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Undesirable Plant Management Project

Final Environmental Impact Statement



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Final Environmental Impact Statement for the Nebraska National Forests and Grasslands Undesirable Plant Management Project

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Abstract: This final environmental impact statement presents the analysis for two alternatives for treating undesirable plant species on the Nebraska National Forests and Grasslands. The no-action alternative is a continuation of current undesirable plant species management; this includes removal of plant growth (such as mowing, cutting, or grazing), soil disturbance (such as pulling or tilling), biological control (the use of one or more insect pests or grass species to control undesirable plants); and herbicide control using ground-based equipment. The modified proposed action (preferred alternative) assumes treatment of up to 50,000 acres of undesirable plant species annually using a combination of biological, chemical (ground-based and aerial), and mechanical control methods and prescribed fire. The preferred alternative also includes the use of preventative measures, early detection and rapid response processes, rehabilitation and restoration, and implementation and effectiveness monitoring actions. Finally, the preferred alternative incorporates adaptive management strategies, as defined and described in this environmental impact statement. The preferred alternative differs most notably from the no-action alternative by including aerial applications of chemicals, the use of prescribed fire to control undesirable plant species, aquatic treatments of undesirable plant species, and the number of acres approved annually for treatment.

Summary

The Nebraska National Forests and Grasslands (hereafter, the Nebraska) propose to use adaptive and responsive treatment strategies to allow for early detection of, and rapid response to, undesirable plant species[1]. The modified proposed action (preferred alternative) assumes up to 50,000 acres would be treated annually across the Nebraska using a combination of biological, chemical (aerial and ground-based), mechanical, and prescribed fire treatments. The preferred alternative also includes using preventative measures, rehabilitation and restoration, a process designed to support early detection and rapid response, and implementation and effectiveness monitoring actions. The preferred alternative requires compliance with comprehensive project design features outlined in Appendix E.

The preferred alternative would broaden current undesirable plant management treatments in the following ways:

- Authorize the use of adaptive and responsive management strategies.
- Approve the use of new, more species-specific, Environmental Protection Agency-registered herbicides.
- Broaden control methods to include prescribed fire and the use of aerial application of herbicides in specific circumstances; for example, large infestations of weeds; especially those in inaccessible or remote areas.
- Increase protection measures for ground and aerial applications of herbicides through pre-implementation requirements and resource-specific design features (Appendices D and E, respectively).

The Nebraska encompasses roughly 1.1 million acres in the states of Nebraska and South Dakota. The area affected by the proposal includes the Nebraska and Samuel R. McKelvie National Forests and the Buffalo Gap, Fort Pierre, and Oglala National Grasslands. Affected counties include Blaine, Cherry, Dawes, Sioux, and Thomas Counties in Nebraska and Custer, Fall River, Jackson, Jones, Lyman, Pennington, and Stanley Counties in South Dakota.

New management for undesirable plants on the Nebraska is needed for the following reasons:

- **To update direction for undesirable plant management.** The Nebraska's current management of undesirable plant species is based on outdated management direction and did not analyze the effects of aerial application of herbicides, prescribed fire, or the treatment of aquatic invasive species (such as, saltcedar, purple loosestrife, narrowleaf cattail).
- **To provide timely response to new infestations, new undesirable plant species, and landscape-scale disturbances**. The Nebraska requires the flexibility to treat expanded and newly identified undesirable plant infestations in a timely manner before they become widely established. Existing control options and practices are limited, making management of undesirable species increasingly more challenging. Current management also does not provide the Nebraska the full ability to implement adaptive management to better address an ever changing human and natural environment.

[1] For more information on the definition of undesirable plants see the Undesirable Plant Species to be Targeted section.

- **To reduce adverse impacts of undesirable plants to humans, animals, and desirable plant communities**. Failure to control or eradicate infestations at a landscape-scale allows undesirable plants to spread, displacing desirable native plant species. A shift from native vegetation to undesirable plants reduces the functionality of habitat and forage for wildlife and livestock; hinders populations of threatened, endangered, and sensitive species; alters physical and biological properties of soil, including soil productivity; changes the intensity and frequency of fires; and affects wilderness characteristics.

Alternatives Considered in Detail

No-Action Alternative: Current management of undesirable plant species on the Nebraska would continue, as supported by a 1993 Environmental Analysis for Management of Undesirable Plant Species, a 1993 Control of Undesirable Plant Species Environmental Assessment and Decision Notices on the Pine Ridge and Wall Ranger Districts, a 1995 Undesirable Weed Management Environmental Assessment and Decision Notice on the Fort Pierre Ranger District, and a 1999 Noxious Weed Control Environmental Assessment and Decision Notice on the Fall River Ranger District. These decisions authorized (1) the removal of plant growth through mowing, cutting, or grazing; (2) soil disturbance such as pulling or tilling; (3) biological control with the use of one or more insect pests or grass species that produce allelopathic compounds[2]; and (4) herbicide from ground-based equipment such as tractors, ATV's, trucks, horses, or hand sprayers. These decisions do not specifically call out protective measures as design features in their analysis, but the information found throughout each meets the definition of a design feature. This direction was filtered from each of the current decisions under the no-action for ease of comparison of alternatives in Appendix E: Project Design Features. Similar design feature elements between ranger districts exist, but Nebraska-wide uniformity is lacking.

Under the no-action alternative, new practices proposed under the modified proposed action (described below) that support rapid response to control new infestations, response to new undesirable plant species, and landscape-scale disturbances would not be implemented resulting in the continued spread of undesirable vegetation. Finally, management practices that focus on the reduction of adverse impacts of undesirable plants to humans, animals, and native plant communities would be limited to those identified in the previously mentioned analyses and decision documents.

Modified Proposed Action (Preferred Alternative): On January 11, 2023, the Nebraska published a notice of intent in the Federal Register which described a proposed action that projected 100,000 acres of undesirable plant treatment annually over 15 years. Based on scoping comments received (40 Code of Federal Regulations 1501.9) and further analysis of Nebraska inventory and monitoring data, the January 11, 2023, proposed action was modified to reduce the projected annual forestwide combined treatments from 100,000 acres to 50,000 acres.

In support of this modification, data shows that at least 150,000 acres of undesirable plant species exist in the Nebraska, while treatment acres for the last 10 years only peaked at approximately 13,500 acres annually. With the inclusion of additional treatment options, such as prescribed fire and aerial application of herbicides, the Nebraska assumes that annual forestwide treatments may approach 50,000 acres. Annual treatment acres also take into consideration potential future environmental conditions such as climate change, species adaptivity, and species spread that are predicted to increase the acres of undesirable plant species in the Nebraska.

[2] Allelopathic is defined as the effects of a plant on the development of neighboring plants through the release of secondary compounds.

The Nebraska proposes to use adaptive and responsive treatment strategies to allow for early detection of, and rapid response to, undesirable plant species. These strategies include using preventative measures, early detection and rapid response, control methods, adaptive management, rehabilitation and restoration, and implementation and effectiveness monitoring. Preventative measures can include projects for education and awareness as well as more traditional activities such as vehicle and equipment cleaning or utilizing certified weed-free forage (Forest Service Manual 2900). The process of early detection and rapid response involves identifying and quantifying undesirable plant species, rapidly assessing potential risks, and promptly treating undesirable plant populations when they are small to prevent spread and larger infestation.

Proposed control methods include (1) biological control, such as the release of host-specific natural enemies or targeted grazing; (2) chemical control, including aerial or ground applications using U.S. Department of Agriculture, Forest Service (hereafter Forest Service) approved herbicides that target undesirable plant species; (3) mechanical techniques, such as mowing, cutting, or pulling; and (4) prescribed fire conducted per established guidance and project specific individual burn plans. Control methods would be employed alone or in combination to achieve the most effective treatment based on the extent, location, type, and character of an infestation and would be implemented using project design features (Appendix E) developed to ensure ecosystem health and protection. Rehabilitation and restoration could include such actions as site preparation and seeding of desirable vegetation in areas where passive restoration is not likely to be successful. Finally, monitoring would occur using a representative sample of areas that have been treated to determine the following: (1) whether treatments were effective, (2) potential effects on non-target plant species, and (3) if recovery occurred as expected. Treatment monitoring would incorporate established protocols outlined in the Nebraska Monitoring Plan (hereafter monitoring plan) for the Revised Land and Resource Management Plan for the Nebraska National Forests and Grasslands (hereafter Nebraska Forest Plan or forest plan). Applicable categories for undesirable species monitoring include Monitoring Category 7: Progress Towards Desired Conditions and Category 8: Management and the Productivity of the Land (amended May 20, 2016). Any future forest plan amendments or revisions will take into consideration this project and the need to incorporate necessary and applicable requirements to address undesirable species or native vegetation monitoring. Any updated, amended, or revised guidance will replace current monitoring guidance.

The modified proposed action incorporates principles of adaptive management to address continually changing environmental conditions and to ensure treatment goals are met. Adaptive management recognizes that knowledge about natural resources is sometimes uncertain at the time of a project decision (43 Code of Federal Regulations 46.30) and therefore requires monitoring to determine if adjustments in control methods are warranted and to inform future project implementation.

Project implementation is desired to begin in 2024. Forestwide combined treatments of up to 50,000 acres annually could be expected. Further information is available on the project website: https://www.fs.usda.gov/project/?project=62500.

Tribal and Public Involvement

The notice of intent (notice) for the Undesirable Plant Management Project Environmental Impact Statement was published in the Federal Register on January 11, 2023. Publication of the notice, which included a description of the proposed action, purpose of and need for the project, and preliminary resource concerns, initiated the scoping process for the analysis. Scoping is an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (40 Code of Federal Regulations 1501.9).

On January 11, 2023, the Nebraska's Forest Supervisor sent scoping information, the notice, and a cover letter inviting formal consultation and participation in the development of the Undesirable Plant Management Project Environmental Impact Statement proposed action to 29 federally recognized tribes. On November 29, 2023, additional, follow-up outreach took place. A project summary and cover letter again inviting formal consultation, as well as input or comments, was sent to the previously contacted 29 federally recognized tribes via email or physical mail. This outreach was sent to both Tribal leaders and Tribal Historic Preservation Officers for each tribe.

As part of the scoping process, the Nebraska sent a notice to review the scope of the project to 30 agencies and 92 stakeholders and published a news release for local media venues. Comments on the notice were accepted for 45 days, until February 27, 2023, which was an additional 15 days beyond the typical 30 days to ensure an adequate public scoping period. Finally, the Nebraska discussed the proposal at grazing association meetings, with federal, state and local agency officials, and published information about the notice on the Nebraska's social media pages found on Twitter and Facebook and on the Nebraska's News and Events webpage. A total of eight (8) comment letters were received in response to the public outreach efforts (refer to chapter 1, Tribal and Public Involvement section for further details on outreach efforts and response).

In response to public comments received, the Nebraska modified the January 11, 2023, proposed action to reduce the projected combined annual treatments from 100,000 acres to 50,000 acres. The remaining comments were either in support of the project or were identified as issues to be incorporated into project design. Therefore, no additional alternatives were deemed necessary.

Comparison of Alternatives

Effects of implementing the no-action and modified proposed action alternatives are disclosed in this draft environmental impact statement. The analysis focuses on the issues listed below. The order in which the issues are listed is arbitrary and does not imply priority or importance.

- Issue 1: Treating undesirable plants may cause negative effects to the composition and structure of desirable native vegetation.
- Issue 2: Treating undesirable plants may harm threatened, endangered, sensitive, or management indicator species.
- Issue 3: Treating undesirable plants could harm soils, riparian, and aquatic resources and could adversely impact the quality of surface and groundwater.
- Issue 4: Treating undesirable plants with herbicide could be toxic or harmful to people due to drift, residue, or direct application.

Table 1. Meeting the purpose and need by alternative

Purpose and need statement	No-action alternative	Modified proposed action
Updating direction for undesirable plant management	This statement is not met. New direction to protect National Forest System lands from undesirable plant species would not be authorized and implemented.	This statement is met. The modified proposed action includes new direction and practices, such as the use of adaptive management and early detection and rapid response strategies, to protect National Forest System lands from undesirable plant species.
Providing timely response to new infestations, new undesirable plant species, and landscape-scale disturbances.	This statement is not met. New practices that support rapid response to control new infestations, new undesirable plant species, and landscape-scale disturbances would not be authorized and implemented.	This statement is met. The modified proposed action expands available control methods to include aerial application of herbicide and prescribed fire. It also supports rapid response to control new infestations, new undesirable plant species, and landscape-scale disturbances. Finally, it authorizes the use of adaptive management to better respond to uncertain ecological conditions and to ensure treatment goals are met.
Reducing adverse impacts of undesirable plants to humans, animals, and desirable plant communities.	This statement is met. Current control of undesirable plant species would continue across the Nebraska, but at a smaller scale than under the modified proposed action.	The modified proposed action better responds to this statement by proposing new, more efficient control methods that can be applied at a broader scale.

Table 2. Issues addressed by alternative

Issue	No-action alternative	Modified proposed action
Issue 1. Effects to the composition and structure of desirable native vegetation.	The number of infested acres will continue to increase at a more rapid pace due to outdated strategies, limited control methods and treatment options, and lack of adaptive management strategies. Based on the current management, undesirable plants are expected to increase which will decrease the overall diversity in composition. An increase in undesirable plants will most likely create homogenous structure across the landscape which can indirectly cause ecosystem instability.	The number of infested acres is expected to show a decrease in the rate of spread in comparison to the no-action alternative. This can be attributed to the early detection and rapid response strategy and more control options being available. The expected impacts on vegetative composition and structure will vary with the method and intensity of treatments utilized. However, the overall effect of improved treatments of undesirable plants will have a positive impact on both.

Issue	No-action alternative	Modified proposed action
Issue 2. Effects to threatened, endangered, sensitive, or management indicator species.	Federally listed species: Current management activities are expected to have "no effect" on federally listed species that could potentially occur within the project area. Sensitive species: Current activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing for sensitive species that are also management indicator species.	Federally listed species: Proposed management activities are expected to have "no effect" on federally listed species that could potentially occur within the project area. Sensitive or management indicator species: Proposed activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing for sensitive species that are also management indicator species. Updated treatment techniques would likely improve the management of undesirable plant species causing a net positive effect on desirable plant species, wildlife, and habitat.
Issue 3. Effects to soils, riparian, and aquatic resources.	No adverse effects to soil, riparian, and aquatic resources due to pre-existing direction and the limited nature of acres managed.	No adverse effects to soil, riparian, and aquatic resources due to pre-existing direction and the limited nature of acres managed. Additional design features would add another layer of protection to these resources.
Issue 4. Effects of herbicide treatment on human health.	Low potential for effect. Guidelines and protection measures are in place for ground-based application of herbicides.	Low potential for effect. Guidelines and protection measures are in place for ground and aerial application of herbicides. Additional project design features, implementation, and aerial application checklists will improve the protection of the public and workers when herbicides are used.

Decision to be Made

Following a thorough National Environmental Policy Act analysis the Forest Service's responsible official will decide whether to approve the modified proposed action and, if approved, what modifications or additional mitigation measures would be required.

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Chapter 1. Purpose of and Need for Action

Introduction

The Nebraska National Forests and Grasslands (Nebraska) has prepared this environmental impact statement in compliance with the National Environmental Policy Act and other relevant Federal and State laws and regulations. This document discloses the direct, indirect, and cumulative environmental impacts that could result from implementing undesirable plant management activities on the Nebraska. Management activities would include preventative measures, early detection and rapid response, targeted control methods, rehabilitation and restoration, monitoring, and adaptive management to control or reduce the presence of undesirable plant species across the Nebraska. The effects of a no-action alternative are also disclosed.

The following summaries explain the structure and content of this document.

- **Chapter 1. Purpose of and Need for Action** describes the purpose of and need for the project and the Nebraska's proposal for achieving that purpose and need. This section also details how the Nebraska informed Tribal governments, public, and other agencies of the proposal and summarizes their response.
- **Chapter 2. Alternatives, Including the Modified Proposed Action** provides a more detailed description of the Nebraska's modified proposed action and a description of a no-action alternative. This chapter also provides a comparison of the alternatives as related to the purpose and need for action and project-specific resource concerns (identified in chapter 1).
- **Chapter 3. Affected Environment and Environmental Consequences** describes the direct, indirect, and cumulative effects associated with the alternatives.
- **Chapter 4: Consultation and Coordination** provides a list of preparers and agencies consulted during the development of the environmental impact statement.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at https://www.fs.usda.gov/project/nebraska/?project=62500.

Background

The Nebraska is comprised of the Nebraska and Samuel R. McKelvie National Forests and the Buffalo Gap, Fort Pierre, and Oglala National Grasslands. The Nebraska encompasses roughly 1.1 million acres in the states of Nebraska and South Dakota. Affected counties include Blaine, Cherry, Dawes, Sioux, and Thomas Counties in Nebraska and Custer, Fall River, Jackson, Jones, Lyman, Pennington, and Stanley Counties in South Dakota. The Nebraska is made up of five ranger districts, including the Pine Ridge, Bessey, Fall River, Fort Pierre, and Wall (figure 1). Predominant neighboring lands include the Badlands National Park, South Dakota School and Public Lands, privately owned lands, tribal lands, and lands administered by the Bureau of Land Management. National Forest System lands depicted on figure 1 below represent the project area for the Nebraska's Undesirable Plant Management Project.

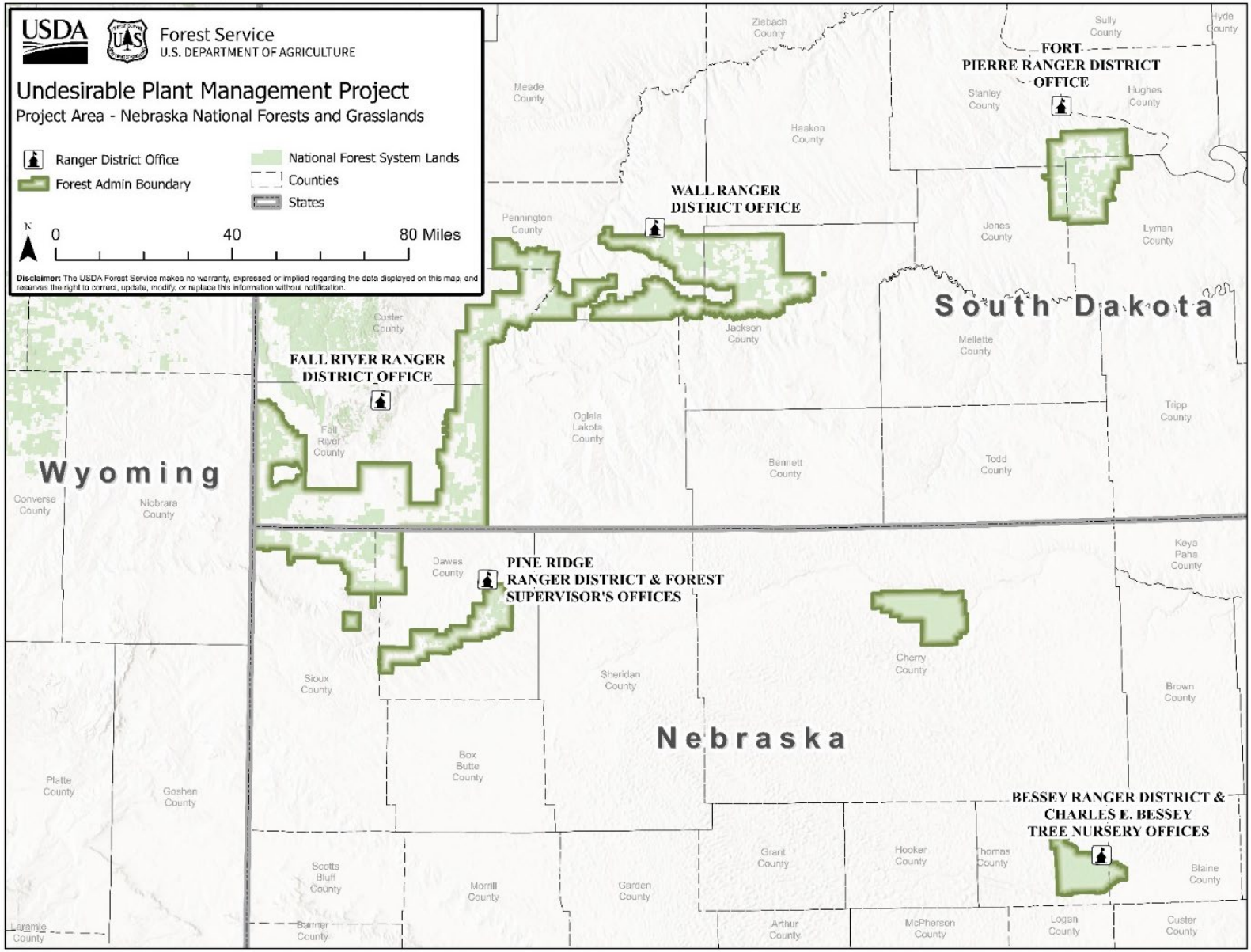


Figure 1. Undesirable Plant Management Project area map

The Nebraska is unique in that it contains areas of grassland ecosystems, forested landscapes, and hand-planted forests. The lack of prescribed fire since human settlement has contributed to the Nebraska's undesirable plant problem. This is particularly noticeable on the sandhill grasslands of the Bessey Ranger District. Here, the lack of prescribed fire has allowed woody species, such as eastern redcedar, to encroach and threaten grassland ecosystems by transitioning them to woodlands. The Fort Pierre Ranger District has seen a rapid expansion of cool-season exotic grasses over the last 15 years. In the forested landscapes, the lack of prescribed fire has increased hazardous fuels which has contributed to dangerous conditions in these areas. For example, in 2006 and 2012, the Pine Ridge Ranger District experienced catastrophic wildfires that consumed almost three fourths of the district's forested acres. That district has seen a dramatic increase of undesirable plants in those wildfire locations since those events occurred.

