mitigation until material has been identified and hazards and precautions noted. • Warn others and keep people away. • Approach only from upwind. • Do not walk in or touch material. • Avoid inhaling fumes and vapors. • Do not smoke, and remove ignition sources. 	District Ranger or Dispatcher
Report the incident. Complete “Reporting Action Guide” within reasonable limits of exposure and timeliness, and report information to District/Forest Dispatcher	
If there is any question that the incident is a threat to personal safety, limit response to public warnings and reporting.	

District

Actions	Contacts
Insure reporting individual is aware of hazards associated with incident.	Forest Dispatcher
Obtain as much information as possible, complete a copy of the “Reporting Action Guide” and relay all information to Forest Dispatcher.	
For fixed facilities, verify if possible, whether or not an emergency guide, Spill Prevention Control and Countermeasure Plan, or similar response plan is available for the specific emergency. If so, implement the response actions as indicated	
Dispatch additional help, communication systems, etc., to incident scene if incident is on National Forest land or is caused by Forest Service activity or facility. Otherwise support as requested by official in charge.	
If there is any question that the incident is a threat to personal safety, limit response to public warning and reporting.	

Grasslands

Actions	Contacts
<p>Immediately contact the Forest Hazardous Materials Incident Commander who will take the following actions:</p> <ul style="list-style-type: none"> • Determine if the incident is a true emergency. • Determine who is the responsible party for the incident, and whether appropriate actions and reporting have been accomplished. • From available information, determine hazards and precautions, if possible, and relay further instructions to reporting individual through the District. • Initiate appropriate local reporting actions, and coordinate responses with District. • Arrange Forest support for on-scene coordinator and/or local emergency response officials as requested. 	<p>Forest Hazardous Materials Incident Coordinator who will determine extent of emergency. If incident is determined reportable, contact:</p> <ul style="list-style-type: none"> • National Response Center • EPA Hazmat emergency response • Regional Incident Dispatcher • County sheriff and/or county disaster and emergency services coordinator • State Emergency and Disaster organizations • North Dakota State Fire Marshal for oil spills in ND only. • Internal Forest Contacts

Make appropriate local emergency contacts as directed by Forest Hazardous Materials Incident Coordinator.	
Relay information from Forest Hazardous Materials Incident Coordinator back to District and up to Regional Office as appropriate.	

Regional Incident Dispatcher

Actions	Contacts
<p>Immediately contact the Regional Hazardous Materials Incident Coordinator who will take the following actions:</p> <ul style="list-style-type: none"> • Personally work with Forest Hazardous Materials Incident Coordinator to determine extent of the emergency. If incident is reportable, implement the following actions: <ul style="list-style-type: none"> • By computer mailing list notify: Regional Forester, Deputy Regional Foresters, Staff Directors, Attorney-in-charge (OGC). • Contact other RO specialists, other agency personnel, etc., as necessary to determine scope of problem and appropriate actions. RO specialist contacts include: <ul style="list-style-type: none"> o Regional Watershed Coordinator (water) o Regional Reclamation Officer (mining) o Regional Safety and Health Program Manager o Regional Cooperative Forestry and Pest Management (herbicides) • Arrange Regional Support for on-scene coordinator and/or local emergency response officials as requested. 	<p>Forest Hazardous Materials Incident Coordinator who will determine extent of emergency. If incident is determined reportable, contact:</p> <ul style="list-style-type: none"> • National Response Center • EPA Hazmat emergency response • Regional Incident Dispatcher • County sheriff and/or county disaster and emergency services coordinator • State Emergency and Disaster organizations • North Dakota State Fire Marshal for oil spills in ND only. • Internal Forest Contacts
Make appropriate local emergency contacts as directed by Forest Hazardous Materials Incident Coordinator.	
Relay information from Forest Hazardous Materials Incident Coordinator back to District and up to Regional Office as appropriate.	