In addition to the lack of prescribed fire, the size and remoteness of the Nebraska has made management of undesirable plant species challenging, particularly when considering the limitations associated with current management practices. Current management of undesirable plant species on the Nebraska is supported by a 1993 Environmental Analysis for Management of Undesirable Plant Species, a 1993 Control of Undesirable Plant Species Environmental Assessment and Decision Notices on the Pine Ridge and Wall Ranger Districts, a 1995 Undesirable Weed Management Environmental Assessment and Decision Notice on the Fort Pierre Ranger District, and a 1999 Noxious Weed Control Environmental Assessment and Decision Notice on the Fall River Ranger District. While these documents provide for control or containment of undesirable plant species using an integrated weed management strategy, none of the associated decisions allow for new practices to support rapid response to control new infestations, eradication of new undesirable plant species, or landscape-scale disturbances. The decisions also did not authorize the use of aerial application of herbicides, use of prescribed fire to control undesirable plant infestations, or the control of aquatic undesirable species throughout the Nebraska. While some past decisions did allow the flexibility for the use of new chemicals developed, they were specific in the undesirable species that would be treated on each district. New control methods to manage undesirable species are necessary, due to the rate at which undesirable plant species spread and outcompete desirable species and the remoteness of many areas on the Nebraska.

Undesirable Plant Species to be Targeted

Given the numerous definitions found throughout scientific literature for invasive species and weeds, the Nebraska used the term 'undesirable plant' in this analysis to collectively refer to all species proposed for treatment. To maintain consistency with management actions, undesirable plants in this analysis are defined, as followed, using scientific definitions found in the Weed Science Society of America Herbicide Handbook (Shaner 2014) and South Dakota State University Extension publication, Pasture and Range Invasive Species Management (Bauman 2020):

1. **Noxious weeds** are plants regulated or identified by law as being undesirable, troublesome, and difficult to control. Precise definitions vary according to legal interpretations (Shaner 2014) and would be those plant species that have been officially declared or defined as a noxious weed by the States of Nebraska (Statute 2-945.01) and South Dakota (Administrative Rule 12:62:03:01.06 and 07). States periodically update their declared noxious weed lists to adapt to changing environmental conditions so the list is not static and can change over time.
2. **Invasive plants** are plants that tend to reproduce and colonize aggressively or that displace desirable vegetation or species and competes successfully for limited resources. Most invasive plants are exotic, while a limited number are native, early successional species (Bauman 2020).

3. **Weeds** are plants that are out of place or deemed undesirable, regardless of origin. A weed may or may not actually be exotic or truly invasive, but it may be undesirable simply because it is located in a place that is deemed unacceptable (Bauman 2020).
4. **Non-native plants** generally do not originate in the surrounding region. This term is most typically applied to plants that are believed to have originated somewhere other than the North American continent. Most non-native plants are undesirable, but not all may be invasive in nature (Bauman 2020).
5. **Native** plants are generally any plant that naturally occurs in an area or the surrounding region. Native plants can be invasive, but invasiveness is often a result of historic or current management that favors early successional species[3] (Bauman 2020). Invasiveness can also be due to the lack of natural processes such as wildfire or grazing.

Undesirable plants have been identified as a major threat to the biological diversity and ecological integrity of a landscape. Undesirable plants cause numerous adverse environmental effects, including displacing native plants; reducing the functionality of habitat and forage for wildlife and livestock; hindering populations of threatened, endangered, and sensitive species; altering physical and biological properties of soil, including soil productivity; changing the intensity and frequency of fires; and affecting wilderness characteristics. Additionally, the potential impacts of expanding undesirable plant species could be seen as a threat to the Nebraska's economic resources such as livestock forage, timber, or recreational attributes.

Undesirable plant infestations have a high potential for expanding on lands within and adjacent to the Nebraska, thereby degrading desired plant communities and the values they provide. National Forest System lands are also threatened by "potential invaders," that is, undesirable plants that have not been found within the Nebraska but are known to occur in adjacent lands, counties, or states.

To date, the Nebraska has inventoried approximately 150,000 acres of undesirable plant species that would be targeted for treatment. Acres of inventoried infestations are provided in table 3 and known infestations of undesirable plant species are displayed in Appendix A: Maps of Inventoried Undesirable Plant Species. Acreages identified are the minimum extent of undesirable plant species inventoried. It is not a true reflection of actual current forestwide conditions. Species depicted in table 3 are subject to change as ecological conditions change and or new plants are discovered and inventoried.

Under the modified proposed action future treatments would not be limited to species known to currently infest the Nebraska. If new undesirable plant species are discovered, they would be treated with one or more of the methods described under the modified proposed action. Appendix C (page 137) contains a current list of undesirable plant species that could be targeted under the modified proposed action. This is not an inclusive list of species to be treated. It is derived from state noxious, watch, or invasive plant lists; problematic species; previously treated species; and species known to occur in the project area or in surrounding counties and states.

Under the no-action alternative, the Nebraska would be limited to species specific treatments by ranger district. Additional information is discussed in chapter 2.

[3] Early successional species are generally defined as plants that develop in an area shortly after a disturbance.

Table 3. Inventoried undesirable plant species

Common name	Scientific name	Acres
absinth wormwood	*Artemisia absinthium*	141
black henbane	*Hyoscyamus niger*	5
bull thistle	*Cirsium vulgare*	1,273
Canada thistle	*Cirsium arvense*	43,895
common burdock	*Arctium minus*	Less than 1
common mullein	*Verbascum thapsus*	688
common St. Johnswort	*Hypericum perforatum*	Less than 1
crested wheatgrass	*Agropyron cristatum*	974
crownvetch	*Securigera varia*	491
eastern redcedar	*Juniperus viriniana*	69,617
field bindweed	*Convolvulus arvensis*	3
hoary cress (whitetop)	*Cardaria draba*	4,256
houndstongue (gypsyflower)	*Cynoglossum officinale*	85
kochia	*Bassia scoparia*	12
leafy spurge	*Euphorbia esula*	302
musk thistle (nodding plumeless thistle)	*Carduus nutans*	12,564
plumeless thistle (spiny)	*Carduus acanthoides*	Less than 1
Russian knapweed	*Acroptilon repens*	388
Russian olive	*Elaeagnus angustifolia*	9
saltcedar	*Tamarix ramosissima*	16
scentless false mayweed	*Tripleurospermum perforatum*	Less than 1
Scotch thistle	*Onopordum acanthium*	305
sericea lespedeza	*Lespedeza cuneata*	Less than 1
sickleweed	*Falcaria vulgaris*	6,663
smooth brome	*Bromus inermis*	3,025
spotted knapweed	*Centaurea stoebe ssp. micranthos*	111
sulfur cinquefoil	*Potentilla recta*	3,231
wild mustard	*Sinapis arvensis ssp.arvensis*	Less than 1

Purpose and Need for Action

The purpose of the project is to protect, maintain, or restore desirable native plant communities from the negative effects of existing and future undesirable plants across the Nebraska. The project is a response to an underlying need to implement policy and direction provided at the federal and state levels pertaining to noxious weed and undesirable plant management.

The need for the project is multi-faceted and includes:

- **Updating direction for undesirable plant management.** The Nebraska's current management of undesirable plant species is tiered to a 1993 Environmental Analysis for Management of Undesirable Plant Species across the Nebraska. Subsequent Environmental Assessments were completed at the ranger district level following the completion of this analysis. These included a 1993 Control of Undesirable Plant Species Environmental Assessment and Decision Notices on the Pine Ridge and Wall Ranger Districts, a 1995 Undesirable Weed Management Environmental and Decision Notice on the Fort Pierre Ranger District, and a 1999 Noxious Weed Control Environmental Assessment and Decision Notice on the Fall River Ranger District. The analyses also tiered to the 2001 Land and Resource Management Plan for the Nebraska National Forest (USDA Forest Service 2001, as amended) and did not analyze the effects of aerial application of herbicides, prescribed fire, or the treatment of aquatic invasive species (for example, saltcedar, purple loosestrife, narrowleaf cattail). While they did allow the flexibility for the use of new chemicals developed, they were specific in the undesirable species that could be treated on each district. A new, standalone decision is also needed to ensure consistent and holistic management of undesirable plant species across the Nebraska. If approved, the modified proposed action will supersede the previous decisions listed above.
- **Providing timely response to new infestations, new undesirable plant species, and landscape-scale disturbances.** The Nebraska requires the flexibility to treat expanded and newly identified undesirable plant infestations in a timely manner before they become widely established. The impacts of undesirable plant species on desirable native vegetation, wildlife, soils, fisheries, aesthetics, and a host of other resources are widely recognized by both the public and land managers. At the same time, the undesirable plant problem on the Nebraska has grown beyond what can be effectively managed using existing control methods and practices, making aerial application of herbicide a viable option. When used appropriately, aerial application is an efficient and useful method for managing undesirable plant infestations involving multiple undesirable species, infestations found in rugged terrain and remote areas, and infestations that are pervasive at a landscape-scale. Finally, new management strategies are needed to address new undesirable plant species found on the Nebraska in an efficient and responsive manner and to provide new tools (for example, early detection and rapid response, aerial application of herbicide, prescribed fire) for managing infestations.
- **Reducing adverse impacts of undesirable plants to humans, animals, and desirable native plant communities.** Failure to control or eradicate infestations quickly and at a landscape-scale allows undesirable plants to spread, displacing desirable native plant species. Effects of this could cause a shift from desirable native vegetation to undesirable plants. Subsequently this may alter wildlife habitat, decrease forage for wildlife, reduce species diversity, increase soil erosion due to a decrease in surface cover, alter the fire return interval, and promote undesirable monocultures. Additionally, the spread of certain undesirable plants may increase threats to human health and safety through the spread of noxious undesirable plant species. By reducing the presence and spread of undesirable plants in specific environments the Nebraska can reduce the chance of adverse impacts to humans, animals, and desirable native vegetation.

Modified Proposed Action (Preferred Alternative)

On January 11, 2023, the Nebraska published a notice of intent (notice) in the Federal Register which described a proposed action that projected 100,000 acres of undesirable plant treatment annually over a 15-year period. Based on scoping comments received (40 Code of Federal Regulations 1501.9) and further analysis of Nebraska inventory and monitoring data, the January 11, 2023, proposed action was modified to reduce the projected annual forestwide combined treatments from 100,000 acres to 50,000 acres.

In support of this modification, data shows that at least 150,000 acres of undesirable plant species exist on the Nebraska, while treatment acres for the last 10 years only peaked at approximately 13,500 acres annually. With the inclusion of additional treatment options, such as prescribed fire and aerial application of herbicides, the Nebraska assumes that annual forestwide treatments may approach 50,000 acres. Annual treatment acres also take into consideration potential future environmental conditions such as climate change, species adaptivity, and species spread that are predicted to increase the acres of undesirable plant species on the Nebraska.

Under the modified proposed action, the Nebraska proposes to use adaptive and responsive treatment strategies to allow for early detection of, and rapid response to, undesirable plant species. These strategies include using preventative measures, early detection and rapid response, control methods, adaptive management, rehabilitation and restoration, and implementation and effectiveness monitoring. Preventative measures can include projects for education and awareness as well as more traditional activities such as vehicle and equipment cleaning or utilizing certified weed free forage (Forest Service Manual 2900). Early detection and rapid response would require identifying and quantifying undesirable plant species, rapidly assessing potential risks, and promptly treating undesirable plant populations when they are small.

Proposed control methods would include (1) biological control, such as the release of host-specific natural enemies or targeted grazing; (2) chemical control, including aerial or ground applications using Forest Service approved herbicides that target undesirable plant species; (3) mechanical techniques, such as mowing, cutting, or pulling; and (4) prescribed fire conducted in accordance with established guidance and project specific individual burn plans. Control methods would be employed alone or in combination to achieve the most effective control based on the extent, location, type, and character of an infestation and would be implemented using project design features (Appendix E, page 154) developed to ensure ecosystem health and protection. Rehabilitation and restoration could include such actions as site preparation and seeding of desirable vegetation in areas where passive restoration is not likely to be successful. Finally, monitoring would occur on a sample basis to determine the following: (1) whether treatments were effective, (2) potential effect to non-target plant species, and (3) if recovery occurred as expected. Treatment monitoring would incorporate established protocols outlined in Monitoring Category 7: Progress Towards Desired Conditions and Category 8: Management and the Productivity of the Land, contained in the monitoring plan (amended May 20, 2016).

The modified proposed action incorporates principles of adaptive management to address continually changing environmental conditions and to ensure that treatment goals are met. Adaptive management recognizes that knowledge about natural resources is sometimes uncertain at the time of a project decision (43 Code of Federal Regulations 46.30) and therefore requires monitoring to determine if adjustments in control methods are warranted and to inform future project implementation.

Project implementation is desired to begin in 2024. Forestwide combined treatments of up to 50,000 acres annually would be expected. Further information is available on the project website: https://www.fs.usda.gov/project/?project=62500.

Management Direction

The following sections provide an overview of management direction applicable to the Undesirable Plant Management Project.

Land and Resource Management Plan for the Nebraska National Forests and Grasslands

Forest and grassland management direction for the Nebraska is contained in the Land and Resource Management Plan for the Nebraska National Forests and Grasslands (hereafter Nebraska Forest Plan or forest plan; USDA Forest Service 2001, as amended). The forest plan provides goals, objectives, standards, and guidelines focused on protecting plant communities, conserving viable plant and animal species and habitats for the long term, designating special areas, and cost-effectively managing vegetation across the Nebraska. The Undesirable Plan Management Project complies with relevant forest plan direction, as documented in the project record (see specialist reports).

The Undesirable Plant Management Project analysis also tiers to the forest plan and final environmental impact statement for the forest plan, as amended. Tiering means that forest plan information is either summarized or incorporated by reference, rather than repeated in this document.

Forest Plan Goals and Objectives

The forest plan establishes four multiple-use goals and associated objectives for management of the Nebraska (pp. 1-1 to 1-9). The Undesirable Plant Management Project responds to three of those goals, as follows:

- Goal 1 – Ensure Sustainable Ecosystems: Promote ecosystem health and conservation using a collaborative approach to sustain the Nation's forests, grasslands, and watersheds.
    - Subgoal 1.c: When appropriate or where necessary to meet resource management objectives, increase the amount of forests and rangelands restored to or maintained in a healthy condition with reduced risk and damage from fires, insects and diseases, and invasive species (USDA Forest Service Strategic Plan 2000, Revision Objective 1.c).

  The Undesirable Plant Management Project presents opportunities for early detection and response; control and management; restoration and rehabilitation; and monitoring to control or reduce the presence of undesirable plant species across the Nebraska. The project also allows for a proactive approach to management by expanding the types of control methods available, including aerial application of herbicide, and using an adaptive management approach that allows flexibility and efficiency to treat areas that are constantly changing across the landscape.
- Goal 3 – Scientific and Technical Assistance: Develop and use the best scientific information available to deliver technical and community assistance and to support ecological, economic, and social sustainability.
    - Subgoal 3.a: Improve the knowledge base provided through research, inventory, and monitoring to enhance the scientific understanding of ecosystems, including humans, to support decision-making and sustainable management of the Nation's forests and rangelands (USDA Forest Service Strategic Plan 2000, Revision Objective 3.c).

  The Undesirable Plant Management Project incorporates improved scientific information and methods for managing undesirable plant populations. It also includes monitoring necessary for implementing an adaptive-management strategy. Information collected from monitoring will be used to evaluate the efficiency of the early detection-rapid response strategy, treatments, and rehabilitation and restoration actions, and may subsequently be used to adapt and update management actions. Two basic types of monitoring would occur: implementation monitoring and effectiveness monitoring. Implementation monitoring answers the question, "Did we do what we said we would do?" Effectiveness monitoring answers the questions, "Were prevention, treatment, or restoration actions effective?" and "Were intended goals accomplished?"

- Goal 4 – Effective Public Service: Ensure the acquisition and use of an appropriate corporate infrastructure to enable the efficient delivery of a variety of uses.
    - Subgoal 4b. – Public and Organizational Relations, Objective 2: Work in cooperation with federal, state, and county agencies, individuals, Tribes, and non-Government organizations for control of noxious weeds and invasive species and animal damage.

  The Undesirable Plant Management Project requires coordination with adjacent private landowners or public land managers when treatments occur along property boundaries. This requirement would increase existing interagency cooperation when treating undesirable plants and would foster enhanced working relationships amongst all parties, thus allowing for a more holistic and effective management approach to treat undesirable plants that occur across jurisdictional boundaries.

Federal Laws, Regulations, and Policies

In addition to the forest plan management direction described above, the Forest Service is directed by numerous laws, regulations, and agency policies to treat undesirable plant species, as follows:

- Bankhead Jones Act of 1935, as amended (December 2003) (PL 108-198): The modified proposed action complies with this Act by focusing on the reestablishment of desirable plant species to better conserve natural resources and to promote more desirable livestock forage.
- Carlson-Foley Act of 1968 (PL 90-583) authorizes and directs Federal agencies to permit control of noxious weeds on Federal lands by state and local governments on a reimbursement basis in connection with similar weed control programs carried out on adjacent nonfederal land.
- Plant Protection Act (PL 106-224, June 20, 2000) repealed the Federal Noxious Weed Act of 1974 and prohibits the unauthorized movement of plant pests.
- Noxious Weed Control and Eradication Act of 2004 amends the Plant Protection Act to require the Secretary of Agriculture to establish a program to provide assistance to eligible weed management entities to control or eradicate noxious weeds on public and private land.
- Federal Land Policy Management Act of 1976 (PL 94-579) authorizes control of weeds on rangeland.
- National Forest Management Act of 1976 (PL-94-588) authorizes removal of deleterious plant growth through forest plans.
- The Wilderness Act of 1964, as amended (October 1978) retains wilderness areas' primitive character and influence, without permanent improvements or human habitation, to preserve natural condition.
- Forest Service Handbook 2109.14, Pesticide Use Management and Coordination Handbook directs proper use, containment, and safety procedures for pesticide use by Forest Service personnel.
- Forest Service Manual 2100, chapter 2150. Pesticide-Use Management and Coordination directs the Forest Service to plan, evaluate, and review pesticides and their use, as well as provide for safety in pesticide use, storage, transportation, and disposal.
- Forest Service Manual 2259.03 states the following: Forest officers shall cooperate fully with County, State and Federal officials in implementing 36 Code of Federal Regulations 222.8 and sections 1 and 2 of Public Law 90-583. Within budgetary constraints, the Forest Service shall control to the extent practical, noxious farm weeds on all National Forest System lands.
- Forest Service Manual 2900, Invasive Species Management lists laws and regulations to which the Forest Service must adhere. Additionally, the manual states that the Forest Service's invasive species policy and management objectives will be based on integrated pest management.

- Forest Service National Strategic Framework for Invasive Species Management (2013) identifies the Forest Service as one of the lead agencies in the effort to control non-native and invasive plants. It provides long-term direction to reduce, minimize or eliminate invasive species across all landscapes and ownerships by improving the management of invasive species using science-based technology, by emphasizing partnerships and by increasing performance and accountability, as well as communication and education.
- 36 Code of Federal Regulations 222.8 directs the Forest Service to cooperate with local weed control districts to analyze and develop noxious weed control programs where there are National Forests.
- Nebraska National Forest Management of Undesirable Plant Species Environmental Analysis (1993) contains the existing weed control plan that provides guidance down to the district level on the control of undesirable plant species on National Forest System lands of the Nebraska.
- Pine Ridge and Wall Ranger Districts Control of Undesirable Plant Species Environmental Assessment and Decision Notices (1993) contains the existing weed control guidance that advises on how to control weeds on the Pine Ridge and Wall Ranger Districts of the Nebraska.
- Fort Pierre Ranger District Undesirable Weed Management Environmental Assessment and Decision Notice (1995) contains the existing weed control guidance that advises on how to control weeds on the Fort Pierre Ranger District of the Nebraska.
- Fall River Ranger District Noxious Weed Control Environmental Assessment and Decision Notice (1999) contains the existing weed control guidance that advises on how to control weeds on the Fall River Ranger District of the Nebraska.
- Executive Order 13112 Invasive Species (64 Federal Register 6183; February 8, 1999) directs Federal agencies “to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological and human health impacts that invasive species cause.”
- Executive Order 13751 Safeguarding the Nation from the Impacts of Invasive Species (Vol. 81, No. 236 Federal Register, December 8, 2016) amends Executive Order 13112 and directs action to continue coordinated Federal prevention and control efforts related to invasive species. It also incorporates considerations of human and environmental health, climate change, technological innovation, and other emerging priorities to address invasive species.

Decision to be Made

Following a thorough National Environmental Policy Act analysis the Forest Service’s responsible official will decide:

- whether to approve the modified proposed action and, if approved, what modifications and/or additional mitigation measures would be required.

Tribal and Public Involvement

The information provided below outlines how the Nebraska engaged with multiple entities as part of the Undesirable Plant Management Project planning effort.

Tribal Governments

The Nebraska regularly consults with tribal governments regarding projects proposed on the forests and grasslands. On January 11, 2023, the Nebraska's Forest Supervisor sent scoping information, the notice of intent, and a cover letter inviting formal Consultation and participation in the development of the Undesirable Plant Management Environmental Impact Statement proposed action to 29 Federally recognized tribes. On November 29, 2023, additional, follow up outreach took place. A project summary and cover letter again inviting formal Consultation, as well as input or comments, was sent to the previously contacted 29 Federally recognized tribes via email or physical mail. This outreach was sent to both Tribal Leaders and Tribal Historic Preservation Officers for each tribe. Additional contacts and information sharing is planned with each of the 29 Federally recognized tribes, as well as any other Federally recognized tribes that may express interest in the project or that are identified as potentially having interest, throughout the environmental analysis process, during project implementation, and beyond.

If the modified proposed action is selected for implementation, tribal governments would continue to be consulted when specific project locations are identified during project implementation. This would allow tribal representatives to provide location-specific comments when they are most useful.

Scoping Efforts

The notice of intent (notice) to prepare an environmental impact statement was published in the Federal Register on January 11, 2023; the Federal Register publication initiated the public scoping process for the analysis. Scoping is an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action (40 Code of Federal Regulations 1501.9). The notice provided a description of the purpose of and need for the project, the proposed action, and preliminary issues and concerns for consideration. Comments on the notice were accepted for a 45-day period until February 27, 2023, which was an additional 15 days beyond the typical 30 days to ensure an adequate public comment period. As part of public scoping, the Nebraska also sent the notice to 30 agencies and 92 stakeholders and published a news release for local media venues. Finally, the Nebraska discussed the proposal with affected livestock grazing associations and federal, state, and local agency officials, and published information about the notice on Twitter and on the Nebraska's News and Events and Facebook pages. A total of eight comment letters were received in response to the public outreach efforts.

Using comments received from the public, other agencies, and tribal governments, the interdisciplinary team developed a list of issues and resource concerns to address in this environmental impact statement.

Project Issues

Issues serve to highlight effects or unintended consequences that may occur from a proposed action or alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decisionmaker and public to understand. Issues for the Undesirable Plant Management Project were developed through deliberations with Nebraska resource specialists. Issues were used to help focus the analysis. Management indicators, or means of measuring change, were developed for issues to help inform differences between the alternatives. The following are the issues that were addressed during the analysis for this environmental impact statement.

Issue 1: Treating undesirable plants may cause negative effects to the composition and structure of desirable native vegetation.

Management Indicators

- Impacts of treatments to desirable native vegetation, composition, and structure.
- Acres of undesirable plant infestations increased or reduced.

Issue 2: Treating undesirable plants may harm threatened, endangered, sensitive, or management indicator species.

Management Indicators

- Direct and indirect effects of undesirable plant treatment activities (disturbance and toxicity).
- Determination of degree of effects.

Issue 3: Treating undesirable plants could harm soils, riparian, and aquatic resources and could adversely impact the quality of surface and groundwater.

Management Indicators

- Soil health.
- Riparian health and function.
- Surface and ground water quality.
- Effects of management activities on aquatic resources.

Issue 4: Treating undesirable plants with herbicide could be toxic or harmful to people due to drift, residue, or direct application.

Management Indicators

- Allowable worker exposure limits.
- Allowable public exposure limits.

Changes Between Draft and Final Environmental Impact Statements

The notice of availability for the draft environmental impact statement was published in the Federal Register on March 22, 2024, initiating a formal 45-day public comment period for the document. The Forest Service received seven comment letters by the close of the comment period on May 13, 2024. The comments received resulted in minor changes to the final environmental impact statement, as described below, but did not result in the development of a new action alternative. Forest Service responses to the comment letters are provided in Appendix F, which is a standalone appendices.

Minor Changes to the Final Environmental Impact Statement:

- Chapter 1, Federal Laws, Regulations, and Policies – added Bankhead Jones Act of 1935, as amended (May 2003).
- Chapter 3, Climate Change and Greenhouse Gas – edited the Methodology section to include updated climate change guidance.
- Chapter 3, Fire and Fuels – added a paragraph specific to the Clean Air Act under Direct and Indirect Effects of the Modified Proposed Action.
- Chapter 3, Listed and Sensitive Wildlife and Plants – edited table 15 to include reocmmendations from the U.S. Fish and Wildlife Service.
- Chapter 4: Consultation and Coordination – updated table 27 to include grazing associations who were invited to participate in project planning.
- Appendix D: Implementation Checklists – added Air Quality Best Management Practices to the Undesirable Plant Management Project Implementation Checklist.
- Appendix F: Response to Public Comments (Standalone document): new appendix.
- Appendix G: U.S. Fish and Wildlife Service Consultation: new appendix.

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Chapter 2. Alternatives, Including the Modified Proposed Action

Introduction

This chapter describes and compares the alternatives considered for the Undesirable Plant Management Project. It includes a description of each alternative considered and presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative (that is, allowing aerial application of herbicide and prescribed fire to control undesirable plant species) and some of the information is based upon the environmental, social, and economic effects of implementing each alternative (impacts to water quality from prescribed fire versus mowing).

The alternatives analyzed in detail in this environmental impact statement include a modified proposed action and a no-action alternative. Alternatives are based on the results of the January 11, 2023, scoping effort. Public comments resulted in a modification to the proposed action's projected total annual treatment acres, reducing it from 100,000 to 50,000 acres annually. Remaining comments were either in support of the project or contained suggestions which were incorporated into project development. Consequently, additional alternatives were not warranted.

Alternatives Considered in Detail

No-Action Alternative

Under the no-action alternative, current management of undesirable plant species on the Nebraska would continue, as supported by a 1993 Environmental Analysis for Management of Undesirable Plant Species and the subsequent district level Environmental Assessments that tiered to it. These included a 1993 Control of Undesirable Plant Species Environmental Assessment and Decision Notices on the Pine Ridge and Wall Ranger Districts, a 1995 Undesirable Weed Management Environmental Assessment and Decision Notice on the Fort Pierre Ranger District, and a 1999 Noxious Weed Control Environmental Assessment and Decision Notice on the Fall River Ranger District. These decisions authorized (1) the removal of plant growth by means of mowing, cutting, or grazing; (2) soil disturbance such as pulling or tilling; (3) biological control with the use of one or more insect pests or grass species that produce allelopathic compounds; and (4) herbicide from ground-based equipment such as tractors, ATV's, trucks, horses, or hand sprayers. Protective measures or sideboards known as design features are not specifically identified in these decisions, but information found throughout each meets the definition (Appendix E: Project Design Features). Similar design feature elements between ranger districts exists, but Nebraska-wide uniformity is lacking. New practices that would support the rapid response to control new infestations, new undesirable plant species, and landscape-scale disturbances would not occur with this alternative (for example, aerial application of herbicide). Finally, management practices that focus on the reduction of adverse impacts of undesirable plants to humans, animals, and native plant communities would be limited to only the previously identified and analyzed plant species and management actions.

Management actions vary by the type of site and the weed species occurring. Current control methods are being used independently or in combination on the following sites:

- **Badlands** – consists of gently sloping to nearly vertical exposures of mudstone, siltstone and shale which are dissected by many narrow intermittent drainageways and flood plains. Little to no vegetation exist on the exposed mudstone, siltstone, and shale. The dominant vegetation on the flood plains consists of grasses with scattered forbs and shrubs. The drainageways consist of grasses that require free or unbound water with few scattered shrubs.
- **Grassland** – areas where the dominant vegetation consists of grasses that do not require free or unbound water. Forbs and widely scattered shrubs may occur mixed with the grasses.
- **Shrublands** – areas where the dominant vegetation consists of shrubs that do not require free or unbound water. The herbaceous understory consists of a mixture of grasses and forbs.
- **Wooded Draws** – areas where the dominant vegetation consists of deciduous/coniferous trees and requires additional water. The herbaceous understory may consist of a mixture of shrubs, grasses, and forbs.
- **Forested** – areas where the dominant vegetation consists of coniferous. trees that do not require free or unbound water. The herbaceous understory may consist of a mixture of shrubs, grasses, and forbs.
- **Road/Trail Corridors** – areas along trails and roadways. Includes any area directly adjacent to human travel routes.
- **Riparian** – includes both riparian and wetland areas. Riparian areas are moist to wet areas along lakes and streams that require free or unbound water. Wetlands are wet areas that require at least seasonally saturated soils.
- **Concentrated Human Use Areas** – areas where human activity is concentrated. Included areas are campgrounds, trailheads, administrative sites, and special use areas.

Table 4 displays the number of acres, by control method, that have been treated each year since 2009 on the Nebraska under the no-action alternative while Appendix B, page 127, provides a visual display of this same information. Table 5 displays the undesirable plant species approved for control and the control type used to manage the infestation.

Table 4. Number of acres treated, by control method, since 2009 – no-action alternative

Year	Removal of plant growth	Soil disturbance	Biological control	Herbicide from ground-based equipment
2009	0	0	4	13,334
2010	0	0	30	6,157
2011	0	0	0	2,284
2012	0	0	135	3,621
2013	0	15	100	3,572
2014	0	0	208	3,864
2015	3,326	1	188	3,756
2016	2,924	0	17	6,250
2017	1,246	0	90	4,493
2018	137	1	94	3,487
2019	0	1	24	4,619

Year	Removal of plant growth	Soil disturbance	Biological control	Herbicide from ground-based equipment
2020	305	1	0	13,216
2021	0	0	0	11,948
2022	0	0	0	11,690

Table 5. Undesirable plant species approved for control and control method used – no-action alternative

Common name	Scientific name	Control method used [1]
absinth wormwood	*Artemisia absinthium*	R, S, H
buffalo bur	*Solanum rostratum*	R, S, H
bull thistle	*Cirsium vulgare*	R, S, H
Canada thistle	*Cirsium arvense*	B, H
common burdock	*Arctium minus*	R, S, H
common mullein	*Verbascum thapsus*	R, S, H
common St. Johnswort	*Hypericum perforatum*	R, B, H
common tansy	*Tanacetum vulgare*	R, S, H
dalmatian toadflax*	*Linaria dalmatica*	R, B, H
deathcamas	*Zigadenus venenosus*	R, H
diffuse knapweed	*Centaurea diffusa*	B, H
field bindweed	*Convolvulus arvensis*	R, S, B, H
halogeton	*Halogeton glomeratus*	R, S, H
hoary cress (whitetop)	*Cardaria draba*	R, S, H
horsenettle	*Solanum carolinense*	R, S, H
Houndstongue (gypsyflower) *	*Cynoglossum officinale*	R, B, H
larkspur	*Delphinium sp.*	B, H
leafy spurge	*Euphorbia esula*	R, B, H
musk thistle (nodding plumeless thistle)	*Carduus nutans*	R, S, B, H
perennial sowthistle	*Sonchus arvensis*	R, S, H
plains prickly pear	*Opuntia polyacantha*	R, H
plumeless thistle (spiny)	*Carduus acanthoides*	R, S, B, H
poison ivy	*Toxicodendron sp.*	R, S, H
puncturevine	*Tribulus terrestris*	S, H
purple loosestrife	*Lythrum salicaria*	R, S, H
racemed poisonvetch	*Astragalus racemosus*	R, H
Russian knapweed	*Acroptilon repens*	S, B, H
sandbur	*Cenchrus longispinus*	R, S, H
Scotch thistle	*Onopordum acanthium*	R, S, H
spotted knapweed	*Centaurea stoebe ssp. Micranthos*	B, H

1. R=removal of plant growth, S=soil disturbance, B=biological, H=herbicide
* Fall River Ranger District only

Modified Proposed Action (Preferred Alternative)

On January 11, 2023, the Nebraska published a notice of intent in the Federal Register which described a proposed action that projected 100,000 acres of undesirable plant treatment annually over a 15-year period. Based on scoping comments received (40 Code of Federal Regulations 1501.9) and further analysis of Nebraska inventory and monitoring data, the January 11, 2023, proposed action was modified to reduce the projected annual forestwide combined treatments from 100,000 acres to 50,000 acres.

In support of this modification, data shows that at least 150,000 acres of undesirable plant species exist on the Nebraska, while treatment acres for the last 10 years only peaked at approximately 13,500 acres annually. With the inclusion of additional treatment options, such as prescribed fire and aerial application of herbicides, the Nebraska assumes that annual forestwide treatments may approach 50,000 acres. Annual treatment acres also take into consideration potential future environmental conditions such as climate change, species adaptivity, and species spread that are predicted to increase the acres of undesirable plant species on the Nebraska.

Under the modified proposed action, the Nebraska proposes to use adaptive and responsive treatment strategies to allow for early detection of, and rapid response to, undesirable plant species. These strategies include using preventative measures, early detection and rapid response, control methods, adaptive management, rehabilitation and restoration, and implementation and effectiveness monitoring. Preventative measures can include projects for education and awareness as well as more traditional activities such as vehicle and equipment cleaning or utilizing certified weed free forage (Forest Service Manual 2900). Early detection and rapid response would require identifying and quantifying undesirable plant species, rapidly assessing potential risks, and promptly treating undesirable plant populations when they are small.

Proposed control methods include (1) biological control, such as the release of host-specific natural enemies or targeted grazing; (2) chemical control, including aerial or ground applications using Forest Service approved herbicides that target undesirable plant species; (3) mechanical techniques, such as mowing, cutting, or pulling; and (4) prescribed fire conducted in accordance with established guidance and project specific individual burn plans. Control methods would be employed alone or in combination to achieve the most effective treatment based on the extent, location, type, and character of an infestation and would be implemented using project design features (Appendix E) developed to ensure ecosystem health and protection. Rehabilitation and restoration could include such actions as site preparation and seeding of desirable vegetation in areas where passive restoration is not likely to be successful. Finally, monitoring would occur using a representative sample of areas that have been treated to determine the following: (1) whether treatments were effective, (2) potential effects to non-target plant species, and (3) if recovery occurred as expected. Treatment monitoring would incorporate established protocols outlined in the monitoring plan for the forest plan. Applicable categories for undesirable species monitoring include Monitoring Category 7: Progress Towards Desired Conditions and Category 8: Management and the Productivity of the Land (amended May 20, 2016). Any future forest plan amendments or revisions will take into consideration this project and the need to incorporate necessary and applicable requirements to address undesirable species or native vegetation monitoring. Any updated, amended, or revised guidance will replace current monitoring guidance.

The modified proposed action incorporates principles of adaptive management to address continually changing environmental conditions. Adaptive management means we recognize that knowledge about natural resources is sometimes uncertain at the time of a project decision (43 Code of Federal Regulations 46.30) and would therefore monitor treatments to determine if adjustments in control methods are warranted and to inform future project implementation.

If approved, the modified proposed action will supersede the analysis and district level decisions found within the no-action alternative. Project implementation is desired to begin in 2024. Further information is available on the project website: https://www.fs.usda.gov/project/?project=62500.

Treatment Priority and Implementation

Treatment priority would be based on risk factors such as the number and size of known infestations; vectors for spread; proximity to susceptible habitat; threat to important resources (for example, wilderness, endangered species habitat); and probability for successful treatment. The priority of species to be treated would vary based on risk factors and could change over time. For example, priority may be given to sites located in areas proposed for ground-disturbing management activities, areas of concentrated use, or areas where aggressive undesirable plant species exist. In addition, opportunities for special funding or cooperative projects with other landowners, agencies, and organizations would be considered. Treatment priorities are part of the adaptive management strategy that would be used by managers in determining how to allocate resources.

The criteria for determining treatment priority of undesirable plant infestations are found within the Nebraska Forest Plan (p. 1-23). Priorities for controlling undesirable plants are set to prevent the introduction of new species and treat new infestations. In areas that already have established undesirable plant species, priority to contain and control the infestation is based on the following:

- Rate of species spread.
- Invasions within special management areas, such as Research Natural Areas and Wilderness, activity corridors, and high use areas.
- Probability of successful treatment in meeting desired conditions.

Several implementation checklists (Appendix D) have been developed to ensure that control treatments remain within the scope of the project analysis. Checklists include 'Project Implementation' and 'Aerial Application of Herbicide.' Annual implementation meetings would occur, as required by Implementation 1 design feature, to review proposed treatment methods and locations prior to undesirable plant management actions. A tracking spreadsheet would determine if the projected total annual treatment acres of 50,000 has been reached and would help determine whether the proposed treatment has achieved the desired outcome or if a different treatment method supported by the analysis' adaptive management strategy is needed. The Project Implementation Checklist would be used, in accordance with Project Design Feature, Implementation 2, as an avoidance or minimization effort when a resource concern has been identified during the annual implementation meeting, or if design feature(s) need to be applied. The Aerial Application of Herbicide Checklist would be used when the chemical control treatment has been selected for aerial application. This checklist provides guidance and confirms that best management practices and other relevant policy is being followed.

Preventative Measures

The use of preventative measures to reduce the introduction and spread of undesirable species would continue to be implemented forestwide. Prevention is perhaps the most important measure in an undesirable plant management program and is likely the most cost-effective method of undesirable plant control. The goal of prevention is to take proactive approaches to manage all areas of the Nebraska in a manner to protect native species and ecosystems from the introduction, establishment, and spread of undesirable plants. Prevention measures may include a wide range of actions and activities to reduce or eliminate the chance of an undesirable plant species entering or becoming established in a particular area. Preventative activities could include projects for education and awareness as well as more traditional activities such as vehicle and equipment cleaning or utilizing certified weed free forage (Forest Service Manual 2900).

Early Detection and Rapid Response

To provide for early detection and rapid response this plan would allow for the prompt treatment of undesirable plant infestations. Undesirable plant species, such as those defined in chapter 1's Undesirable Plant Species to be Targeted, may initiate the need for early detection and rapid response actions throughout the Nebraska. These infestations may include existing and future sites. The intent of early detection and rapid response is to allow timely control so that infestations can be treated when they are small, which prevents establishment and spread while reducing treatment costs and adverse consequences.

In line with the early detection and rapid response concept, areas susceptible to invasion of undesirable plants would be surveyed and inventoried quickly to detect infestations and immediately implement specific actions to eradicate the undesirable plants before they become established and spread. Coordination would occur internally and externally to achieve an effective approach across boundaries as needed.

Early detection and rapid response actions are grouped into three main categories:

- **Early Detection**: The process of finding, identifying, and quantifying new, small, or previously unknown infestations of undesirable plants prior to its establishment.
- **Rapid Assessment**: Assessing the risk of the undesirable plant by determining the geographic extent of the infestation, distance from other known locations, the mobility and potential rate of spread of the species, potential impacts, and treatments available.
- **Rapid Response**: Quick and immediate actions taken to eradicate, control, or contain infestations that must be completed within a relatively short time to maximize the biological and economical effectiveness against the targeted undesirable plant (Forest Service Manual 2900).

Early detection and rapid response are a management strategy that would be used to deal with undesirable plant infestations that are constantly changing. This would be used in conjunction with an adaptive management approach to evaluate the fluctuation of infestations, effectiveness of treatments, or new treatment options. Adaptive management is a structured, iterative process of robust decision making in the face of uncertainty, with an aim to reduce uncertainty over time via monitoring. Adaptive management is a tool which is used not only to change a system, but also to learn about the system. Because adaptive management is based on a learning process, it improves long-run management outcomes.

Figure 2 depicts a continuous diagram illustrating how adaptive management could be implemented at any step of the project's development. The figure is intended to convey that certain steps could be revisited during the treatment's lifecycle from any point. If monitoring indicates that goals are not, or will not, be attained through the selected treatment, adaptive management will allow resource specialists to move back to the appropriate step in order to adjust accordingly. At no point would adaptive management allow for implementation to move forward or skip steps within the process. Conditions that could require an adaptive management approach include, but are not limited to:

- Boundaries of existing infestations change.
- Post-treatment monitoring finds adverse effects to non-target species or unacceptable success rate.
- New mechanical, biological, or chemical methods are identified.
- New chemicals or adjuvants are introduced.