Regional Incident Dispatcher

Actions	Contacts
<p>Immediately contact the Regional Hazardous Materials Incident Coordinator who will take the following actions:</p> <ul style="list-style-type: none"> • Personally work with Forest Hazardous Materials Incident Coordinator to determine extent of the emergency. If incident is reportable, implement the following actions: <ul style="list-style-type: none"> o By computer mailing list notify: Regional Forester, Deputy Regional Foresters, Staff Directors, Attorney-in-charge (OGC). o Contact other RO specialists, other agency personnel, etc., as necessary to determine scope of problem and appropriate actions. RO specialist contacts include: <ul style="list-style-type: none"> • Regional Watershed Coordinator (water) • Regional Reclamation Officer (mining) • Regional Safety and Health Program Manager • Regional Cooperative Forestry and Pest Management (herbicides) <p>Arrange Regional Support for on-scene coordinator and/or local emergency response officials as requested.</p>	<p>Regional Hazardous Materials Incident Coordinator</p>

Arrange a Regional Investigation/follow-up team if determined necessary Keep Regional Forester, Staff Directors and OGC advised of situation via routine computer updates	
	Regional Emergency Coordinator
	If incident is determined to be reportable, verify the National Response Center and appropriate Federal, State, and local contacts have been made
	WO Engineering
	WO Personnel Management

Although reporting requirements vary depending on the type of incident, the responsibility of the employee(s) in the field is limited to collecting appropriate information and relaying it to the proper level of the organization in a timely manner. Following is a list of the information that should be collected, if possible; however, **it is more important to maintain personal safety and report in a timely manner than to collect all information.**

1. Date

- Time of release:
- Time discovered:
- Time Reported:
- Duration of release:

2. Location (include state, county, route, milepost, etc)

3. Chemical name:

- Chemical identification number:
- Other chemical data:

NOTE: For transportation related incidents, this information may be available from the driver, placards on the vehicle, and/or shipping papers.

4. Known health risks:

5. Appropriate precautions if known:

6. Source and cause of release:

- 7. Estimate of quantity released: _____ gallons
- Quantity reaching water: _____ gallons
- Name of affected watercourse: _____ gallons

8. Number and type of injuries

9. Potential future threat to health or environment:

10. Your Name: _____

- Phone number for duration of emergency: _____
- Permanent phone number: _____
- For transportation related incidents, also report:

11. Name and address of carrier:

12. Railcar or truck number:

If there is any doubt whether an incident is a true emergency, or whether reportable quantities of hazardous materials or petroleum products are involved, or whether a responsible party has already reported the incident, always report the incident.

APPENDIX H – RESPONSE TO COMMENTS

TOPIC: GENERAL COMMENTS		
#	COMMENT	RESPONSE
1-1	The EPA Agrees with the need in the DPG Noxious Weed Management Project for an integrated approach to continue to treat existing and future infestations of noxious weeds.	Thank you for your comment.
1-2, 13-1	We support the proposed integrated weed management methods in the preferred alternative.	We agree. Thank you for your comment.
1-10[T]he DEIS has been rated as Category LO-1 (Lack of Objections – Adequate Information)	Thank you for your comment.
3-1, 4-6	Reference to scientifically peer-reviewed journal articles and citations to the pertinent literature relating to natural resource values would make this a more robust environmental impact statement (EIS)	The DEIS is meant to be a summary of the analysis, which is why it does not include many of the references used by specialists. However, individual specialist reports used a large number of references in the analysis (for example, the wildlife report cites 33 references and the soil and hydrology report cites 89 references). References are listed on DEIS pages 127 through 131. The specialist reports and references are in the project file.
4-7	Long and short term effect definitions outside of the fish and wildlife section are unclear and need definition	For botany, vegetation, soils and hydrology short-term refers to one growing season after treatment; long-term would be beyond that time. For human health, short-term (acute) effects generally occur immediately or within 14 days, and long-term (chronic) effects can occur over a person's lifetime. This will be noted in the FEIS.
12-1	Use of tax dollars for this project is ludicrous in view of global warming which is causing native vegetation to change. Why doesn't this project take into account global warming changes in vegetation?	This is beyond the scope of this project.