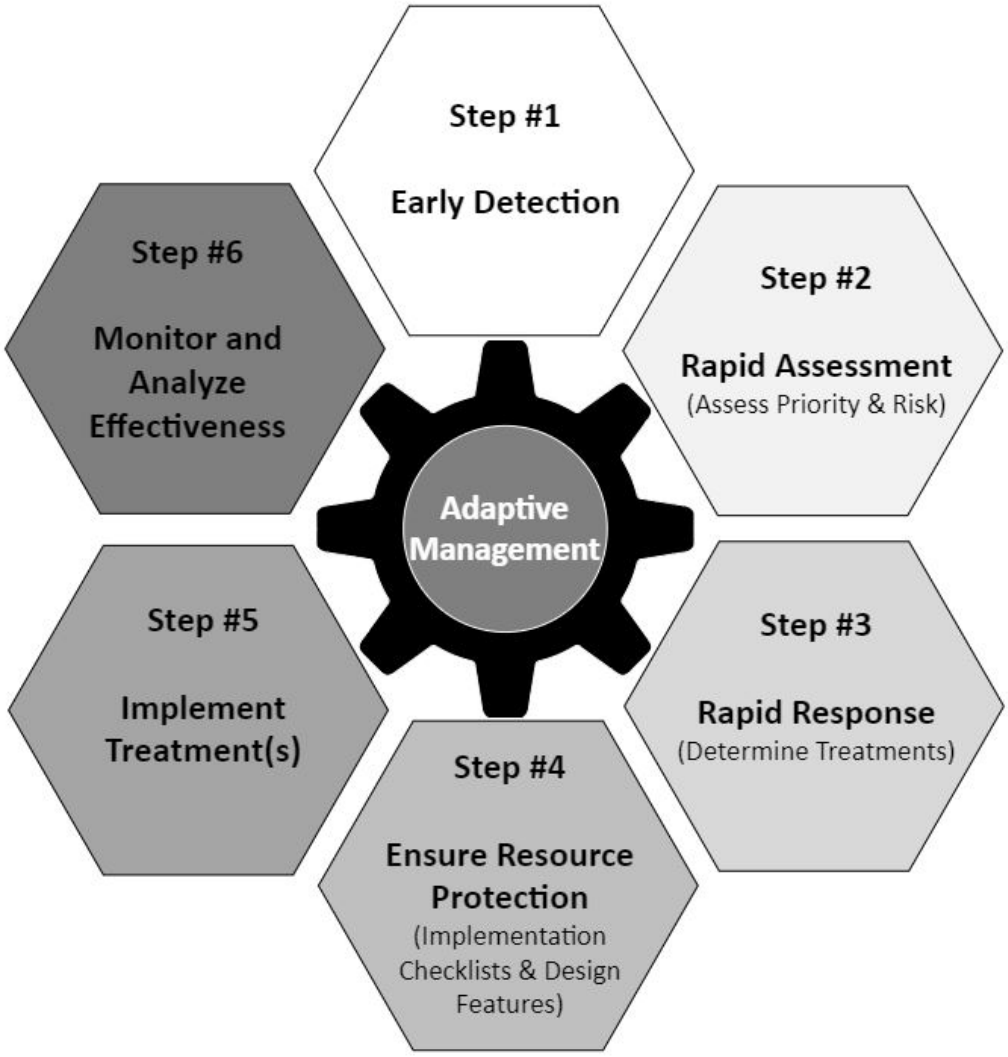


Figure 2. Implementation and adaptive management diagram

Control Methods

Biological Control

Biological control is the use of predators, parasites, or pathogens to weaken and reduce the ability of an undesirable plant species to compete or reproduce. Biological control agents typically include host-specific insects, mites, nematodes, and pathogens of a targeted plant species. The introduction of biological control agents is regulated by USDA Animal and Plant Health Inspection Service Plant Protection and Quarantine.

Biological control agents would be used in conjunction with other management actions when the target species occupies extensive portions of the landscape and other methods of control are prohibitive based on cost and location. Biological control is the preferred treatment method for remote areas where access is limited, for extensive populations where other control methods may not be appropriate, for species for which biological control agents are available and have been shown to be effective, and in conjunction with other control methods to reduce density of the target species. The objective of biological control is not to eradicate the target species but to reduce target plant densities to tolerable levels, allowing desired plants to compete for space, water, and nutrients.

Areas with undesirable plants would continue to be inventoried and monitored to determine biological control agent establishment and when the released biological control agents distribute with the target species as its range expands. Several repeat visits may be needed during a season and over a series of years to determine if additional releases are needed or if a different or additional biological control agents need to be released at a site.

Treatments may require years for biological control agent establishment and subsequent effects to targeted undesirable plants. As biological control agent impacts reduce target weed density and vigor, simultaneous increases of native or desirable vegetation may increase and eliminate the need for additional restoration inputs; however, in some instances, additional inputs may be required to reach desired vegetation conditions.

Targeted grazing is the specialized use of livestock grazing or browsing at a specified time, duration, intensity, and frequency to achieve defined vegetation and landscape management goals or objectives. An example is grazing cheatgrass early in the season when it is palatable and gives desirable cool season grasses a chance to compete.

Chemical Control

Chemical control treatments involve the use of U.S. Environmental Protection Agency registered herbicides and associated adjuvants.[4] Ground-based applications may take place in both terrestrial and aquatic ecosystems using the appropriately registered herbicide to treat undesirable plants in that environment.

Ground-based or aerial application of herbicides would be used based on:

1. treatment objective and priority of the target undesirable plant species;
2. accessibility, topography, and the size of treatment area,
3. the expected efficiency and effectiveness of the method selected;
4. the risk for spread or invasion into other locations, and
5. the potential to harm priority habitats and vegetation complexes such as those associated with threatened, endangered, or sensitive species.

A total of 21 active ingredients that as of 2023 have Human Health and Ecological Risk Assessments completed are proposed for use under the modified proposed action (table 6). Additional herbicides may be added in the future, at either the forest plan or project level, through appropriate risk analysis. However, no new chemical active ingredient would be added until it has undergone the appropriate risk analysis and Endangered Species Act consultation as required.

[4] Adjuvants are chemically and biologically active compounds that may improve the effectiveness of the herbicide they are added to, either increasing its desired impact and/or decreasing the total amount of formulation needed to achieve the desired impact.

Table 6. Active ingredients analyzed under the modified proposed action

Active ingredient	Labeled for aquatic application	Labeled for aerial application	Selectivity of active ingredient
2,4-D**	Yes – some formulations only	Yes	A selective systemic herbicide used to control broadleaf weeds
Aminocyclopyrachlor	No	Yes	Herbicide used to control broadleaf weeds and woody vegetation
Aminopyralid**	No	Yes	Effective reduced risk herbicide used to treat invasive broadleaf weeds
Chlorsulfuron**	No	Yes	A pre-emergent and post-emergent non-selective herbicide used to control grasses and weeds
Clopyralid**	No	Yes	A highly selective herbicide used mainly in the control of broadleaf weeds and woody vegetation
Dicamba**	No	Yes	A selective herbicide used in the control of broadleaf weeds and woody vegetation
Endothall	Yes	No	An aquatic herbicide used for control of algae and aquatic plants
Flumioxazin	Yes – some formulations only	No	A broad spectrum pre-emergent and post-emergent herbicide that can be used to control aquatic vegetation or terrestrial weeds and woody vegetation
Fluridone	Yes	No	An effective aquatic herbicide used to control some aquatic plants
Fluroxypyr	No	Yes	A selective post-emergent systemic herbicide used for the control of broadleaf weeds and woody vegetation
Glyphosate**	Yes - some formulations only	Yes – some formulations only	A nonselective herbicide for controlling either aquatic or terrestrial plants depending on the formulation
Imazamox	Yes – some formulation only	Yes	May be used for either terrestrial or aquatic weed control
Imazapic**	No	Yes	A non-selective herbicide used in the control of grasses and broadleaves
Imazapyr**	Yes - some formulations only	Yes – some formulations only	A nonselective herbicide for controlling either aquatic or terrestrial plants depending on the formulation
Indaziflam	No	Yes	A pre-emergent herbicide that provides broad spectrum control of many weed seedlings through the inhibition of seedling emergence and root development
Metsulfuron methyl**	No	Yes	A selective pre-emergence and post-emergence herbicide used primarily to control broadleaf weeds and woody vegetation
Oxyfluorfen	No	Yes	Used to control broadleaf weeds and grasses around conifers and some deciduous trees
Picloram**	No	Yes	A selective herbicide used in the control of broadleaf weeds and undesirable brush
Sulfometuron methyl	No	Yes	A non-selective herbicide that is effectively used to control broadleaf weeds and grasses

Active ingredient	Labeled for aquatic application	Labeled for aerial application	Selectivity of active ingredient
Tebuthiuron	No	Yes	A soil active herbicide used primarily for the control of woody vegetation
Triclopyr**	Yes – some formulations only	Yes – most formulations	A selective herbicide applied either terrestrial or aquatic depending on the formulation for controlling broadleaf plants and woody vegetation

**Active Ingredients currently being used under the no-action alternative.

Mechanical Control

Mechanical control could include the use of heavy equipment, such as tractors, swathers, or backhoes, as well as power tools, including mowers, chainsaws, and power weed trimmers to cut or dig up undesirable plants. Choosing the appropriate equipment is based on characteristics of the target undesirable plant species (for example, stem size and sprouting ability); density of the infestation; size of the infestation; location and condition of the infestation; and soil and topographic considerations.

Mechanical treatments are typically used to remove seed heads, individual plants, and undesirable tree species such as eastern redcedar that are encroaching into grasslands. Mechanical treatments for undesirable plant species may be used in sensitive areas to avoid impacts to non-target plant species or water quality, and to prevent seed production. Mechanical approaches are generally slow and very labor intensive and are generally effective only for small infestations. Mechanical treatments for undesirable tree species may involve digging trees up from the roots, cutting, mowing, or masticating. These treatments for tree species can be effective for small areas and is most efficient on smaller trees.

Prescribed Fire

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

Undesirable plant management objectives for each prescribed fire treatment would be defined in a project-specific prescribed burn plan. Prescribed burn plans may also include follow-up treatments for post-fire undesirable plant discoveries using appropriate integrated pest management treatment proposed in this environmental impact statement.

Rehabilitation and Restoration

Rehabilitation and restoration actions would be designed and implemented based on the conditions found in and around infested areas. Passive revegetation (allowing native, desired plants on site to fill in treated areas) and active revegetation (introduction and re-establishment of native plants using one or more methods of planting or seeding) would be considered. Rehabilitation techniques would be assessed and implemented to promote native plant communities that are resistant to infestation by undesirable plants.

Treatment Monitoring

Monitoring is the process of observing undesirable plant populations and documenting the progress or quality of undesirable plant treatments over time; it is an integral part of any adaptive management program. Monitoring enables early detection and rapid response and effective treatment, informing future decision-making and strategy. Both quantitative and qualitative monitoring efforts are included in the overall monitoring program. Post-treatment reviews of monitoring data would occur on a sample basis to determine the following:

1. whether treatments were effective,
2. potential effect to non-target plant species, and
3. if recovery of desired plant community occurred as expected.

Treatment monitoring would incorporate established protocols outlined in Monitoring Category 7: Progress Towards Desired Conditions and Category 8: Management and the Productivity of the Land, contained in the monitoring plan (amended May 20, 2016).

Re-treatment and active rehabilitation or restoration prescriptions would be developed as needed and based on post-treatment monitoring data. Treatment methods may be modified based on an assessment of monitoring data collected after the undesirable treatment. For example, an undesirable plant population first treated with a broadcast herbicide may later be hand-pulled or spot treated once the size of the infestation and density of the seed bank were reduced.

Project Design Features

Design features are sideboards for subsequent projects and activities to help achieve the desired outcome. This may include such things as legal and regulatory direction, treatment and clear need criteria, standards and guidelines, or monitoring and evaluation procedures. The no-action alternative's decisions do not specifically call out protective measures as design features in their analysis, but individual ranger districts environmental assessments or decision documents contain information that meets the definition of a design feature. This direction was filtered from the each of the current decisions under the no-action for ease of comparison of alternatives in Appendix E: Project Design Features. Similar design feature elements between ranger districts exists, but Nebraska-wide uniformity is lacking.

Project design features are part of the modified proposed action; they are intended to reduce or prevent potential undesirable effects resulting from management activities, to ensure public health and safety, and to ensure consistent analysis of project effects, respectively. Project design features were developed using guidance from the State of Nebraska and South Dakota best management practices, the Watershed Conservation Practices Handbook, forest plan standards and guidelines, and other environmental protection required by applicable laws, regulations, and policies.

Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by the National Environmental Policy Act 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 Code of Federal Regulations 1502.14). Public comments received in response to the January 11, 2023, Proposed Action provided suggestions for alternative methods for achieving the purpose and need and led to the development of the modified proposed action. The January Proposed Action had proposed 100,000 acres of treatments annually. However, after further review, this acreage was deemed high and likely unattainable. Therefore, the proposed action was eliminated from detailed study and the modified proposed action was adopted for detailed study instead. The modified proposed action reduces the projected annual forest-wide combined treatments from 100,000 to 50,000 acres.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Table 7 provides a comparison, by alternative, of the purpose and need for the project while table 8 provides a comparison, by alternative, of project issues.

Table 7. Purpose and need by alternative

Purpose and need statement	No-action alternative	Modified proposed action
Updating direction for undesirable plant management	This statement is not met. New direction to protect National Forest System lands from undesirable plant species would not be authorized and implemented.	This statement is met. The modified proposed action includes new direction and practices, such as the use of adaptive management and early detection and rapid response strategies, to protect National Forest System lands from undesirable plant species.
Providing timely response to new infestations, new undesirable plant species, and landscape-scale disturbances.	This statement is not met. New practices that support rapid response to control new infestations, new undesirable plant species, and landscape-scale disturbances would not be authorized and implemented.	This statement is met. The modified proposed action expands available control methods to include aerial application of herbicide and prescribed fire. It also supports rapid response to control new infestations, new undesirable plant species, and landscape-scale disturbances. Finally, it authorizes the use of adaptive management to better respond to uncertain ecological conditions and to ensure treatment goals are met.
Reducing adverse impacts of undesirable plants to humans, animals, and native plant communities.	This statement is met. Current control of undesirable plant species would continue across the Nebraska, but at a smaller scale than under the modified proposed action.	The modified proposed action better responds to this statement by proposing new, more efficient control methods that can be applied at a broader scale.

Table 8. Issues by alternative

Issue	No-action alternative	Modified proposed action
Issue 1. Effects to the composition and structure of desirable native vegetation.	The number of infested acres will continue to increase at a more rapid pace due to outdated strategies, limited control methods and treatment options, and lack of adaptive management strategies. Based on the current management, undesirable plants are expected to increase which will decrease the overall diversity in composition. An increase in undesirable plants will most likely create homogenous structure across the landscape which can indirectly cause ecosystem instability.	The number of infested acres is expected to show a decrease in the rate of spread in comparison to the no-action alternative. This can be attributed to the early detection and rapid response strategy and more control options being available. The expected impacts on vegetative composition and structure will vary with the method and intensity of treatments utilized. However, the overall effect of improved treatments of undesirable plants will have a positive impact on both.

Issue	No-action alternative	Modified proposed action
Issue 2. Effects to threatened, endangered, sensitive, or management indicator species.	Federally listed species: Current management activities are expected to have “no effect” on federally listed species that could potentially occur within the project area. Sensitive species: Current activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing for sensitive species that are also management indicator species.	Federally listed species: Proposed management activities are expected to have “no effect” on federally listed species that could potentially occur within the project area. Sensitive species: Proposed activities may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing for sensitive species that are also management indicator species. Updated treatment techniques would likely improve the management of undesirable plant species causing a net positive effect on desirable plant species, wildlife, and habitat.
Issue 3. Effects to soils, riparian, and aquatic resources.	No adverse effects to soil, riparian, and aquatic resources due to pre-existing direction and the limited nature of acres managed.	No adverse effects to soil, riparian, and aquatic resources due to pre-existing direction and the limited nature of acres managed. Additional design features would add another layer of protection to these resources.
Issue 4. Effects of herbicide treatment on human health.	Low potential for effect. Guidelines and protection measures are in place for ground-based application of herbicides.	Low potential for effect. Guidelines and protection measures are in place for ground and aerial application of herbicides. Additional project design features, implementation, and aerial application checklists will improve the protection of the public and workers when herbicides are used.

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Chapter 3. Affected Environment and Environmental Consequences

Introduction

This chapter summarizes the physical, biological, and social environments of the Nebraska and discloses the direct, indirect, and cumulative effects of implementing each alternative on these environments. While this chapter presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. Alternatives, Including the Modified Proposed Action the information provided is a summary of reports developed for the analysis. Full reports are filed in the project record.

Environmental consequences are compared to the affected environment for each resource and for each alternative. Direct effects are caused by the action and occur at the same time and place. Indirect effects are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable (40 Code of Federal Regulations 1508.8). Finally, cumulative effects are changes to the environment caused by the combined impact of past, present and reasonably foreseeable future human activities and natural processes. Environmental consequences to issues identified in chapter 1 are disclosed first while environmental consequences to other resources are disclosed second.

NOTE: The maximum application scenario of effects in this environmental impact statement uses an assumed 50,000-acre annual treatment as the upper limit associated with the modified proposed action. While not all estimated acres are expected to be treated annually, these acres are the best estimates of what could be needed based on current conditions, both on and off the Nebraska, where undesirable plant species are increasingly being identified across the landscape. Although this approach ensures consistency in analyses, it also means that the acreages and effects displayed in the resource sections described below could be overstated.

Cumulative Effects

Cumulative effects are changes to the environment caused by the combined impact of past, present and reasonably foreseeable future human activities and natural processes. Cumulative effects to the environment are the result of multiple activities whose individual direct or indirect impacts may be relatively minor but, in combination with others, may be significant. Council of Environmental Quality guidance on considering past actions in cumulative effects analysis (June 24, 2005) states that agencies should do the following when analyzing cumulative effects.

1. Use scoping to focus on the extent to which information is relevant to reasonably foreseeable significant adverse impacts.
2. Analyze cumulative effects because it is essential to a reasoned choice among alternatives.
3. Prepare the analysis 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 (Council of Environmental Quality 2005).

It can be assumed that cumulative effects for the no-action and modified proposed action would be similar in context, spatial boundaries, and temporal boundaries for each resource analyzed below. Generally, the spatial boundaries for the management of undesirable plant species have included, and will continue to include, all Forest System Lands managed by the Nebraska and the immediately adjacent properties. The temporal boundary could include multiple aspects from the half-life of a chemical (time it takes a chemical to decrease by half) to the assumed years the selected alternative will be implemented. Temporal boundaries for both alternatives are assumed to be the same to account for similar proposed treatment methods, with the exception of aerial chemical application and prescribed fire. The assumption would be that these two additional treatment methods for the modified proposed action would not increase or reduce the temporal boundary of analysis from that of the no-action alternative. This can be attributed to the fact that aerial application would use chemicals that are the same or similar to active ingredients currently applied from ground-based methods on the Nebraska. Additionally, prescribed fire is also currently used as a management treatment for undesirable plant species, but on a project-by-project level. Differences in intensity of the effects would be evident in the modified proposed action with the increase in available treatment methods such as aerial application and prescribed fire. This assumption is carried forward into the analysis below with a single evaluation of cumulative effects under the Modified Proposed Action and a closing comparison of the two alternatives.

Past actions generally include livestock grazing practices and associated developments, undesirable plant species treatments by both the agency and adjoining landowners, timber sales, road and trail construction and maintenance, recreational activities, and the spread of undesirable plant species. Current and reasonably foreseeable activities that could contribute to the degree of effects include travel management and potential reconstruction and decommissioning of routes, livestock grazing, anticipated increases in recreation use and developments such as campgrounds and trails, and continued use biological, mechanical, chemical, and prescribed fire to control undesirable plant species by the Nebraska and adjoining landowners.

Events such as wildfire, drought, flooding, and other natural or manmade disturbances would continue to create disturbances that help undesirable plant species establish and spread. These events have the potential to introduce new undesirable plant species, advance the spread of undesirable plant species to new locations, or accelerate the spread of existing infestations. Climate change is also likely to stress native plant communities and perhaps create an ecological advantage for undesirable plant species. Most undesirable plant species flourish because they can cope with challenging growing conditions. The effects of these natural disturbances are described in the affected environment sections of this chapter.

Analysis Assumptions

The following analysis assumptions were developed for the no-action alternative and the modified proposed action to ensure consistent effects analyses by Forest Service resource specialists.

Analysis Assumptions for Both Alternatives

- Protocols and stipulations established within the Section 106 programmatic agreements between the Nebraska and the two State Historic Preservation Offices (South Dakota and Nebraska) would be adhered to during project review and implementation. In the case that undertakings fall outside of the scope of the programmatic agreements, the Nebraska would follow the standard Section 106 process as described in 36 Code of Federal Regulations 800.
- Relevant direction from the Nebraska Forest Plan would be followed.

- Forest Service Manual 2900, Invasive Species Management would be followed. Forest Service Manual 2902 and 2903 describe objectives and policy for the management of aquatic and terrestrial invasive species based on an integrated pest management approach, prioritizing prevention and early detection and rapid response actions as necessary. Key policy under Forest Service Manual 2903: Ensure that all Forest Service management activities are designed to minimize or eliminate the possibility of establishment or spread of invasive species on the National Forest System, or to adjacent areas.
- Contract and permit clauses, directing activities of contractors and permittees, would be required to prevent and control the introduction, establishment, and spread of aquatic and terrestrial undesirable species.
- Where States have legislative authority to certify materials as weed-free (or invasive-free) and have an active State program to make those State-certified materials available to the public, forest officers shall develop rules restricting the possession, use, and transport of those materials unless proof exists that they have been State-certified as weed-free (or invasive-free), as provided in 36 Code of Federal Regulations 261 and Departmental Regulation 1512-1.
- Forest Service Manual 2150, Pesticide Use Management and Coordination and Forest Service Handbook 2109.14, Pesticide Use Management and Coordination would be followed. Key policy under Forest Service Manual 2150.3 that guides staff to conduct all pesticide-use activities using an integrated pest management approach to improve overall treatment effectiveness and to reduce pesticide risk(s) for both humans and the environment would be fulfilled.
- All Forest Service pesticide-use activities would be conducted in full compliance with applicable Federal laws, regulations, and other authorities including, but not limited to, the Federal Insecticide, Fungicide, and Rodenticide Act, the National Environmental Policy Act, and the Endangered Species Act.
- All undesirable plant activities conducted on National Forest System lands would follow applicable U.S. Environmental Protection Agency label restrictions.
- All Forest Service personnel who use any pesticide on the National Forest System lands would be trained in the proper, safe, and effective use of the respective pesticides being applied for the management activity.
- Pertinent pesticide-use policy and related handbook guidance would be incorporated into all management activities on the National Forest System and other lands, waters, or facilities administered by the Forest Service; including but not limited to procurement activities, contracts, permits, leases, and agreements to foster the safe and effective use of pesticides.
- Forest Service pesticide-use activities, as appropriate, would be coordinated with federal, State, Tribal, and local government agencies.
- Forest Service Handbook 2509.25, chapter 10 - Watershed Conservation Practices Handbook, would be used for selecting management measures and additional design features to protect soil, aquatic, and riparian systems.
- National Best Management Practices for Water Quality Management on National Forest System Lands, Volume 1: National Core Best Management Practices Technical Guide (FS-990a) would be followed during implementation of all control methods (USDA Forest Service 2012c).
- Only biological control agents that have been approved by USDA Animal and Plant Health Inspection Service would be released.

- Control methods would be prohibited or modified where they would have adverse effects on threatened, endangered, proposed, candidate, or sensitive plant and wildlife species to include their habitat.
- All applicable direction in the Region 2 "Conservation of the Northern Long-eared Bat and Other At-risk Bat Species, Summary of Conservation Measures and Recommendations" would be followed.
- Appropriate control methods that minimize risk to non-target species would be selected for treatment.
- Policy for selection, use, and storage of native and non-native plant materials that are used in the revegetation, restoration and rehabilitation of National Forest System lands found within Forest Service Manual 2070, Vegetation Ecology, 2070.3 Policy would be followed.
- Project implementation could occur year-round.
- Areas would be monitored to determine effectiveness of treatment.

Analysis Assumptions for the Modified Proposed Action Only

- Forestwide combined treatments of up to 50,000 acres annually is the upper limit anticipated to be reached due to funding and availability of resources.
- A 15-year period of implementation of the proposed actions is expected before reevaluation of forestwide needs for undesirable plant species management.
- Aerial application of herbicide will not be implemented in Wilderness Areas, Areas Recommended for Wilderness, and in all 3.63 forest plan management areas (Black-footed Ferret Reintroduction Habitat).
- Prescribed fire would be conducted in accordance with procedures found in Forest Service Manual 5140, Hazardous Fuels Management and Prescribed Fire.

Disclosure Of Environmental Consequences

The environmental consequences of the alternatives to the issues identified in chapter 1 are disclosed first in this document. These issues include native vegetation; threatened, endangered, sensitive, or management indicator species; soils, riparian, and aquatic resources; and human health. Information for other potentially affected resource areas is disclosed next.

Vegetation

Issue 1: Treating undesirable plants may cause negative effects to the composition and structure of desirable native vegetation.

Measurement Indicators

- Impacts of treatments to native vegetation, composition, and structure.
- Acres of undesirable plant infestations increased or reduced.

Methodology

Nebraska National Forests and Grasslands Geographic Information System (GIS) data and other national Forest Service databases that contain vegetation information were used for this analysis. Knowledge from previous site visits on the Nebraska over the last seven years for field inspections, botany surveys, and other miscellaneous reasons, combined with more than 25 years of rangeland management experience in the Northern Great Plains mixed grass prairie ecosystem, was used to help determine effects to the resource. Information was also obtained through a review of scientific literature, U.S. Environmental Protection Agency registered herbicide product labels, and Human Health and Ecological Risk Assessments. Recent vegetation management projects completed by other Forest Service units with similar proposed activities were also reviewed to help provide scientifically determined effects to vegetation.

Survey data for undesirable plants across the entire Nebraska has not been completed and is not available due to limitations in funding and personnel. District specific data is available in varying forms but there is not a complete inventory. Professional knowledge and data from effectiveness monitoring in areas of known locations of undesirable plants was used to analyze existing effects on native vegetation, composition, and structure. For the analysis, assumptions were made that future effects from proposed control methods on vegetation would be similar to those effects from previous comparable treatments on the same habitat type. State and transition models developed by the Natural Resources Conservation Service for the dominant ecological sites found on the Nebraska were also reviewed for expected outcomes from proposed management activities towards native vegetation, composition, and structure.

Affected Environment

Components of the affected environment for vegetation are the native plant communities and known undesirable plant populations found on the Nebraska. The presence and abundance of each of those components will determine the vegetative composition and structure found within a plant community. The vegetation information is presented in the following sub-sections: native vegetation, composition, and structure. Vegetative composition refers to the mix of graminoid, forb, and shrub species (either desirable or undesirable) that inhabit a site at a given time. Vegetative structure in this analysis refers to the height and density of grassland communities.

Native Vegetation

The project area is in the Great Plains region which is the greatest expanse of grasslands in the United States. The vegetation of the Great Plains is highly diverse. Although grasslands are the dominant vegetation type, shrub, forest (dense growth of trees), and woodland (sparse growth of trees) vegetation also exist. The USDA Natural Resources Conservation Service's National Resources Inventory assessment for the Great Plains includes 146 plant families and 764 plant genera. They have inventoried 483 graminoid, 950 forb, 393 shrub and subshrub, and 174 tree species within the region (USDA NRCS 2018).

The Great Plains region includes tallgrass, mixed grass, and shortgrass prairie ecosystems. The Nebraska predominantly falls within the mixed grass prairie ecosystem. There are five ranger districts spread throughout South Dakota and Nebraska (figure 1). Due to the distance between ranger districts, there is a wide variety of plant communities within the mixed grass prairie ecosystem. The Nebraska borders the shortgrass prairie to the west and tallgrass prairie to the east.

The Fort Pierre, Wall, and Fall River Ranger Districts found in South Dakota are predominantly composed of clayey, shallow clay, and loamy USDA Natural Resource Conservation Service ecological sites (R060AY017SD, R060AY040SD, R060AY041SD, R063AY011SD, and R063AY017SD)[5]. The vegetation on these sites is described as a mix of cool and warm season grasses, however, mid-statured, cool season grasses are the dominant functional group. Western wheatgrass and needle grasses are the most abundant native cool season grasses, whereas sideoats grama, little bluestem, blue grama, and buffalograss are the dominant native warm season grasses. Forbs are common and diverse, and shrubs are present but are in minor amounts. These sites are susceptible to invasion of non-native, cool season grasses like smooth brome and Kentucky bluegrass. The Fall River and Wall Ranger Districts have unique badlands landscape features that are highly erodible lands with little or no vegetation.

The Pine Ridge Ranger District in Nebraska is comprised of two distinct landscape features: the Oglala National Grassland and the Pine Ridge escarpment. Vegetation on the Oglala National Grassland is very similar to the ecological sites found in southwestern South Dakota on the Fall River Ranger District. The Pine Ridge escarpment supports a mixture of short, mid, and tall statured warm and cool season grasses. Little bluestem, sideoats grama, and blue grama are dominant warm season grasses. Cool-season grasses and grass-like species including needle and thread, rhizomatous wheatgrasses, and threadleaf sedge make up a significant portion of the composition. A wide variety of forbs can be found and shrubs are common on the landscape. These plants grow in association with ponderosa pine, Rocky Mountain juniper, western snowberry, skunkbush sumac, common chokecherry, and rose. Ponderosa pine and Rocky Mountain juniper typically grow on steep slopes and ridgetops that are adjacent to rock outcrops.

The Bessey Ranger District is in the sandhills of Nebraska and is composed primarily of sands ecological site R065XY033NE in the 17-22 inches precipitation zone. This area is characterized by warm season mixed grasses intermingled with native shrub stands. The dominant vegetation consists of several sandhill communities. They include bunchgrass communities of little bluestem, prairie junegrass, needle and thread, prairie sandreed, and switchgrass; sand muhly communities of sand muhly, sand bluestem, needle and thread, prairie sandreed and hairy grama; and blowout communities of blowout grass, prairie sandreed, sand muhly, Indian ricegrass, sand lovegrass and the endangered species, blowout penstemon. The Bessey Ranger District also has a limited floodplain deciduous forest community. In addition to this, 21,710 acres of jack pine, Austrian pine, Scotch pine, ponderosa pine and eastern redcedar plantations were hand planted between 1909 and 1945.

Currently, there are approximately 150,000 acres of undesirable plants inventoried on the Nebraska. This accounts for almost 15 percent of the total National Forest System Lands on the Nebraska. It has not been possible to survey every acre of the Nebraska and, because of that, it is likely that the inventoried acres of undesirable plants are underestimated. The most abundant undesirable plant species inventoried are displayed in table 9. Eastern redcedar and Canada thistle are by far the most prevalent species. Other undesirable plants with fewer than five hundred acres inventoried, but of a great concern due to their invasive nature are Russian knapweed (*Acroptilon repens*), spotted knapweed (*Centaurea biebersteinii*), houndstongue (*Cynoglossum officinale*), leafy spurge (*Euphorbia esula*), and scotch thistle (*Onopordum acanthium*).

[5] For more information on the Ecological Site Descriptions found within the Nebraska, please see the USDA Natural Resources Conservation Service's online Ecosystem Dynamics Interpretative Tool at https://edit.jornada.nmsu.edu/.

Table 9. Dominant undesirable plant species inventoried on the forest

Common name	Scientific name	Acres
eastern redcedar	*Juniperus virginiana*	69,617
Canada thistle	*Cirsium arvense*	43,895
musk thistle (nodding plumeless)	*Carduus nutans*	12,564
sickleweed	*Falcaria vulgaris*	6,663
hoary cress (whitetop)	*Cardaria draba*	4,256
sulphur cinquefoil	*Potentilla recta*	3,231
smooth brome	*Bromus inermis*	3,025
bull thistle	*Cirsium vulgare*	1,273

Composition

Over the last 50 years, vegetative composition has been monitored on the Nebraska using a variety of techniques, including: range condition, seral stage, and similarity index. Differences in protocols and purpose for monitoring prevent direct comparison among those techniques. In addition to those differences, there has also been inconsistencies in the frequency and scale of data collected. Not every ranger district has recently collected vegetative composition data or in a manner consistent with the forest plan objectives, making it difficult to determine if the Nebraska is meeting composition objectives (USDA Forest Service 2001, as amended).

The forest plan established specific vegetation objectives by geographic area. The Nebraska is divided into 11 different geographic areas as displayed in figure 3. A geographic area includes management direction that is too specific to apply across an entire national grassland or national forest or the entire Nebraska. The forest plan's vegetation composition objectives focused on native species plant communities only; they did not account for the presence of native invaded or invaded plant communities. Because of the current prevalence of undesirable plant species, it is difficult to compare existing plant communities to forest plan objectives.

Desired vegetation conditions need to be tailored to the vegetation types, climate, and productivity of each specific geographic area (that is, Bessey, McKelvie, Fall River Northeast, Fall River Southeast, Fall River West, Wall North, Wall Southeast, Wall Southwest, Fort Pierre, Oglala, and Pine Ridge). Desired conditions for composition on the Nebraska are to have a mix of seral stages ranging from early to late that would mimic evolutionary development of the northern Great Plains. It is desired to have lesser amounts of early and early intermediate seral stages and a majority of the geographic areas in the late intermediate and late seral stage categories.

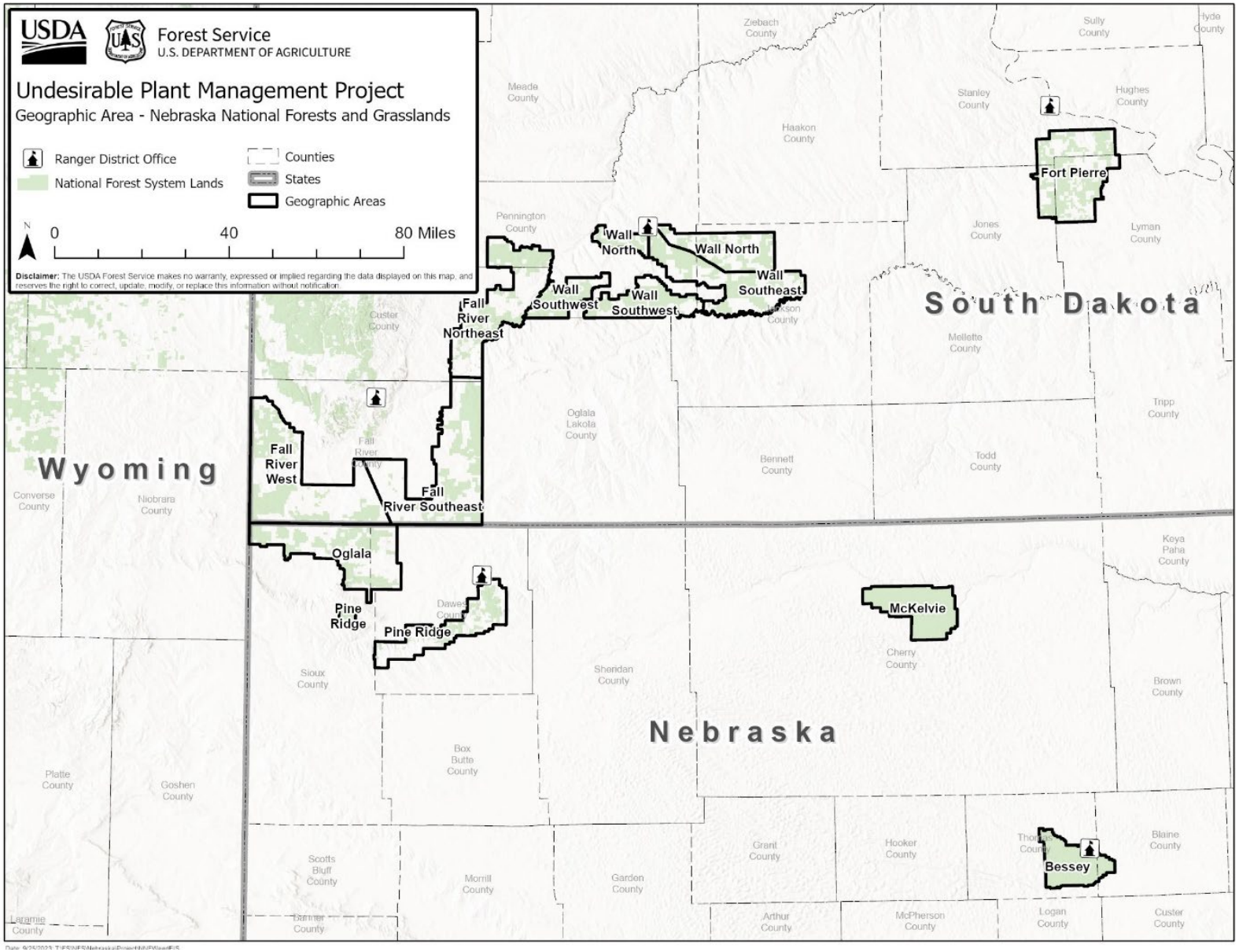


Figure 3. Nebraska geographic areas as designated by the forest plan

The Fort Pierre Ranger District has seen a substantial increase in the undesirable plants; smooth brome and Kentucky bluegrass. When smooth brome or Kentucky bluegrass exceeds 30 percent of the plant community composition and native vegetation represents less than forty percent of the composition, a threshold has been crossed and the plant community is considered to be in the Invaded State as per the Clayey ecological site state and transition model (R063AY011SD). This state experiences an increased layer of thatch that decreases the amount of sunlight reaching plant crowns thereby shifting a competitive advantage to shade tolerant, introduced grass species. The nutrient cycle also becomes impaired which results in higher levels of nitrogen that introduced species thrive on. This state of vegetative composition does not fit into any of the seral stage descriptions for the geographic area. It is estimated that almost one third of the district is now dominated by those two species. The remainder of the district is at risk of being dominated by the undesirable grasses. Once this threshold is crossed, a change in grazing management alone cannot reduce the undesirable plants and other control methods are needed to help reduce the invasion (Toledo et al. 2014).

The sands ecological site on the Bessey Ranger District is very susceptible to encroachment from eastern redcedar that was introduced in the early 20th century from plantation and shelterbelt developments in the area. Eastern redcedar can increase and potentially dominate the grasslands in the absence of fire or other brush control practices. The Bessey Ranger District has seen this species dramatically increase and it is affecting the ecological conditions of the sandhill prairie ecosystem. It is currently being treated by prescribed fire and mechanical means under hazardous fuels reduction projects. An integrated approach utilizing multiple treatment methods would help restore the sandhill grassland communities.

Some areas not meeting desired conditions have been identified on the Nebraska due to the presence of undesirable species but overall, the Nebraska is exhibiting a mix of seral stage communities. However, it cannot be verified that each geographic area is meeting the designated percent mixture of each seral stage.

Structure

Vegetative structure is a function of how much vegetation grows in a particular site which is influenced by the type of soils, species composition, and precipitation received. Vegetative structure is also a function of how much vegetation has been removed.

As with composition objectives, the forest plan also provides specific structure objectives by geographic area. Desired conditions for vegetation composition were intended to provide the opportunity for meeting vegetation structure objectives. Desired conditions for structure on the Nebraska are to have a mix of High, Moderate, and Low categories throughout each geographic area. Most of the structure desired is to fall within the High and Moderate categories with little structure categorized as Low.

The Fort Pierre Geographic Area has generally shown an overabundance of moderate structure and shortfalls in the desired low structure and high structure categories (USDA Forest Service 2021). The Fort Pierre Ranger District has made changes to the grazing rotations over the last five years to try and achieve the desired vegetative structure objectives. The Bessey and McKelvie Geographic Areas have predominantly been achieving desired grassland structure objectives over the last ten years except in the tree plantations. Overall, the Nebraska is displaying a mix of vegetative structure categories, but it cannot be verified that each geographic area is meeting the designated percent mixture for each category because not every ranger district has recently collected vegetation structure data.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

Native Vegetation

Native vegetative can be affected by ecological disturbances such as wildfire, timber harvest, or other ground disturbing activities. These disturbances then have the potential to impact the native vegetation composition. During these changes in composition one can expected to see establishment of new undesirable plant species along with reestablishment of existing species. Under the no-action alternative, the number of undesirable plant acres would most likely increase following ecological disturbances given their historical increase under current management. Under this alternative, some of the undesirable plants would be treated and some may be eradicated or prevented from spreading. The 1993 Environmental Analysis for Management of Undesirable Plant Species listed 915 acres of undesirable plants inventoried. It can also be assumed that not every acre of undesirable plants was inventoried during that analysis, but it shows that Canada thistle has grown from 565 inventoried acres to 43,895 acres under current management. Table 10 shows the acres of inventoried undesirable plants listed in the Nebraska's 1993 Environmental Analysis and what their inventoried acres are today. Any increase in undesirable plant acres would have a proportional inverse effect on native vegetation. Meaning an increase in undesirable plant acres will reduce the number of acres of native vegetation.

Table 10. Acres of inventoried undesirable plant species from 1993 compared to 2023

Common name	Scientific name	1993 acres	2023 acres
Canada thistle	*Cirsium arvense*	565	43,895
Hoary cress (whitetop)	*Cardaria draba*	118	4,256
Leafy spurge	*Euphorbia esula*	210	302
Musk thistle (nodding plumeless)	*Carduus nutans*	0.5	12,564
Poison ivy	*Toxicodendron rydbergii*	4	Not inventoried
Russian knapweed	*Acroptilon repens*	17	388

On average, ten thousand acres of these undesirable plants are being treated each year, which is less than ten percent of the approximately 150,000 inventoried acres. Infestations of undesirable plants that reproduce and colonize aggressively and compete successfully for limited resources have the opportunity to expand exponentially if they are not treated. Additionally, of the current undesirable plants inventoried, 14 of those species were not approved for treatment under the last environmental analysis. Of those 14 species that were not previously analyzed for treatment, five are listed as either a State or County noxious weed (black henbane, houndstongue, saltcedar, sericea lespedeza, and sulphur cinquefoil) and five are considered to be invasive species (crown vetch, eastern redcedar, Russian olive, sickleweed, and smooth brome). Given the invasive characteristics of some of these species it can be assumed that there will be an increase in undesirable plant species acres due to current management constraints.

Composition

Expected changes in composition due to ecological disturbances are often illustrated by state and transition model diagrams developed by the Natural Resources Conservation Service. Under the no-action alternative, impacts from ecological disturbances would be similar to the current impacts. Figure 4 displays the state and transition model for the dominant ecological site located on the Fort Pierre Ranger District. The figure illustrates that non-use or long-term light grazing and no fire will transition a Reference State to a Native and Invaded State. Continuation of those same practices or lack of other disturbances will further transition the site to an Invaded State where greater than 30 percent of the plant composition is composed of smooth brome or Kentucky bluegrass. As illustrated in the figure, once a site enters the Invaded State it cannot leave that state simply by changes in grazing management alone. Other control methods are needed to reduce the invasion. This state and transition model is consistent to what has been exhibited on the Fort Pierre Ranger District.

Other expected changes that are illustrated by a state and transition model is the encroachment of eastern redcedar on the Bessey Ranger District. Figure 5 illustrates how any plant community in the sands ecological site can be affected by eastern redcedar encroachment. However, unlike the previous example, a plant community invaded by eastern redcedar can transition back to a desired state through brush management, prescribed fire, or prescribed grazing. Likewise, a lack of prescribed fire or brush management practices will increase eastern redcedar on the site. This model is consistent with what has been experienced with local resource conditions on the Bessey Ranger District.