12-5	Stop building roads and close some down. Roads cause invasive exotics to spread.	Closing roads is beyond the scope of this project. However, roads can be a vector in causing weeds to spread. Prevention measures for weeds spread by roads are addressed on DEIS pages 13, 39, 45, 46, 50, 56, 154-156, 157, 165, 176, 181, 186, 187, and 188.
13-2, 13-3, 13-4, 13-5, 13-6, 13-7	Various technical corrections.	Thank you for your comments. The changes will be considered in the FEIS.
TOPIC: ADAPTIVE MANAGEMENT		
#	COMMENT	RESPONSE
1-4	...[R]ecommends an adaptive management program that monitors treatment activities and effects; documents and assures effective weed treatment with minimal impacts on non-target species; and avoids other adverse environmental or public health effects	Thank you for your comment. We believe these recommendations are already in our planned monitoring (see DEIS pages 54 and 55).
1-6, 3-5, 10-1, 11-11 11-12	Support the ongoing evaluation of new technologies, biological controls and herbicides as they become available over the lifetime of this project. Consider adding new chemicals such as Aminopyralid (Milestone) to the list of herbicides. Look at using a cocktail of Tordon/plateau/2,4-D/MSO. Consider adding molasses coated rollers to attract cows to leafy spurge areas to graze on it.	<p>We agree that new and evolving technologies, biological controls and herbicides should be added to the array of treatment options as they become fully available. Our adaptive management strategy, outlined on DEIS pages 43 and 44 describes the steps needed to add new treatments. Probably the most limiting factor for new herbicides is the human health risk assessment, which may take several years to complete.</p> <p>We agree that cocktails or tank mixes can be a useful and effective tool. The FEIS will include a design criteria to more clearly allow their use.</p> <p>Other treatments, such as leafy spurge habituated cattle or using attractants for grazers, could also be considered in this strategy.</p>

TOPIC: MONITORING		
#	COMMENT	RESPONSE
1-7[P]leased that the DEIS includes monitoring of water samples to detect the presence of herbicides from drift, leaching or runoff. The Forest may also want to consider monitoring for herbicide concentrations in soils, and soil microbiologic assays or assessments of soil fertility.	<p>Federal law and State water-quality standards set maximum concentration levels for various herbicides in water, but not in soil. The monitoring program emphasizes water to comply with state and federal laws and regulations. The fact that herbicides might appear in water is evidence that the application methods are causing migration of herbicides and could affect non-target plants and animals.</p> <p>Many herbicides are intentionally designed to persist in soil so that they may control weeds throughout a growing season or longer. With limited financial and personnel resources, the FS believes that monitoring water quality is more efficient and informative.</p>
TOPIC: EXISTING CONDITION		
#	COMMENT	RESPONSE
1-5	We encourage the Forest Service to track weed infestations, control actions, and effectiveness of control actions in a Forest-level weed database.	The Monitoring section on DEIS pages 54-55 outlines such a tracking system.
4-1	The 2006 DEIS does not indicate where we are today, relative to the past. The 2006 DEIS should identify the changes in abundance and distribution of the noxious weed infestations on the Sheyenne National Grasslands and other Districts.	The DEIS discusses the current state of noxious weeds on pages 21-22 (Status of Noxious Weeds on the Dakota Prairie Grasslands), page 27 (Purpose and Need for Action) and throughout Chapter 3, in particular under the Noxious Weeds and Non-target Vegetation section.
4-2	To the degree possible, the DEIS should identify where alternative treatments have been applied; the extent they have succeeded; and , what has been learned about the effects these pose to other resources	The DEIS addresses current acres treated by method on pages 34 and 61. Effects, current successes or failures and effects to other resources of alternative treatments are addressed on at least the following pages: 48, 67, 68, 70, 93, 97, 109 110, and 122.

4-8	One cited EIS has a baseline for each infestation. In order to service as a stand-alone site-specific document we believe such site specific reporting (baseline infestation data) is needed.	General weed infestation locations and species are described in Chapter 3 (DEIS pages 60-62). During the course of this analysis, the DPG has been transitioning from hand-drawn maps with variances between the districts to the more standardized GIS data linked to the FACTS database. This new system (generally described in the Monitoring section on DEIS pages 54-55) will start a more standardized baseline data. We did not consider waiting for a standardized map set to do the analysis for this EIS as there was a compelling purpose and need to continue this project with the information at hand (see Purpose and Need, DEIS pages 27-28).
TOPIC: DESIGN CRITERIA, MITIGATION and BEST MANAGEMENT PRACTICES - GENERAL		
#	COMMENT	RESPONSE
1-2	We recognize that aerial application of herbicides facilitates effective weed management where there are large areas of weed infestations across inaccessible terrain.	We agree. Thank you for your comment.
3-7	We wonder what measures will be used to ensure that all of these partners will follow the best management practices (BMPs) and other mitigation measures outlined in the EIS.	There is always the possibility of human error entering into the best of plans and decisions. However, the new decision and analysis, including the BMP and other mitigation measure will be provided to our partners. In cases where special use permits, agreements or contracts are involved, these will be built into those documents. Monitoring and continued communications with our partners should aid in compliance with the upcoming decision for this project.

<p>3-8</p>	<p>The Grasslands should consider specific BMPs for the Grasslands. (the ones listed seem to be overarching BMPs that apply to all of the Forest Service)</p>	<p>The BMPs identified in Appendix E are broad by design to allow managers across Region 1 of the Forest Service the flexibility they need to adopt the BMPs to their particular situation. The IDT and deciding official have determined that the identified BMPs in conjunction with the design criteria listed in Chapter 2 are sufficient to meet the needs of this project and additional site specific BMPs are not warranted.</p>
<p>10-2</p>	<p>The DEIS states that machinery used in road construction and maintenance will be taken to private land for cleaning once the project is finished. We believe this could further spread noxious weeds...and equipment should be cleaned where it has been used.</p>	<p>We believe you are referring to the following point taken from Appendix E: Best Management Practices for Weed Control As Outlined in Forest Service Manual 2080: Remove all mud, dirt, and plant parts from all off road equipment before moving into project area. Cleaning must occur off National Forest lands. This does not apply to service vehicles that will stay on the roadway, traveling frequently in and out of the project area (FSM 2081(2) (a)). This requires that a vehicle entering National Forest System lands to complete a project be free of mud, dirt, plant parts etc. (page 154, DEIS)</p> <p>We agree that equipment should be cleaned at the project site once a project is complete. Appendix E, FSM 2081(2)(b) bears this out by requiring: Clean all equipment prior to leaving the project site, if operating in areas infested with new invaders as determined by the Forest Weed Specialist. Reference Contract Provision C/CT 6.626. (page 154, DEIS)</p> <p>Cleaning vehicles at the project site is also strongly emphasized in Appendix F – Guide To Noxious Weed Prevention Practices.</p>

4-4	We support the mitigation measures you are proposing to safeguard the many resource values associated with the Grasslands; and further believe that such specific guidance is warranted if the decision is to succeed.	Thank you for your comment.
TOPIC: DESIGN CRITERIA AND MITIGATION - AERIAL SPRAYING		
#	COMMENT	RESPONSE
1-3	...[P]leased to see that the accuracy and safety of aerial pesticide application has been taken into account, and helicopters will be used to conduct aerial application of herbicides	Thank you for your comment. Please note that fixed wing aerial application has been added into the FEIS as an option provided all the design criteria can be met.
5-4, 10-4	We feel that the use of a helicopter for application should not be limited to just the Sheyenne, it is a beneficial tool that should be available to all if needed.	The DEIS does not limit helicopter use to the Sheyenne National Grassland. This treatment method is available for use across the DPG. See Table 4 on DEIS page 36, and Table 6 on DEIS page 42 and 43.
3-2, 6-2, 7-1, 8-3, 11-8	The number of acres (250-500) allowed to be sprayed aerielly seems to be too limited.	Table 2 in the DEIS identifies that 200-500 acres as an estimate of the amount of noxious weeds that would be treated through aerial application of herbicides. This estimate was based on the best information available at the time the table was constructed and is meant as an estimate, not necessarily a limitation. Table 2 in the FEIS has been updated to account for new information.
7-3 8-4, 11-10	Consider the use of fixed wing aircraft – especially for areas of large infestations. They are more available and don't have downdraft issues.	Helicopters were identified, by the IDT, as the aerial application method of choice due to their ability to maneuver, low herbicide drift, and onboard GPS systems that map the actual treated area. Aerial application by fixed wing aircraft requires a straight line approach to herbicide application which may be difficult where application of the design criteria creates a treatment area that has irregular boundaries and islands that are not available for aerial treatment. However, the FEIS will be changed to