Undesirable plants have been shown to reduce species richness, plant diversity, and plant community production. It has been found that species richness can decline by nearly 75 percent in an infestation and that most native species are absent when there is an abundance of undesirable plants. Plant diversity often increases following undesirable plant species control efforts (DiTomaso 2000). In summary, the no-action alternative would be expected to result in an increase in undesirable plant species and a subsequent decrease in plant composition diversity.

Structure

Vegetative structure is affected by changes in native vegetation and composition. Impacts of ecological disturbances from the current management actions would not change. Based on current management actions, undesirable plants are expected to increase which may decrease the overall diversity in structure. An increase in undesirable plants will most likely create homogenous structure across the landscape which can indirectly cause ecosystem instability.

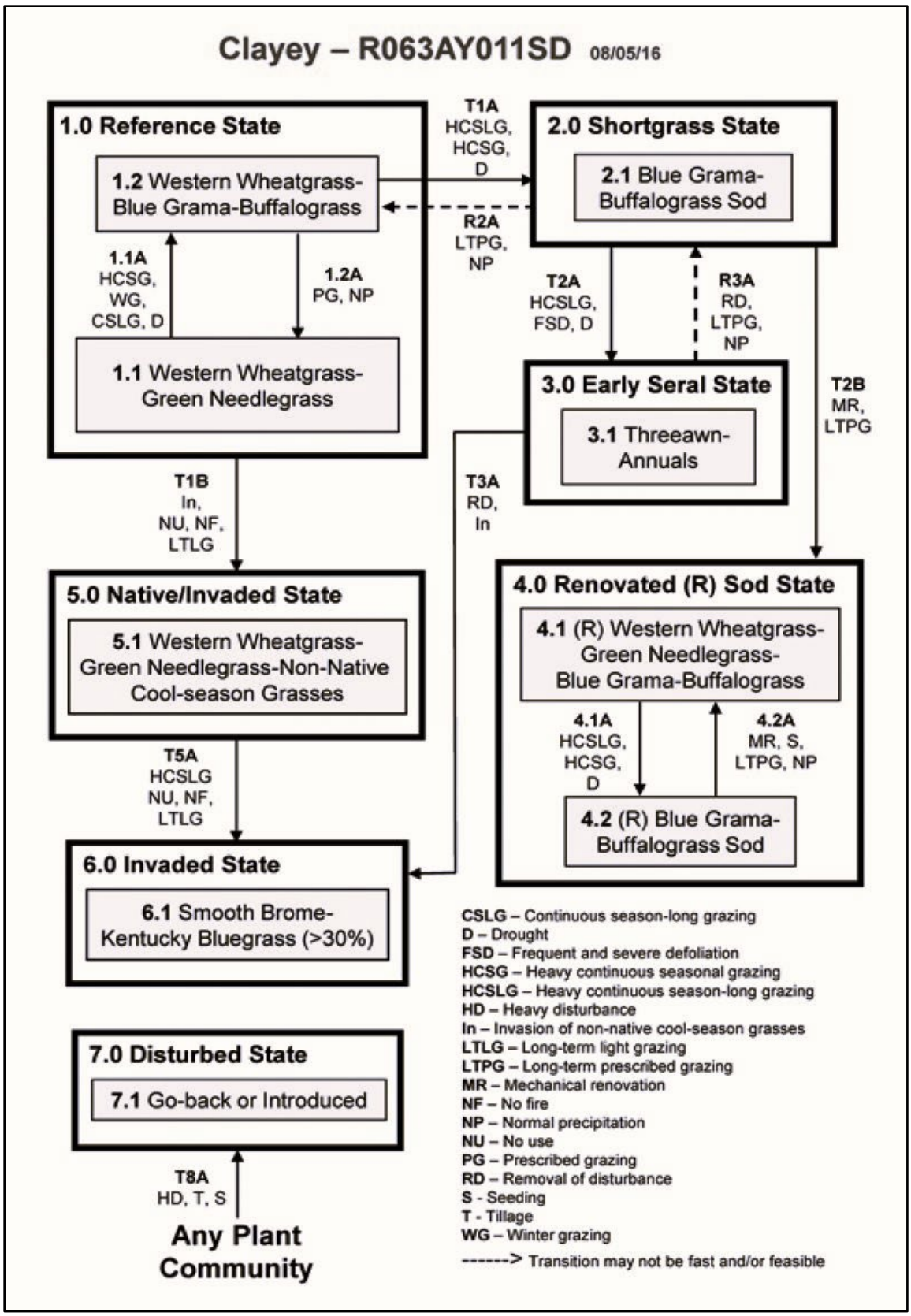


Figure 4. State and transition model Clayey Ecological Site in Major Land Resource Area–Northern Rolling Pierre Shale Plains

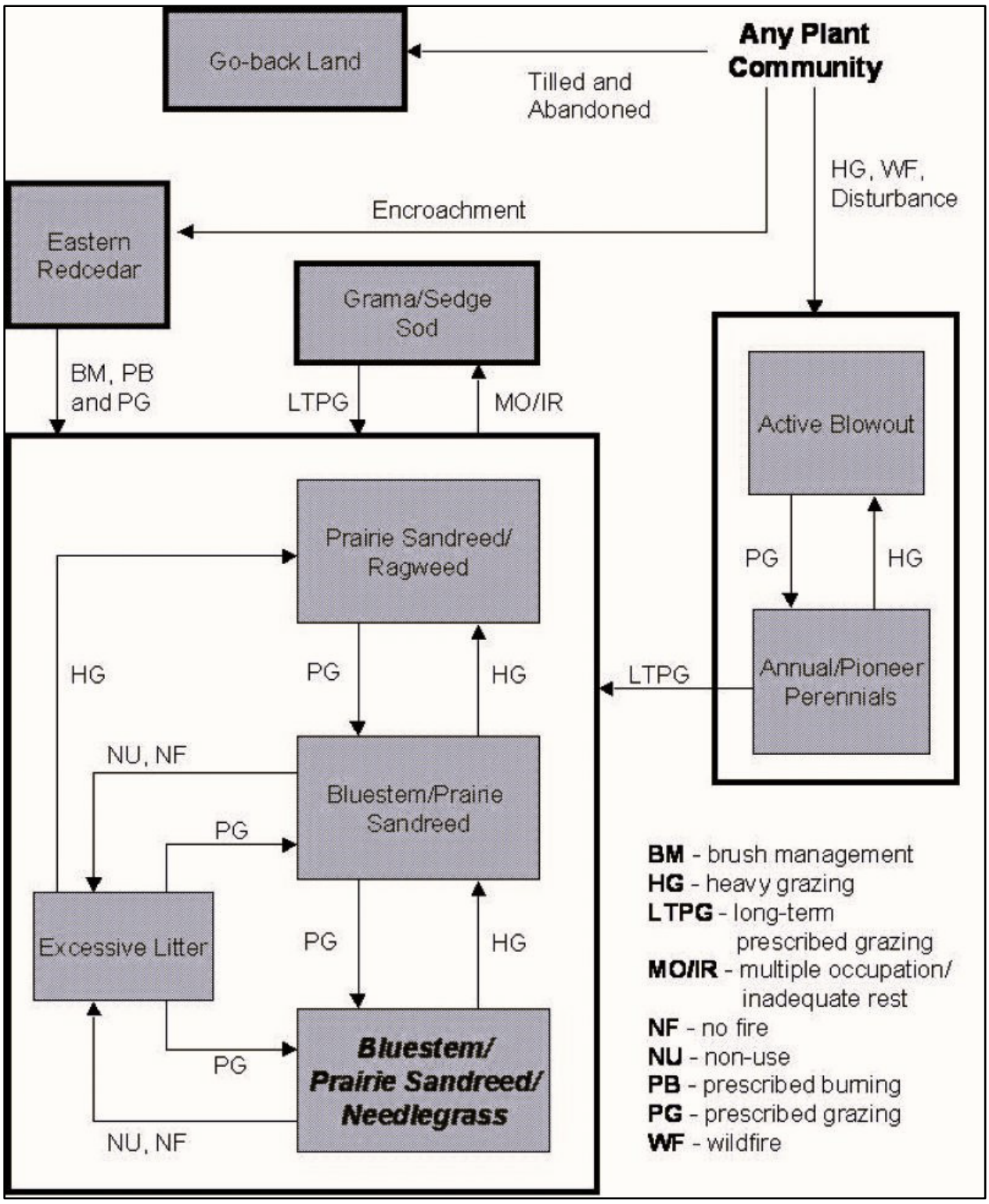


Figure 5. State and transition model Sands Ecological Site in Major Land Resource Area – Nebraska Sand Hills

Modified Proposed Action

Direct and Indirect Effects of Control Methods

Biological Control

USDA Animal and Plant Health Inspection Service rigorously screens and tests any new biological control agent for impacts to native plants and insects before it can be released into the environment. Vegetation 2 design feature has been developed to only release USDA Animal and Plant Health Inspection Service approved biological control agents. Since biological control agents are specific to a single nonnative plant species and not known to negatively affect other species, no negative impacts to native vegetation, composition, or structure are anticipated. Another design feature, Vegetation 3, has been developed to ensure the viability of biological control agents that have been released. Where biological control agents have become successfully established, those sites will be protected from other forms of undesirable plant control to promote the spread of biological control agents and provide collection locations for release to other sites.

Targeted grazing is the use of livestock grazing to accomplish defined vegetation or landscape goals. Livestock managers manipulate livestock impacts to vegetation using the principles of grazing management: timing, intensity, duration and frequency to accomplish the overall intensity of defoliation desired to the targeted species. Managers use grazing management principles to prevent overuse of preferred plants and increase use of undesirable plants at a time in their lifecycle when they are most vulnerable to defoliation. Targeted livestock grazing differs from other grazing management systems in that its objective is to accomplish defined land management goals rather than livestock productivity, however, it is a proven tool for manipulating rangeland vegetation.

Chemical Control

Chemical control can treat many infestations in a short amount of time with high efficacy. Undesirable plant control from herbicides is influenced by plant community tolerance, the targeted species and size of infestation, and climatic conditions. These factors should be considered when determining the selection of herbicide and adjuvant to be used and at what application rate.

Vegetation 5 design feature has been developed to ensure the use of the lowest chemical application rate recommended for effective control of the targeted species. Lower application rates can be used under favorable growing conditions and when undesirable plants are small and actively growing. However, in well-established infestations or under adverse growing conditions a higher application rate will need to be used to effectively control the undesirable plant. Higher application rates can lead to herbicide drift and residual carryover in the soil. It is possible that nontarget plants could be impacted from drift or carryover but following U.S. Environmental Protection Agency approved herbicide labels will minimize drift and residual carryover. Utilizing the proper nozzle size and shape and spraying only during suitable climatic conditions are a few of the label specifications that will minimize impacts to nontarget plants.

A specific herbicide will have the same effect on the undesirable plant regardless of if the application method is from the ground or air. The application method effects drift and residual carryover. Along with the techniques described above to help minimize impacts from application methods another design feature and an aerial application implementation checklist has been developed. Vegetation 6 design feature states that aerial spray units will be field validated, flagged, and marked using global positioning system prior to spraying to ensure only appropriate portions of the unit are aerially treated and will be marked using global positioning system before and during the flight. Other ways to minimize impacts to nontarget plants are to use herbicides that have short residual activity or by applying herbicides using specific targeted methods such as spot spraying. Efforts to utilize the most selective herbicide for the targeted species should also be considered.

Herbicides have a wide range of plant selectivity and can be classified into families based on how they affect plants. They can be grouped by their mode of action and site of action or by their chemical similarity. It is important to understand these mode and site of actions to help maintain greater diversity in herbicide use and to reduce the risk of developing herbicide resistance and problems with chemical carryover. Vegetation 4 design feature has been created that states herbicides will be rotated, when and where possible, to prevent the development of herbicide resistant plants. Population shifts through repeated use of a single herbicide can also reduce desired plant diversity and create nutrient changes in the soil that decreases the total vigor of the plant community (DiTomaso 2000). Rotating herbicides with different action sites will minimize these issues (Knezevic et al. 2023).

The mode of action is the overall manner in which herbicide affects a plant at the tissue or cellular level. Herbicides with the same mode of action will have the same translocation pattern (intake of herbicides through roots, shoots, or foliage) and produce similar injury symptoms. The herbicide selectivity on plants and behavior in the soil is less predictable but are often similar. Plants are complex organisms with well-defined vital processes taking place in an ordered and integrated sequence. The chemical makeup of herbicides is what disrupts one or more of those vital processes in order to kill or suppress the plant (Ross and Childs 1996).

Table 11 displays the current active ingredients that have a Human Health and Ecological Risk Assessment completed and the purpose of use. Any new herbicides developed in the future that fall into one of these mode and site of action groups should have similar effects on vegetation as described in table 11. Data from the Herbicide Handbook (Shaner 2014) and the 2023 Guide for Weed, Disease, and Insect Management in Nebraska (Knezevic et al. 2023) was used to analyze the effects of these active ingredients on vegetation. This in-depth analysis is part of the project record and was used to reach the determination of effects for chemical control treatments on native vegetation, composition, and structure.

Table 11. Active chemical ingredients and purpose of ingredient - modified proposed action

Active chemical ingredient	Mode of action	Group number Site of action	Effects on vegetation
2,4-D**	Growth regulator	Group 4 Synthetic auxins	A selective herbicide absorbed through the roots and leaves and controls many broadleaf plants with little to no activity on grasses. Effected plants will show epinastic bending and twisting of stems and petioles, stem swelling (particularly at nodes) and elongation, and leaf cupping and curling. Leaf shape and venation often appear abnormal. This will be followed by chlorosis at the growing points, growth inhibition, wilting, and necrosis. Death of susceptible plants occurs slowly, usually within two to four weeks.
Aminocyclopyrachlor	Growth regulator	Group 4 Synthetic auxins	Broad spectrum control of broadleaf plants and woody vegetation absorbed through the roots, stems, and leaves. As the herbicide translocates and accumulates in meristematic tissue it causes uneven cell division and growth resulting in death of susceptible plants. Within hours or days of application, symptoms such as thickened, curved, and twisted stems and leaves, cupping and crinkling of leaves, stem cracking, narrow leaves with callus tissue, hardened growth on stems, enlarged roots and proliferated growth will be exhibited. Control of perennial herbaceous broadleaf plants or woody plants may take two months or more after application.
Aminopyralid**	Growth regulator	Group 4 Synthetic auxins	Provides post emergence control of many broadleaf plants and some woody species, including difficult to control invasive plants. Depending on the rate applied this herbicide can also provide pre-emergence control of some germinating weed seeds and seedlings. Most perennial grasses are not adversely affected by post emergence applications. Effects to susceptible plants are the same as aminocyclopyrachlor. As the herbicide translocates and accumulates in meristematic tissue it causes uneven cell division and growth resulting in death of susceptible plants. Within hours or days of application, symptoms such as thickened, curved and twisted stems and leaves, cupping and crinkling of leaves, stem cracking, narrow leaves with callus tissue, hardened growth on stems, enlarged roots and proliferated growth will be exhibited. Control of perennial herbaceous broadleaf plants or woody plants may take two months or more after application.

Active chemical ingredient	Mode of action	Group number Site of action	Effects on vegetation
Chlorsulfuron**	Amino acid synthesis inhibitor	Group 2 Acetolactate synthase (ALS) or Acetohydroxy acid synthase (AHAS) inhibitor	A pre-emergent and post-emergent broad-spectrum herbicide with rapid foliar and root absorption. Growth of treated plants is inhibited within a few hours after application, but injury symptoms usually appear one to two weeks later. It accumulates in the meristematic areas where it gradually becomes chlorotic and necrotic, followed by general foliar chlorosis and necrosis.
Clopyralid**	Growth regulator	Group 4 Synthetic auxins	A highly selective herbicide applied post-emergent to control many broadleaf plants which is readily absorbed by roots and foliage. Symptoms of effected plants include epinastic bending and twisting of stems and petioles, stem swelling (particularly at nodes) and elongation, and leaf cupping and curling. This is followed by chlorosis at the growing points, growth inhibition, wilting, and necrosis.
Dicamba**	Growth regulator	Group 4 Synthetic auxins	A selective herbicide used in the control of broadleaf plants and readily penetrates plant leaves, roots, and stems. Symptoms of effected plants include twisting and curling of stems and petioles (epinasty), stem swelling (particularly at nodes) and elongation, and leaf cupping. This is followed by chlorosis at the growing points, growth inhibition, wilting, and necrosis.
Endothall	Unknown	Not Classified	An aquatic herbicide used for control of algae and aquatic plants. Under both terrestrial and aquatic conditions, symptoms of effected plants are similar to those of chilling injury with defoliation and brown desiccated tissue. Injury is generally restricted to plant parts in contact with the herbicide. Endothall also inhibits root elongation when applied to the soil.
Flumioxazin	Cell membrane disruption	Group 14 Protoporphyrinogen oxidase (PPO) inhibitor	A broad spectrum pre-emergent and post-emergent herbicide absorbed through roots and foliage that can be used to control broadleaf plants. Plants emerging from treated soils become necrotic and die shortly after exposure to sunlight. Foliar contact causes rapid desiccations and necrosis of exposed plant tissue.
Fluridone	Carotenoid biosynthesis inhibitor	Group 12 Phytoene desaturase inhibitor	An aquatic herbicide used to control aquatic plants and is absorbed from the water by plant shoots or from the hydrosoil by roots. Symptoms appear in seven to ten days as white or pink growing points. It can take 30 to ninety days before weeds are controlled.

Active chemical ingredient	Mode of action	Group number Site of action	Effects on vegetation
Fluroxypyr	Growth regulator	Group 4 Synthetic auxins	A selective foliar applied herbicide used for the control of many broadleaf plants. It disrupts plant cell growth and can also interfere with the plant's ability to metabolize nitrogen and produce enzymes. Susceptible plants exhibit an epinastic response such as stimulation of cell elongation and premature of senescence, particularly in meristematic tissue leading to cessation of normal growth and death within days or weeks.
Glyphosate**	Amino acid synthesis inhibitor	Group 9 5-enolypyruvyl-shikimate-3-phosphate (EPSP) synthase inhibitor	A nonselective herbicide applied foliar to control undesirable plants. Growth is inhibited soon after application followed by general foliar chlorosis and necrosis within four to seven days for highly susceptible grasses and within ten to 20 days for less susceptible species. Chlorosis may appear first and be most pronounced in immature leaves and growing points. Foliage sometimes turns reddish-purple in certain species. Regrowth often appears deformed with whitish markings or striation and multiple shoots may develop at the nodes.
Imazamox	Amino acid synthesis inhibitor	Group 2 Acetolactate synthase (ALS) or Acetohydroxy acid synthase (AHAS) inhibitor	Herbicide used for either terrestrial or aquatic plant control. Absorbs rapidly into foliage, but root absorption is slower. Growth of susceptible plants is inhibited within a few hours after application, but injury symptoms usually appear one to two weeks or more later. Meristematic areas become chlorotic, followed by slow, general foliar chlorosis and necrosis.
Imazapic**	Amino acid synthesis inhibitor	Group 2 Acetolactate synthase (ALS) or Acetohydroxy acid synthase (AHAS) inhibitor	A non-selective herbicide used in the control of grasses and broadleaves. Growth of susceptible plants is inhibited within a few hours after application, but injury symptoms usually appear one to two weeks or more later. Meristematic areas become chlorotic, followed by slow, general foliar chlorosis and necrosis.
Imazapyr**	Amino acid synthesis inhibitor	Group 2 Acetolactate synthase (ALS) or Acetohydroxy acid synthase (AHAS) inhibitor	A nonselective herbicide for controlling either aquatic or terrestrial plants depending on the formulation. Foliar absorption is rapid but may vary with plant species. It can also be absorbed through roots. Growth of susceptible plants is inhibited within a few hours after application, but injury symptoms usually appear one to two weeks or more later. Meristematic areas gradually become chlorotic, followed by slow, general foliar chlorosis and necrosis.
Indaziflam	Cellulose biosynthesis inhibitor	Group 29 inhibit cellulose biosynthesis	A pre-emergent herbicide that provides broad spectrum control of many weed seedlings through the inhibition of seedling emergence and root development. Post-emergent symptoms include stunted growth and root swelling or clubbing.

Active chemical ingredient	Mode of action	Group number Site of action	Effects on vegetation
Metsulfuron methyl**	Amino acid synthesis inhibitor	Group 2 Acetolactate synthase (ALS) or Acetohydroxy acid synthase (AHAS) inhibitor	A selective herbicide used primarily to control broadleaf plants with rapid foliar and root absorption. Growth of susceptible plants is inhibited within a few hours after application, but injury symptoms usually appear one to two weeks or more later. Meristematic areas become chlorotic and necrotic, followed by general foliar chlorosis and necrosis.
Oxyfluorfen	Cell membrane disruption	Group 14 Protoporphyrinogen oxidase (PPO) inhibitor	Used to control broadleaf plants and annual grasses through foliar absorption. Symptoms of susceptible plants include rapid leaf bleaching, desiccation, and necrosis, often localize around sites of contact. General foliar necrosis will occur within one to two days.
Picloram**	Growth regulator	Group 4 Synthetic auxins	A selective herbicide applied foliar to control broadleaf plants and undesirable brush and is readily absorbed through roots and foliage. Injury symptoms are similar to other growth regulator herbicides which includes epinastic bending and twisting of stems and petioles, stem swelling (particularly at nodes) and elongation, and leaf cupping and curling. Leaf shape and venation often appear abnormal. This is followed by chlorosis at the growing points, growth inhibition, wilting, and necrosis. Death of susceptible plants occurs slowly, usually within three to five weeks.
Sulfometuron methyl	Amino acid synthesis inhibitor	Group 2 Acetolactate synthase (ALS) or Acetohydroxy acid synthase (AHAS) inhibitor	A non-selective herbicide that is effectively used to control broadleaf plants and grasses. Readily absorbs into leaves from foliar application and into roots from treated soil. Growth of treated plants is inhibited within a few hours after application, but injury symptoms usually appear more than two to three weeks later. Meristematic areas gradually become chlorotic, followed by general foliar chlorosis and necrosis. Plants may exhibit reddish-purplish coloration, vein discoloration, and necrosis of terminals.
Tebuthiuron	Photosynthesis inhibitor	Group 7 Photosynthesis inhibitor at photosystem II site A different binding behavior from Group 5	A nonselective herbicide applied by soil but can also be applied foliar and is used primarily for the control of woody vegetation. It is readily absorbed into roots, but less so into foliage. It translocates quickly following root absorption and inhibits photosynthesis.

Active chemical ingredient	Mode of action	Group number Site of action	Effects on vegetation
Triclopyr**	Growth regulator	Group 4 Synthetic auxins	A selective herbicide applied either terrestrial or aquatic depending on the formulation for controlling broadleaf plants and woody vegetation. Injury symptoms are similar to other growth regulator herbicides which includes epinastic bending and twisting of stems and petioles, stem swelling (particularly at nodes) and elongation, and leaf cupping and curling. Leaf shape and venation often appear abnormal. This is followed by chlorosis at the growing points, growth inhibition, wilting, and necrosis. Death of susceptible plants occurs slowly, usually within three to five weeks.

**Active Ingredients currently being used under the no-action alternative.

Short term impacts of chemical control treatments on native vegetation, composition, and structure are anticipated to be only minor since undesirable plants will be the species targeted. Implementation checklists and design features have been developed that will reduce any adverse impacts to nontarget species. Treating the undesirable plants would have positive overall effects. It is a greater risk to native vegetation, composition, and structure to leave the undesirable plants untreated.

Mechanical Control

Mechanical control reduces growth or kills undesirable plants by physically damaging the plant. Some examples of how this can be achieved is by pulling, digging, mowing, cutting, masticating, disking, or plowing. Equipment used for mechanical treatments can vary from hand tools to large machinery so associated impacts will vary depending on the type of equipment used.

Pulling and digging are minor ground disturbing activities and vegetation removal at small scales will have few negative impacts on native vegetation, composition, and structure. However, these methods are only effective with shallow rooted plants that are easily pulled from loose or moist soils. It can also be an effective control treatment on small infestations or areas where follow-up management is needed when only a few plants remain (DiTomaso 2000).

Mowing undesirable plants decreases their competitive advantage and favors desired plants if proper timing, frequency, and height of mowing is considered for each situation. How a plant responds will depend on the height of its growing point above ground. Growing points are a function of plant maturity and plant-growth characteristics. Figure 6 taken from the University of Nebraska Lincoln Plant and Soil Sciences eLibrary illustrates the location of growing points at different growth stages on a perennial grass. Mowing will not eradicate undesirable plants. However, it can stress the targeted species by reducing carbohydrate reserves, which will provide desired plants a competitive advantage. Mowing is very good at preventing or greatly reducing seed production on the undesirable plant (Sheley 2017). This should only result in minimal impacts to native vegetation and species composition.

Structure will be altered in the infestations mowed but removal of the undesirable plants will have a positive impact on creating a more heterogenous community. Mowing is most effective when implemented with other treatment methods such as chemical control or livestock grazing.

Mechanical control methods such as cutting and masticating are activities used to control woody species that cannot be mowed. These activities can target specific undesirable species and minimize any impacts to native vegetation or composition. There can be minor impacts to native vegetation, composition, and structure during equipment operation, but effects will be short lived.

Large-scale ground disturbing activities such as disking or plowing can alter native plant communities, causing a species composition shift and can spread additional undesirable plants. These types of control methods will need to be revegetated with desirable species and should be integrated with the rehabilitation and restoration treatments (Orloff et al. 2022). These activities are very labor intensive and can be expensive so should only be used in the most extreme cases.

Prescribed Fire

Prescribed fire is a way to shift the balance from undesirable species to desired vegetation. Fire was one of the principal interacting forces that maintained the Great Plains as grasslands by suppressing woody vegetation. Prescribed fires are planned and conducted at the proper time to meet specific management objectives.

How a plant responds to fire, depends on the height of its growing point above ground. Due to project design, prescribed fire typically has minimal impacts on the soil because fires are planned to create a mosaic burn pattern of low to moderate soil burn severity. This planning allows prescribed fires to have cooler temperatures than a wildfire and will usually only raise the temperature in the upper quarter inch of soil momentarily. If growing points are above the soil surface and the fire reaches lethal temperatures, the plant will likely be damaged or killed. Perennial grasses that tolerate fire have growing points at or below the soil surface. Perennial grasses differ in their responses to burning based on the position of their growing point. Perennial grasses can be damaged if their stems are elongated at the time of burning (Stubbendieck et al. 2007). In the vegetative stage plants have growing points near the ground surface and will tolerate effects from prescribed fire while in the elongation stage the growing point is elevated from the ground surface and can be susceptible to damage from prescribed fires (figure 6). Utilizing these plant growth characteristics, prescribed fire can be timed to favor desirable grasses and suppress undesirable grasses.

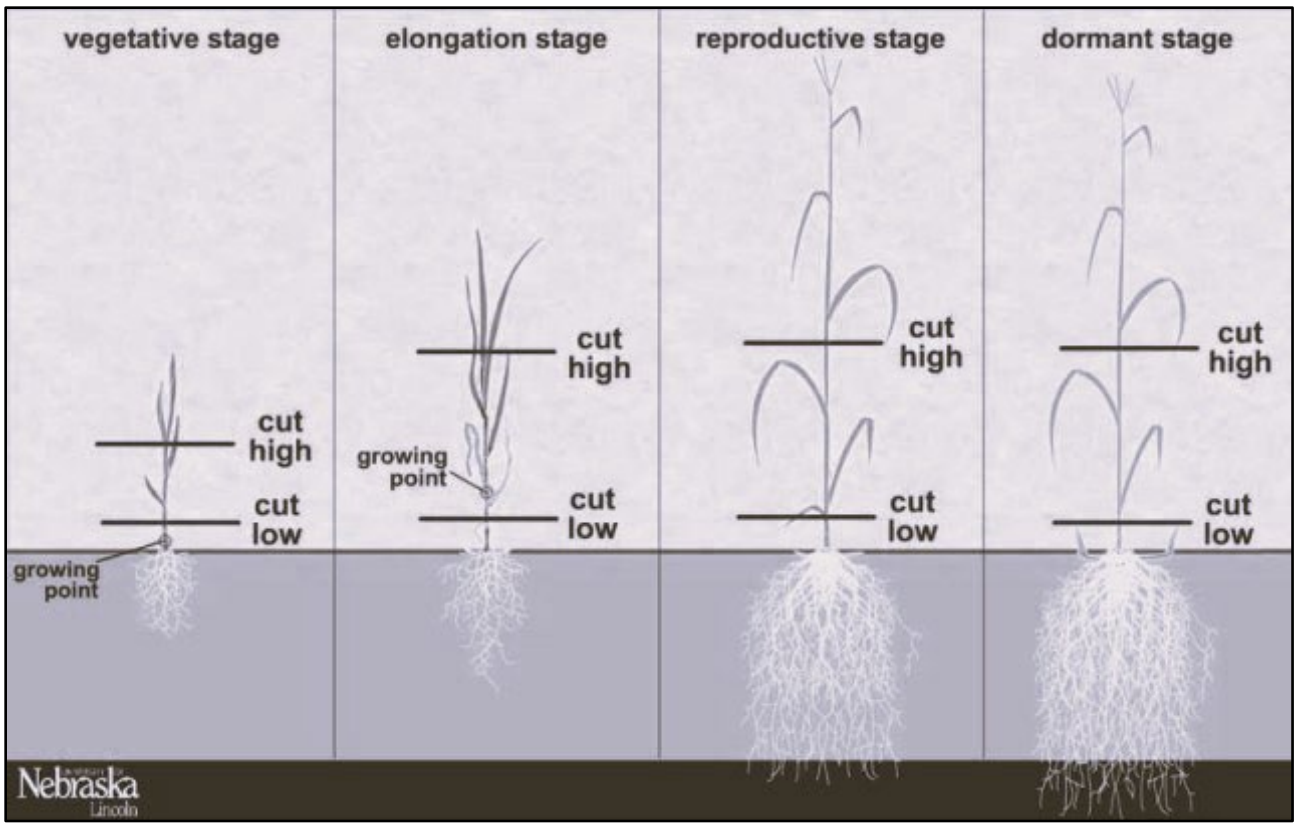


Figure 6. Location of growing points on a perennial grass during different phenological stages

Plants that reproduce by seed, can be killed by fire if their growing points are at the stem or twig tips and are exposed to lethal temperatures. If those growing points are subsurface buds, then they will only be top killed and can resprout many shoots after fire. Woody plants can resist heat damage if their growing points are above the flames (Stubbendieck et al. 2007). To effectively control the undesirable species and minimize effects to desirable species, it is imperative to understand the phenology of those species so the prescribed fire can be planned accordingly.

A Fire and Fuels 1 design feature, along with a checklist for annual implementation meetings, has been developed to provide guidance when planning prescribed burns for undesirable plant control. Utilizing this design feature and checklist would minimize impacts from prescribed fire and should prevent any increase in undesirable plants. Thus, only small-scale, short-lived disturbances with little negative effects are expected. Additionally, prescribed fire can be used to treat specific areas with high infestations of undesirable plants, so there would be very few negative impacts to native vegetation or composition in those instances. Structure would be altered in the infestations treated but removal of the undesirable plants would have a positive impact on creating a more heterogenous community.

Direct and Indirect Effects on Native Vegetation, Composition, and Structure

Native Vegetation

Any treatment that reduces undesirable plants within a community would result in a positive impact to native vegetation as the plant community is restored. A summary of the direct and indirect effects for all aspects of the proposed action on native vegetation as previously discussed are found table 12.

Table 12. Summary of direct and indirect effects from each proposed action on native vegetation

Proposed treatment	Direct effects	Indirect effects
Preventative measures	This will have a positive impact on native vegetation by helping to prevent the introduction of new undesirable plant infestations on the Forest. There will be no increase in acres of new infestations due to human activities if these measures are adhered to.	This will help maintain desirable acres of native vegetation.
Early detection and rapid response	This will limit the spread of undesirable plants on the Forest which will beneficially impact native vegetation. There will be only small increases in acres of undesirable plants using this strategy.	This will help maintain desirable acres of native vegetation.
Biological control	The release of host specific natural enemies for treating undesirable plants would not have any impacts to native vegetation. Targeted grazing of undesirable plants may impact native vegetation, but livestock would be removed if grazing is not targeting the undesirable plant species resulting in only minimal impacts. Acres of undesirable plants will be reduced.	This will help maintain or increase desirable acres of native vegetation.
Chemical control	There may be short term impacts to native vegetation during chemical control treatments. Acres of undesirable plants will be reduced.	This will help maintain or increase desirable acres of native vegetation.
Mechanical control	There may be short term impacts to native vegetation during mechanical control treatments. Acres of undesirable plants will be reduced.	This will help maintain or increase desirable acres of native vegetation.
Prescribed fire control	There may be short term impacts to native vegetation during prescribed fire control treatments. Acres of undesirable plants will be reduced.	This will help maintain or increase desirable acres of native vegetation.
Rehabilitation and restoration	There may be short term impacts to native vegetation during rehabilitation and restoration activities. Acres of undesirable plants will be reduced.	This will increase acres of native vegetation.
Implementation and effectiveness monitoring	Native vegetation will not be impacted by this activity.	There are no indirect effects to native vegetation from this activity.

Composition

All proposed treatments are intended to alter vegetative composition, but they are specifically designed to favor desired vegetation and to reduce the vigor of undesirable plants. The expected impacts on vegetative composition would vary with the method and intensity of treatments utilized. However, the overall effect of treating undesirable plants would positively impact vegetative composition. A summary of the direct and indirect effects for all aspects of the proposed action on vegetative composition as previously discussed are found in table 13.

Table 13. Summary of direct and indirect effects from each proposed action on vegetative composition

Proposed treatment	Direct effects	Indirect effects
Preventative measures	This will help prevent the introduction of new undesirable plant infestations on the Forest.	This will help maintain desired plant species composition objectives.
Early Detection and Rapid Response	This will limit the spread of undesirable plants on the Forest. There will be only small increases in acres of undesirable plants using this strategy.	This will help maintain desired plant species composition objectives.
Biological control	Biological control treatments should not have any negative impacts to vegetative composition.	This will help maintain or achieve desired plant species composition objectives.
Chemical control	There may be short term impacts to vegetative composition during chemical control treatments but diversity in the plant community should increase over the long-term.	This will help maintain or achieve desired plant species composition objectives.
Mechanical control	There may be short term impacts to vegetative composition during mechanical control treatments but diversity in the plant community should increase over the long-term.	This will help maintain or achieve desired plant species composition objectives.
Prescribed Fire control	There may be short term impacts to vegetative composition during prescribed fire control treatments but diversity in the plant community should increase over the long-term.	This will help maintain or achieve desired plant species composition objectives
Rehabilitation and Restoration	There will be short term impacts to vegetative composition during rehabilitation and restoration activities but diversity in the plant community should increase over the long-term.	This will help achieve desired plant species composition objectives.
Implementation and Effectiveness monitoring	Vegetative composition will not be impacted by this activity.	There are no indirect effects to vegetative composition from this activity.

Structure

Proposed treatments would affect vegetative structure by changing the vegetative composition. Treatments are specifically designed to favor desired vegetation and to reduce the vigor of undesirable plants. The expected impacts on vegetative structure would vary with the method and intensity of treatments utilized. However, the overall effect of treating undesirable plants would positively impact structure by creating a more heterogenous community. A summary of the direct and indirect effects for all aspects of the proposed action on vegetative structure as previously discussed are found in table 14.

Table 14. Summary of direct and indirect effects from each proposed action on vegetative structure

Proposed treatment	Direct effects	Indirect effects
Preventative measures	This will help prevent the introduction of new undesirable plant infestations on the Forest.	This will help maintain desired structure objectives.
Early Detection and Rapid Response	This will limit the spread of undesirable plants on the Forest. There will be only small increases in acres of undesirable plants using this strategy.	This will help maintain desired structure objectives.
Biological control	The release of host specific natural enemies for treating undesirable plants will not have any impacts to vegetative structure. Targeted grazing of undesirable plants will have short term impacts by altering vegetative structure.	This will help maintain or achieve desired structure objectives.
Chemical control	There may be short term impacts to vegetative structure during chemical control treatments but heterogeneity in the plant community should increase over the long-term.	This will help maintain or achieve desired structure objectives.
Mechanical control	There may be short term impacts to vegetative structure during mechanical control treatments but heterogeneity in the plant community should increase over the long-term.	This will help maintain or achieve desired structure objectives.
Prescribed Fire control	There may be short term impacts to vegetative structure during prescribed fire control treatments but heterogeneity in the plant community should increase over the long-term.	This will help maintain or achieve desired structure objectives
Rehabilitation and Restoration	There will be short term impacts to vegetative structure during rehabilitation and restoration activities but heterogeneity in the plant community should increase over the long-term.	This will help achieve desired structure objectives.
Implementation and Effectiveness monitoring	Vegetative structure will not be impacted by this activity.	There are no indirect effects to structure from this activity.

Cumulative Effects

Physical disturbances to desirable native plant communities by natural or human caused actions will always occur. Natural events such as wildfire, drought or climate change, and erosion can create disturbances that help undesirable plant species become established and spread. Human caused actions like driving through undesirable plant infestations in one location and travelling to another location without cleaning the vehicle, oil and gas operations, and other activities that create bare ground all can create avenues for new undesirable plant infestations. If any of these disturbances occurred on adjacent lands it may also cause an increase in undesirable plants. Those infestations could have the potential to spread onto the Nebraska.

Recent decisions that treat hazardous fuels, remove timber products, and create new recreational developments are occurring throughout the Nebraska. These activities have the potential to introduce new undesirable plant species or undesirable plants to new locations. However, the number of infested acres will not increase as rapidly as the no-action alternative due to the early detection and rapid response strategy and more control options being available to utilize.

Listed and Sensitive Wildlife and Plants

Issue 2: Treating undesirable plants may harm threatened, endangered, sensitive, or management indicator species.

Measurement Indicators:

- Direct and indirect effects of undesirable plant treatment activities (disturbance and toxicity).
- Determination of degree of effects.

Methodology

The indicators for assessing effects to this issue include direct and indirect effects of undesirable plant treatment activities (disturbance and toxicity) to (1) threatened, endangered, or proposed species under the Endangered Species Act; (2) Forest Service Region 2 sensitive species; and (3) migratory birds and their habitat and determination of effects. A pre-field review was conducted of available information to assemble occurrence records for affected species, describe habitat needs and ecological requirements, and determine whether field reconnaissance was needed to complete the analysis. Sources of information included Forest Service records and files, Forest Service Region 2 sensitive species list (as of February 2023), the State Natural Heritage Program database, state wildlife agency information, Environmental Conservation Online System, Forest Service Region 2 Conservation Assessments, and published research (see References section). On February 25, 2023, a list of threatened, endangered, and proposed species, to include critical habitat, that may be present in the action area was requested from the United States Department of Interior (USDI) Fish and Wildlife Service (hereafter Fish and Wildlife Service). The list of species was received on February 25, 2023 (USDI Fish and Wildlife Service 2023) and can be found in Appendix G: U.S. Fish and Wildlife Service Consultation).

The Forest Service also contracted with Syracuse Environmental Research Associates, Inc. to evaluate ecological effects of herbicides using Environmental Protection Agency studies and other peer-reviewed articles from the open scientific literature. Laboratory and field studies surrounding herbicide toxicity, exposure, and environmental fate were used to estimate the risk of adverse effects to nontarget terrestrial and aquatic organisms (Syracuse Environmental Research Associates, 2003-2009). The United States Department of Energy, Bonneville Power Administration has also prepared Herbicide Fact Sheets that analyze the effect of herbicide toxicity on mammals and birds (U.S. Department of Energy 2000). Both the herbicide fact sheets and risk assessments were used to complete this analysis and evaluate toxicity of herbicides on mammalian and avian wildlife species.

Affected Environment

Table 15 includes threatened, endangered, proposed, candidate, and sensitive species and designated critical habitats located on the Nebraska, or that are adjacent to or downstream, that could potentially be affected by project implementation. Table 15 includes information relevant to terrestrial wildlife, birds, reptiles, amphibians, invertebrates, and fish.

Candidate species have sufficient information on their biological status and threats to warrant a proposal to list as endangered or threatened, but development of a listing regulation is precluded by other higher priority listing activities. Species that are candidates for listing under the Endangered Species Act are automatically placed on the Region 2 Regional Forester's sensitive species list. The analysis and determination of effects for candidate species are included as part of the biological evaluation for sensitive species. The biological evaluation for this project is summarized in the following information and is part of the project record.

Sensitive species are identified on the Region 2 Regional Forester's sensitive species list (USDA Forest Service 2023a). Management indicator species are identified in the forest plan for each geographic area across the Nebraska. Management indicators are defined in the forest plan as, "plant or animal species or habitat components selected in a planning process used to monitor the effects of planned management activities on populations of wildlife and fish, including those that are socially or economically important." The analysis and determination of effects for management indicator species are included as part of the analysis for sensitive species.

Fish and Wildlife Service consultation identifies priority migratory birds that are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Many are identified as Region 2 sensitive species. Those that are will be included as part of the analysis for sensitive species.

No further analysis was needed for species that are not known or suspected to occur in the project area, and for which no suitable habitat is present. The pre-field review process mentioned above determined which species would be carried forward in the analysis and which would be eliminated. Species were eliminated from detailed analysis if they fell into one of the ten following categories. The numerical categories are referred to in the last column of table 15.

For all species that were screen from further analysis in table 15, the biological determination for all Regional Forester sensitive species is "No Impact", the determination for management indicator species is "Neutral Effect on Population Trend", and the determination for migratory birds is "No Effect".

1. Habitat is completely absent or lacks vital components inside activity areas, making it unsuitable for occupancy or use by the species in question.
2. The action area is located outside the species' current known geographic or elevation range.
3. Proposed activity or disruption effects would occur outside of an animal's seasonal occupancy of otherwise suitable habitat.
4. No elements of a species' primary habitat or life requisites would be changed by the alternatives.
5. No environmental changes (disruption of breeding, modification of food web, reduction in cover or shelter structures, loss or degradation of denning/nesting habitat, and so on) created by the alternatives could be identified which would detrimentally affect this species or its habitat.
6. Individual animals may be accidental, dispersing, migrating, happenstance, vagrant, nomadic or opportunistic visitors to the habitat(s) impacted by the alternatives, but no affiliation or dependence upon these habitat(s) has been shown.
7. A reproductive population of this species is not present in the vicinity and there remains scientific uncertainty as to whether a reproductive population of this species ever was resident on the Nebraska in the recent past.
8. An absence of trapping, hunting, sighting, carcass, photographic or other records in the last 50 years indicates local extirpation of the species is likely in the county (counties) where the proposal is located, or published reports indicate the species is not present locally.