		allow fixed wing aircraft use if they meet the applicable design criteria identified in Chapter 2 of the EIS.
11-9	The 200 foot setback in aerial applications for streams and wetlands should have some consideration of which way the wind is blowing. If blowing away from the wetland, should be able to spray closer.	Because of the high potential for drift with aerial applications and the sometimes rapid wind shifts in the project area, these criteria will remain in place. Drift cards will be used in all aerial applications.
TOPIC: HERBICIDES		
#	COMMENT	RESPONSE
6-1, 8-1, 7-4, 9-1, 11-1, 11-2, 11-3	There are formulations of 2,4-D that do not have restrictions for ground water or open water on the label. Why is use restricted for ground water, open surface water and streams in the DEIS?	<p>Some 2,4-D labels do have open water restrictions, and those that are labeled for open water limit application to 1/3 of the body water.</p> <p>However, we are changing language in the Streamside Management Zone, Wetland Management Zone, and Groundwater Vulnerable Zone to reflect the option to use formulations that allow use on open water.</p> <p>To provide protection of natural resources, the use of 2,4-D in any management zone and anywhere within the Dakota Prairie Grasslands will be limited to those formulations that are designed and approved for use in and near water. As a consequence, the setback distances for spraying will be lifted for Streamside Management Zone (p. 146) and Wetland Management Zone (p. 147). In addition, the restrictions governing depth to groundwater in a Groundwater Vulnerable Zone is lifted (p. 148). Related changes appear in Appendix B of the DEIS.</p> <p>All other label restrictions still apply. Notably, 2,4-D may not be applied to more than 1/3 of a water body at any one time to prevent decaying plant matter from consuming excessive quantities of dissolved oxygen.</p>

		<p>The herbicide 2,4-D applied according to label generally will not contaminate ground water; most 2,4-D contamination of groundwater has occurred through improper mixing and disposal.</p> <p>The monitoring program will continue to test for 2,4-D in ground water to ensure that the FS is complying with federal and state regulations.</p>
7-4	<p>Why is the Forest Service changing the water table level Tordon can be used at? Seems manufacture's label would be correct.</p>	<p>The manufacturers' specimen labels for picloram (Tordon) state that picloram is very mobile, highly persistent, and readily leached into groundwater, especially in soils with low organic-matter content, sandy textures, and/or high permeability (see DEIS, p. 83-84). The Forest Service has clearly defined zones where application of picloram is restricted to prevent contamination of shallow groundwater. This measure is designed to protect natural resources, to comply with federal and state laws and regulations, and to protect neighboring irrigators and groundwater drinkers from using groundwater with picloram.</p>
8-2	<p>Plateau is restricted to 10 feet from the water table. Why not just follow the label instructions?</p>	<p>Imazapic (Plateau) is not registered for aquatic use. Furthermore, sources suggest that imazapic has a high potential to leach below the root zone of plants. Also, imazapic is most mobile in soils with high sand content and low organic-matter content, which are common properties of many soils in the Shyenenne National Grassland. The restrictions defined in Appendix C of the DEIS (pp. 146-149) are consistent with information provided in the manufacturers' labels. These restrictions are designed to protect natural resources, to comply with federal and state laws and regulations, and to protect neighboring irrigators and</p>

		groundwater drinkers from using groundwater with imazapic.
6-3, 11-4	At the low rate 2,4-D is being applied, the option of twice per year application should be made available.	<p>The specimen labels provide clear direction on the maximum application rates for different weeds in different environments. The Hi-Dep label for pasture and rangeland the limitations are as follows: the maximum application rate to pasture and rangeland is 2 pounds acid equivalent 2,4-D per acre per application per site. On pasture and rangeland. The maximum seasonal rate is 6 quarts of 2,4-D (5.7 lbs of acid eq.) per acre per season.</p> <p>We expect all weed treatments to comply with label directions. If there is a need for twice a year applications, then the total seasonal application of herbicide must not exceed the maximum application rate as defined in the specimen label.</p>
7-2	Aerial spraying 2,4-D twice a year at a lower cost and cover more acres than ground application.	See answer above. As long as the design criteria are met and the total seasonal application of herbicide is not exceeded this would be an allowable practice.
11-5	Use of 2,4-D is not good for forbs, but widespread weeds are not good for them either.	We agree; therefore we have analyzed the effect of all weed treatments on threatened, endangered, proposed, and sensitive plants (DEIS, pp. 87-101). We acknowledge that the war on noxious weeds will injure to some desired plants. To minimize damage, we have proposed mitigation efforts, identified best management practices, selected application methods, and identified other safeguards to minimize damage to desired plants (see DEIS Appendix C Woody Draw Management Zone, and Appendix E and Appendix F). The ephemeral loss of some desired plants by weed-control practices must be weighed against the long-lived loss

		<p>from inaction and expansion of noxious weeds. Furthermore, once the noxious weed populations are controlled in various project areas, efforts can be initiated to restore any desired plants that have been adversely affected by weed-control measures.</p>
<p>6-4</p>	<p>[I]n the many years of 2,4-D usage, there has been no detection of this chemical in water tests.</p>	<p>The North Dakota Department of Health monitors the Sheyenne Delta aquifer and the Hankinson Hills aquifer on a 5-year period. In 1994 and 1999 (the only data available to the public), seven wells within the two aquifers contained 2,4-D. 2,4-D has been detected in groundwater, but repeat samples collected a few months later typically have no detectable traces of 2,4-D. The disappearance of 2,4-D is not surprising given its short half-life. In conversation with state employees, we deduce that occurrences of 2,4-D in groundwater are more likely related to improper handling and disposal of 2,4-D than to improper application. The Forest Service will continue to monitor for the presence of 2,4-D to make sure we are complying with state and federal laws and regulations.</p>
<p>12-3, 12-11</p>	<p>Application of these toxic herbicides is an assault on the vegetation, wildlife, birds and people for all areas in the U.S. From the hazardous effects of this saturation of American land with poisons. I find this wholesale application of toxic poisons completely unacceptable. Herbicides poison the water and cause cancer. On page 150 - those toxic effects are far too potent for most Americans to allow their use. Stop soaking America in poison.</p>	<p>There is considerable information on sub-chronic and chronic effects due to exposure to herbicides in controlled animal studies. The information provided in Appendix D suggests that the herbicides proposed for use by the DPG are not carcinogenic, and there is no evidence to suggest that herbicides proposed for use by the DPG would result in carcinogenic, mutagenic, teratogenic, neurological or reproductive effects based on anticipated exposure levels to the worker and the public. Appendix D, however, indicates that there is some possible concern associated with 2,4-D related to carcinogenic, reproductive</p>

		and mutagenic effects. The EPA is currently reviewing 2,4-D and will develop a final position related to cancer, reproduction, and mutagenic effects.
12-8	Most herbicides are not "quickly degraded" at all. Taking 100 days for a half life to degrade is not quick. Why do you write so deceptively? (pg 65)	No deception is intended in the analysis. The half life of any given chemical is highly dependent on its formulation and intended effects. As noted elsewhere in this document and the DEIS, some are persistent in soil for up to two years. Other chemicals do break down quickly in either the soil, water or with sunshine. Human and domestic animal allowable re-entry times into a treated area vary by label, which will be followed.
12-10	P 128 shows pesticide sheets from 11 years ago - surely there is more modern information than such old information.	Some chemical sheet are not updated as frequently as others. The best available information was used in this analysis.

TOPIC: DESIGN CRITERIA AND MITIGATION - SENSITIVE PLANTS

#	COMMENT	RESPONSE
3-6	The document indicates that glyphosate may be applied within the 50-foot buffer for sensitive plants if the sensitive plant species is dormant. Depending on the species, it may be better to use a specific herbicide for the particular species being controlled. Glyphosate will kill everything and is non-selective	We will use the most appropriate, allowed herbicide for the situation. The design criteria for sensitive plants will be changed in the FEIS to read (as it was originally written in the botanist's report): Glyphosate would only be applied within the 50-foot buffer, if the sensitive plant species is dormant and known not to be affected by the herbicide.

TOPIC: ORCHID

#	COMMENT	RESPONSE
1-9	...[S]upports the Orchid Recovery Strategy for the western prairie fringed orchid, which is a Threatened species located on the Sheyenne National Grassland. ...The document's risk assessment summary indicates a commitment by the Forest Service to follow herbicide product labels, adhere to mitigation measures and design	Thank you for your comments.

	criteria, and consult with a unit botanist to minimize or avoid impacts to the Orchid.	
TOPIC: NOXIOUS WEEDS		
#	COMMENT	RESPONSE
2-1	Request that you add to section “Status of Noxious Weeds on the Dakota Prairie Grasslands” page 22, Table 1 to include all ND listed noxious weeds. Dalmatian Toadflax, Diffuse Knapweed, Purple Loosestrife, and Yellow Starthistle are not listed in this table.	The DEIS recognizes the need to include all of the North Dakota noxious weeds. The four noxious weeds listed are currently not known to occur on the DPG so they were not included in Table 1. However, they are identified in Table 3, “Weeds Proposed for Treatment.” Any of these species will be treated if and when they are found.
3-3	Hoary cress and Houndstongue should be given a higher priority. (Page 35 – Table 3.)	Hoary Crest and Houndstongue are listed as low priority due to the limited known acreage of these species on the DPG. It is not meant to imply that treatment of this noxious weed is not a concern. Both of these species can be treated wherever they are encountered.
5-1	There are 500 acres of leafy spurge listed for McKenzie County, in using other reporting processes there are an estimated 48,160 acres of Leafy Spurge in McKenzie County	There has been a change over the years in how noxious weed acres are reported. It is possible that 500 acres may under represent the patch size for National Forest System lands on the McKenzie Ranger District. Regardless, new and existing infestations will be treated as detailed in the selected alternative.
5-3	Over the past few years we are seeing an increase in weed populations, we are finding Leafy Spurge along the Montana border where very few infestations have occurred in the past.	Thank you for this information. Refer to the DEIS pages 43-45 on treatment of new infestations.

12-2	USDA in fact let these exotic invasives into the U.S. so that the nurseries they service could make high profits and now USDA wants more money from taxpayers so they can stamp out what they caused. This is completely unacceptable. USDA has the responsibility for what is allowed to enter the U.S.	How the noxious weeds arrived in this country is beyond the scope of this project.
TOPIC: BIOLOGICAL CONTROL		
#	COMMENT	RESPONSE
3-4	Biological control agents the Grasslands plans on using and are mentioned in the document will not survive or do well in those (stream, riparian and wetland) types of soils/habitats. (pg. 36, Table 4)	Biological controls have been extremely effective in riparian zones for the western districts of the DPG (see DEIS page 62). While biological agents have not been as successful on the Sheyenne National Grasslands, 2005 flea beetle surveys indicate there are populations that are surviving and reproducing in some areas. Table 4 identifies the DPG's desire to go forward with an integrated program. Different species may be discovered for control that prefer or tolerate these habitat types. At that point, biological control will be the preferred method of control in those areas.
12-4	I oppose all "biological controls" since I am well aware of the endless problems caused by this agency with their use of "biological controls". Recently they brought in an insect to eat moths and the insect brought in was much favored as a meal for mice so that Hantavirus was caused by the mice.	Our approach to biological controls is described on page 41. Also see page 109 in the DEIS analyzing biological controls.
TOPIC: LIVESTOCK GRAZING		
#	COMMENT	RESPONSE
4-3	Noxious weeds can result in the loss of livestock grazing capacity. These inter-related effects need to be addressed in a timely fashion.	Loss of livestock grazing capacity is best addressed during the Allotment Management Planning process. This is beyond the scope of this analysis.
TOPIC: WILDLIFE		

#	COMMENT	RESPONSE
4-5	We believe that cumulatively the actions occurring on the Sheyenne national Grasslands have had and will continue to have a negative effect on the native skippers associated with the area.	A cumulative effects analysis addresses how an alternative contributes to cumulative effects. The cumulative effects analysis for Alternative 1 (No Action) acknowledges that there have been actions that contribute to negative cumulative effects. Alternative 2 (Proposed Action) includes extensive design criteria which will limit effects to some individuals and habitats in the short-term, but will have positive long-term effects as weeds are controlled. Therefore, overall, the Proposed Action will have a positive contribution to cumulative effects.
TOPIC: FIRE		
#	COMMENT	RESPONSE
5-2, 10-3	Fire has very little, if any, effect on noxious weeds – it sets grass species back and allow for more weeds to spread. We do not feel it would be a beneficial tool.	Fire is to be used to enhance the effectiveness of other treatments (DEIS, pg. 37). One example is to make sure an area scheduled for prescribed fire was planned for a grazing or herbicide treatment so as to future stress noxious weeds after the fire. Also note proposed treatment usage in Table 5 (DEIS pages 37-38).
12-9	"Short term effects of burning" seems deceptive when it takes 5 to 10 years to recover from a burning. (reference pg 86).	This is in reference to the short term effects a prescribed fire may have on soil and water resources. Length of effect from a prescribed burn varies great by eco-type. Fire is a natural part of the prairie system and its plants are adapted to it. In a prairie setting fire generally removes accumulated dead or decadent plant material while at the same time creating a fertilizer effect. Fire generally stimulates prairie plants and recovery periods generally occur within one year. In prairie systems, the graminoid recovery time is usually within a growing season.

TOPIC: ALTERNATIVE (TO HERBICIDE) TREATMENTS/EFFECTIVE TREATMENTS		
#	COMMENT	RESPONSE
6-5, 6-8 7-6 8-5 9-2 9-3	Alternative treatments (to biocontrols and sheep and goats) will still be necessary. The many restrictions proposed in this document will severely limit our control of noxious weeds due to the many variables. Until we have something in place that will work, don't limit us on spraying more than need be.	An integrated treatment program uses the tools identified and more. The intent of this EIS is not to limit treatment methods but to provide for as many as possible. However, each treatment method has a set of constraints. The restrictions identified in the EIS for herbicides are tied to their effects on different resources. The EIS only limits the use of a herbicide where it would have an unacceptable effect on another resource such as water, an endangered plant, etc.
11-7	If no herbicide application is allowed in wet years (10 ft ground water and 25 feet from open water restrictions), the leafy spurge will continue to spread.	The effort to control leafy spurge must be multi-faceted and fully integrated. Many different tools (herbicide application, herbivory, biocontrols, mechanical controls, fire, etc.) are necessary. Though not all herbicides are allowed up to the water's edge, several herbicides are formulated and approved for use near and even in water. An integrated weed-control plan as outlined in this DEIS provides a wide variety of tools for controlling noxious weeds in a variety of settings.
TOPIC: REVEGETATION		
#	COMMENT	RESPONSE
6-6	Due to the amount of Leafy Spurge seed in the soil and deep rooting, revegetation doesn't seem feasible for the SNG.	The intention of revegetation in this document was in those areas where treatments may have created bare ground and in combination with other treatments.
TOPIC: MOWING		
#	COMMENT	RESPONSE
6-7 7-5	Mowing/low land manipulation could be an effective tool to implement. However restrictions on mowing dates may not conform to effective control. If the mowing dates were adapted for site-	Mowing/haying in the DPG Grassland Plan has guidelines for grouse and western prairie fringed orchid habitat. Mowing/haying is allowed after July 15.

	specific areas, this could help with the reduction of seed formation	Lowland manipulation (mowing/haying) is a tool used to provide better forage for livestock and reduce willow expansion. We are unaware of “lowland manipulation” being used to control noxious weeds.
TOPIC: FUNDING		
#	COMMENT	RESPONSE
9-4	Funding for the weed program is a real concern. All we can do now is spray the large areas that are easily accessible even though we should be working on control with ATVs and hand sprayers to get more effective control.	We realize funding has been, and likely will continue, to limit treatment acres. However, this is beyond the scope of this document.
12-6, 12-7	U.S. taxpayers should not be taxed to provide vegetation for cattle baron profiteers, whose cattle decimate and destroy and ruin an area. I think the 7 grazing associations should pay for this situation caused by them. They caused it – they profit from its improvement. Stop assaulting taxpayers with bills.	This is beyond the scope of this document.
TOPIC: TREES		
#	COMMENT	RESPONSE
11-6	In areas where the Forest Service is trying to kill or remove trees, why restrict herbicide applications around them?	On some areas of the DPG the absence of fire on the landscape and/or long wet cycles has resulted in an expansion of trees across the landscape. In other cases exotic non-native trees such as Russian olive and Siberian elm were planted during homesteading. Some of the expanding stands or small groups of trees have been identified for removal by the Forest Service. For those stands, small groups or individual trees targeted for removal, herbicide drift is not of concern. A new design criteria will be in the FEIS to address this situation.