9. Considering the territory or home range size for this animal in comparison to the area extent of the habitat affected by the proposed action, no measurable change in primary prey populations can be ascertained at the landscape level.
10. The project includes protection measures which will eliminate impacts to this species.

Table 15. Threatened, endangered, proposed, candidate, or Region 2 sensitive species and management indicator species that either occur, potentially occur, or that may be influenced by actions on the Nebraska

Common name (species guild)	Scientific name	Status	Known/ suspected to be present?	Suitable habitat present?	Rationale if not carried forward for analysis (see above numerical rationale descriptions).
All Species Critical Habitats	---	---	No	No	No affect. There are no critical habitats within the project area.
Black-footed Ferret (E) (Mammal)	*Mustela nigripes*	Endangered	Yes	BG, prairie dog colony dependent	4,5,10
Black-footed Ferret (E) (Mammal)	*Mustela nigripes*	Experimental Population, Non-Essential	Yes	BG, prairie dog colony dependent	4,5,10
Northern Long-eared Bat (E) (Mammal)	*Myotis septentrionalis*	Endangered	Yes	RO, PP	1,3,4,5
Tricolored Bat (P) (Mammal)	*Perimyotis subflavus*	Proposed Endangered	Yes	RO, PP, ERC, BB	1,3,4,5
Piping Plover (T) (Avian)	*Charadrius melodus*	Threatened	No	AQ/R	1,3,4,5
Red Knot (T) (Avian)	*Calidris canutus rufa*	Threatened	No	AQ/R	1,3,4,5
Whooping Crane (E) (Avian)	*Grus americana*	Endangered	No	GL, AQ/R	1,2,3,4,5,6,7
Pallid Sturgeon (E) (Fish)	*Scaphirhynchus albus*	Endangered	No	AQ/R	1,3,4,5
Topeka Shiner (E) (Fish)	*Notropis topeka (=tristis)*	Endangered	No	AQ/R	1,3,4,5
American Burying Beetle (T) (Invertebrate)	*Nicrophorus americanus*	Threatened	Yes	GL	4,5,10

Common name (species guild)	Scientific name	Status	Known/ suspected to be present?	Suitable habitat present?	Rationale if not carried forward for analysis (see above numerical rationale descriptions).
Monarch Butterfly (C) (Invertebrate)	*Danaus plexippus*	ESA-candidate species	Yes	GL	Analyzed as a Forest Service sensitive species.
Blowout Penstemon (E) (Terrestrial Plant)	*Penstemon haydenii*	Endangered	Yes	BG	5,10
Ute Ladies'-tresses (T) (Terrestrial Plant)	*Spiranthes diluvialis*	Threatened	No	WET	1,3,4,5,6,8
Western Prairie Fringed Orchid (T) (Terrestrial Plant)	*Platanthera praeclara*	Threatened	No	WET	1,3,4,5,6,8
Rocky Mountain Bighorn sheep (Mammal)	Ovis canadensis canadensis	R2 Sensitive	Yes	RO	Carried forward for analysis.
Black-tailed prairie dog (Mammal)	Cynomys ludovicianus	R2 Sensitive MIS	Yes	GL, BG	Carried forward for analysis.
Fringed myotis (Mammal)	Myotis thysanodes	R2 Sensitive	Yes	RO, PP	1,3,4,5
Hoary bat (Mammal)	Lasiurus cinereus	R2 Sensitive	Yes	PP	1,3,4,5
River otter (Mammal)	Lontra canadensis	R2 Sensitive	Yes	AQ/R	1,3,4,5
Townsend’s big-eared bat (Mammal)	Corynorhinus townsendii	R2 Sensitive	Yes	RO, PP	1,3,4,5
Swift fox (Mammal)	Vulpes velox	R2 Sensitive	Yes	GL	4,5,9
American bittern (Avian)	*Botaurus lentiginosus*	R2 Sensitive	Yes	WET, AQ/R	1,3,4,5,10
Black tern (Avian)	*Chlidonias niger*	R2 Sensitive Migratory	Yes	WET, AQ/R needs open water	1,3,4,5,10
Brewer’s sparrow (Avian)	*Spizella breweri*	R2 Sensitive	Yes	SG	Carried forward for analysis.
Burrowing owl (Avian)	*Athene cunicularia*	R2 Sensitive	Yes	GL, BG	Carried forward for analysis.
Chestnut-collared longspur (Avian)	*Calcarius ornatus*	R2 Sensitive Migratory	Yes	GL	Carried forward for analysis.
Ferruginous hawk (Avian)	*Buteo regalis*	R2 Sensitive Migratory	Yes	GL	Carried forward for analysis.
Grasshopper sparrow (Avian)	*Ammodramus savannarum*	R2 Sensitive	Yes	GL	Carried forward for analysis.
Greater prairie-chicken (Avian)	*Tympanuchus cupido*	R2 Sensitive MIS	Yes	GL	Carried forward for analysis.

Common name (species guild)	Scientific name	Status	Known/ suspected to be present?	Suitable habitat present?	Rationale if not carried forward for analysis (see above numerical rationale descriptions).
Greater sage-grouse (Avian)	*Centrocercus urophasianus*	R2 Sensitive MIS	Yes	SG	1,2,3,4,5,6,7
Lark bunting (Avian)	*Calamospiza melanocorys*	R2 Sensitive Migratory	Yes	GL	Carried forward for analysis.
Lewis's woodpecker (Avian)	*Melanerpes lewis*	R2 Sensitive Migratory	Yes	PP	1,3,4,5,7
Loggerhead shrike (Avian)	*Lanius ludovicianus*	R2 Sensitive	Yes	FM, RIP	Carried forward for analysis.
Long-billed curlew (Avian)	*Numenius americanus*	R2 Sensitive Migratory	Yes	GL, WET	Carried forward for analysis.
Thick-billed longspur (formerly McCown's longspur) (Avian)	*Rhynchophanes mccownii*	R2 Sensitive Migratory	Yes	GL, BG	Carried forward for analysis.
Mountain plover (Avian)	*Charadrius montanus*	R2 Sensitive Migratory	Yes	GL, SG, BG	1,2,3,4,5,6,7
Northern harrier (Avian)	*Circus cyaneus*	R2 Sensitive	Yes	GL, RIP, WET	Carried forward for analysis.
Pygmy nuthatch (Avian)	*Sitta pygmaea*	MIS	Yes	PP	Carried forward for analysis.
Pinyon jay (Avian)	*Gymnorhinus cyanocephalus*	R2 Sensitive Migratory	Yes	SG, PP	Carried forward for analysis.
Sharp-tailed grouse (Avian)	*Tympanuchus phasianellus*	MIS	Yes	GL	Carried forward for analysis.
Short-eared owl (Avian)	*Asio flammeus*	R2 Sensitive	Yes	GL, SG, WET	Carried forward for analysis.
Trumpeter swan (Avian)	*Cygnus buccinator*	R2 Sensitive	Yes	WET	1,3,4,5,10
Northern leopard frog (Amphibian / Reptile)	*Lithobates pipiens*	R2 Sensitive	Yes	WET, RIP	4,5,10
Plains leopard frog (Amphibian / Reptile)	*Lithobates blairi*	R2 Sensitive	Yes	WET, RIP	4,5,10
Northern redbelly dace (Fish)	*Chrosomus eos*	R2 Sensitive	No	AQ/R	1,3,4,5,6,8
Finescale dace (Fish)	*Chrosomus neogaeus*	R2 Sensitive	Yes	AQ/R	4,5,10
Flathead chub (Fish)	*Platygobio gracilis*	R2 Sensitive	Yes	AQ/R	4,5,10
Northern pearl dace (Fish)	*Margariscus nachtriebi*	R2 Sensitive	Yes	AQ/R	4,5,10
Plains minnow (Fish)	*Hybognathus placitus*	R2 Sensitive	Yes	AQ/R	4,5,10
Plains topminnow (Fish)	*Fundulus sciadicus*	R2 Sensitive	Yes	AQ/R	4,5,10

Common name (species guild)	Scientific name	Status	Known/ suspected to be present?	Suitable habitat present?	Rationale if not carried forward for analysis (see above numerical rationale descriptions).
Sturgeon chub (Fish)	*Macrhybopsis gelida*	R2 Sensitive	Yes	AQ/R	4,5,10
Arogos skipper (Invertebrate)	*Atrytone arogos*	R2 Sensitive	No	GL	1,2,3,4,5,6,7
Monarch butterfly (Invertebrate)	*Danaus plexippus*	ESA Candidate Species R2 Sensitive	Yes	GL	Carried forward for analysis.
Ottoe skipper (Invertebrate)	*Hesperia ottoe*	R2 Sensitive	No	GL	1,2,3,4,5,6,7
Regal fritillary (Invertebrate)	*Speyeria idalia*	R2 Sensitive	Yes	GL	Carried forward for analysis.
Western bumblebee (Invertebrate)	*Bombus occidentalis*	R2 Sensitive	Yes	GL, FM	Carried forward for analysis.
Cooper's Rocky Mountain snail/Black Hills mountainsnail (Invertebrate)	*Oreohelix strigosa cooperi*	R2 Sensitive	No	PP	1,2,3,4,5,6,7
Lesser panicled sedge (Terrestrial Plant)	*Carex diandra*	R2 Sensitive	Yes	WET	Carried forward for analysis.
Slender bristlegrass, or slender cottongrass (Terrestrial Plant)	*Eriophorum gracile*	R2 Sensitive	Yes	WET	Carried forward for analysis.
Yellow widelip orchid (Terrestrial Plant)	*Liparis loeselii*	R2 Sensitive	Yes	WET	Carried forward for analysis.
Hall's bulrush (Terrestrial Plant)	*Schoenoplectus hallii*	R2 Sensitive	No	WET	7
Barr's milkvetch (Terrestrial Plant)	*Astragalus barrii*	R2 Sensitive	Yes	BD, BG	Carried forward for analysis.
Visher's buckwheat (Terrestrial Plant)	*Eriogonum visheri*	R2 Sensitive	Yes	BD, BG	Carried forward for analysis.
Lesser bladderwort (Terrestrial Plant)	*Utricularia minor*	R2 Sensitive	Yes	WET	Carried forward for analysis.
Bald eagle (Avian)	*Haliaeetus leucocephalus*	Migratory Bird	Yes	GL, PP, FM, RIP	5,10
Golden eagle (Avian)	*Aquila chrysaetos*	Migratory Bird	Yes	GL, RIP	5,10
American Golden-plover (Avian)	*Pluvialis dominica*	Migratory Bird	Yes	WET, AQ/R	1,3,4,5,10
Baird's Sparrow (Avian)	*Ammodramus bairdii*	Migratory Bird	Yes	GL	3,4,5,6
Black-billed Cuckoo (Avian)	*Coccyzus erythropthalmus*	Migratory Bird	Yes	PP, RIP, AQ/R	4,5,6

Common name (species guild)	Scientific name	Status	Known/ suspected to be present?	Suitable habitat present?	Rationale if not carried forward for analysis (see above numerical rationale descriptions).
Bobolink (Avian)	*Dolichonyx oryzivorus*	Migratory Bird	Yes	GL, WET	4,5,10
California Gull (Avian)	*Larus californicus*	Migratory Bird	Yes	WET, AQ/R	1,3,4,5,10
Chimney Swift (Avian)	*Chaetura pelagica*	Migratory Bird	Yes	RO, BB	1,4,5,10
Clark's Grebe (Avian)	*Aechmophorus clarkii*	Migratory Bird	Yes	WET, AQ/R	1,3,4,5,10
Franklin's Gull (Avian)	*Leucophaeus pipixcan*	Migratory Bird	Yes	WET, AQ/R	1,3,4,5,10
Hudsonian Godwit (Avian)	*Limosa haemastica*	Migratory Bird	Yes	WET, AQ/R	1,3,4,5,10
Lesser Yellowlegs (Avian)	*Tringa flavipes*	Migratory Bird	Yes	WET, AQ/R	1,3,4,5,10
Long-eared Owl (Avian)	*Asio otus*	Migratory Bird	Yes	GL, PP	4,5,10
Marbled Godwit (Avian)	*Limosa fedoa*	Migratory Bird	Yes	WET, AQ/R	1,3,4,5,10
Prairie Falcon (Avian)	*Falco mexicanus*	Migratory Bird	Yes	GL, RO	4,5,10
Red-headed Woodpecker (Avian)	*Melanerpes erythrocephalus*	Migratory Bird	Yes	PP, RIP	4,5,10
Sprague's Pipit (Avian)	*Anthus spragueii*	Migratory Bird	Yes	GL	3,4,5,6,10
Western Grebe (Avian)	*Aechmophorus occidentalis*	Migratory Bird	Yes	WET, AQ/R	1,3,4,5,10
Willet (Avian)	*Tringa semipalmata*	Migratory Bird	Yes	GL, WET, AQ/R	1,3,4,5,10

Key:
GL=Grassland; SG=Sagebrush; BD=Badlands; PP=Ponderosa Pine; ERC=Eastern Red Cedar; FM=Forest Meadows; RIP=Riparian; WET=Wetland; AQ/R=Aquatic/Riverine; RO=Rock/Cliff/Cave/Canyon/Mines; BG=Barren Ground or Barren Soil; BB=Buildings, Bridges and Various Structures.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

Removal of plant growth and soil disturbance treatment methods include, but are not limited to, such activities as hand-pulling, grubbing, mowing, or cutting. This type of treatment could have short-term, site-specific impacts to wildlife through disturbance to individuals during breeding, nesting, foraging, or denning. These impacts would be short in duration and would be considered insignificant. They would have beneficial impacts on wildlife habitat by restoring native vegetation and reducing or preventing spread of undesirable plant species.

Biological control agents are released by the Animal and Plant Health Inspection Services 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. The assessment includes environmental analysis, host specificity and other testing, consultation with the Fish and Wildlife Service, and review by the Technical Advisory Group for Biological Control Agents of Weeds. Screening and assessments have become more comprehensive over time as concern for effects to native plants and animals has increased. The Nebraska would only use biological control agents that have been determined to be harmless to native or desirable plants but detrimental to the target plant. Therefore, direct and indirect effects from biological controls are expected to be minimal.

While the risk assessments and herbicide labels relay the expected direct effects of herbicide exposure and ingestion, they do not address the indirect effects of habitat alteration. In general, the risk assessments for herbicides indicate that it is possible to have some adverse effects to species following applications; however, effects are generally unlikely. Toxicity levels would be low if a species encountered the herbicides that may cause some discomfort or sickness, but not death. Moreover, inadvertent contact with herbicides would affect individuals, not populations.

The effects of many herbicides on wildlife have not been studied in detail, although most herbicides have been tested on experimental animals. Suggested findings from experimental animals are extrapolated to mammal and avian species, which means that conclusions regarding the effects of these chemicals on wildlife are somewhat uncertain. However, risk levels for herbicide use are calculated in a very conservative manner and worst-case exposure scenarios have been studied for most herbicides.

Herbicides can affect habitat by killing, injuring, or suppressing non-target vegetation that is necessary or desirable habitat for wildlife species. This is a concern for sensitive species that are associated with specific grass, forb, or shrub species for food or cover during their life cycle and have low mobility to move into different areas when their habitats are impacted. The degree to which herbicides affect non-target vegetation varies by specific herbicides, with some having more broad impacts than others.

Modified Proposed Action

Direct and Indirect Effects

Biological Control

Biological controls are permitted by the USDA Animal and Plant Health Inspection Services 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. The assessment includes environmental analysis, host specificity and other testing, consultation with the Fish and Wildlife Service, and review by the Technical Advisory Group for Biological Control Agents of Weeds. Screening and assessments have become more comprehensive over time as concern for effects to native plants and animals has increased. Prior to release of new biological agents, the Nebraska would determine that it is detrimental to the target plants while at the same time being virtually harmless to native or desirable plants.

For this project, Vegetation 2 design feature states, “only biological control agents that have been approved by the USDA Animal and Plant Health Inspection Service will be released.” Prior to release of such agents, the Nebraska would also determine that the biological control is virtually harmless to native or desirable plants while at the same time being detrimental to the target plants. Therefore, direct and indirect effects from biological controls are expected to be minimal.

Targeted grazing is proposed to be incorporated as a biological control. This control is a common treatment for constructing desirable ecosystems throughout the Nebraska. Targeted grazing is the application of livestock grazing at a specified season, duration, and intensity to accomplish specific vegetation management goals. The term "targeted" refers to the specific plant or landscape that is the aim of controlled grazing practices (Launchbaugh et al. 2006). No adverse effects are anticipated from the implementation of target grazing. Coordination with Nebraska staff biologists and botanist during annual implementation meetings or during review of project specific implementation checklists will ensure that timing, duration, or avoidance measures are followed for the protection of listed or sensitive wildlife or plants.

Chemical Control

While the risk assessments and herbicide labels relay the expected direct effects of herbicide exposure and ingestion, they do not address the indirect effects of habitat alteration. In general, the risk assessments for herbicides indicate that it is possible to have some adverse effects to species following applications; however, effects are generally unlikely. Toxicity levels would be low if a species encountered the herbicides that may cause some discomfort or sickness, but not death. Moreover, inadvertent contact with herbicides would affect individuals, not populations.

The effects of many herbicides on wildlife have not been studied in detail, although most herbicides have been tested on experimental animals. Suggested findings from experimental animals are extrapolated to mammal and avian species, which means that conclusions regarding the effects of these chemicals on wildlife are somewhat uncertain. However, risk levels for herbicide use are calculated in a very conservative manner and worst-case exposure scenarios have been studied for most herbicides.

Lethal Dose 50 values are used as a measure of toxicity and are defined as the quantity of chemical per unit body weight that would cause lethal effects in 50 percent of a study population with a single dose. Reported LD50 values for herbicides were sometimes highly variable, reflecting differences among studies such as use of different species or exposure techniques, varying sample sizes, and so on Despite this variability, data is sufficient to determine that the herbicides proposed for use under both alternatives are generally of low toxicity to mammalian and avian wildlife. Exposure to extremely high levels of most herbicides through direct ingestion of herbicide or spraying during laboratory studies often led to death or a variety of sub-lethal toxic effects including damage or irritation to the nervous system, kidneys, eyes, or skin; inhibition of reproduction; and other problems. However, the doses required to produce such effects were much higher than what wildlife would encounter from application of herbicides in the field even under worst-case scenarios.

The long-term fate of herbicides in the environment is also a concern. Bioaccumulation is the process by which chemicals enter the food chain from the environment, whereas biomagnification is the increase in concentration of these chemicals from one link in the food chain to the next. The combined effect of these processes is that small concentrations of chemicals can lead to toxic effects for organisms high in the food chain. However, for biomagnification to occur, the chemical must be long-lived, mobile, and fat-soluble. If a chemical is not long-lived, it will break down before entering the food chain. If it's not mobile, such as when it's bonded to soil, it is unlikely that it could be taken up by an organism. If it is water-soluble rather than fat-soluble, the organism will excrete it. The herbicides proposed for use in this project appear to be rapidly excreted (SREA 2003a-c, 2004a-g, 2005, 2006, 2007, and 2009) and do not accumulate in tissues, although data was often limited. Because of this, these herbicides present little or no potential for bioaccumulation as detailed in the Department of Energy Herbicide Fact Sheets (US Department of Energy 2000a-k and 2006a-b).

Issue 2, discussed above, describes the general effects of herbicides on target and 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 Nebraska, this is a concern for sensitive species that are associated with specific grass, forb, or shrub species for food or cover during their life cycle and have low mobility to move into different areas when their habitats are impacted. The degree to which herbicides affect non-target vegetation varies by specific herbicides, with some having more broad impacts than others. However, it is expected that project design features would reduce effects of herbicides on habitat to acceptable levels.

Aerial application of herbicide results in more potential for drift of herbicide into non-target areas as compared to when ground-based equipment is used. On the Nebraska, aerial application would generally be limited to relatively large, heavily infested areas or remote inaccessible areas. In most cases, species such as cheatgrass or smooth brome, which have invaded large areas of grasslands, would be the objective of aerial application. Aerial application of herbicide also results in more potential for drift onto wildlife species during application, particularly species that have low mobility such as small mammals, nesting birds, or insects. As aerial drone technology is developed and becomes more accessible for use, this technology could allow for more site specific and targeted aerial herbicide applications across the Nebraska.

Vegetation design features 5 and 6 require the lowest rate of herbicide application possible and field review and flagging of treatment units prior to aerial application of herbicide to ensure that aerial treatments stay within intended treatment areas. Wildlife design feature 2 also requires operations to cease if a Federally listed species, sensitive species, species of local concern, or a critical habitat component of those species is found prior to or during project implementation. Given these project design features, as well as others, effects to wildlife species are expected to be minimal during aerial application of herbicide.

Mechanical Control

Mechanical methods include, but are not limited to, such activities as hand-pulling, grubbing, mowing, or cutting. This type of treatment could have short-term, site-specific impacts to wildlife through disturbance to individuals during breeding, nesting, foraging, or denning. These impacts would be short in duration and would be considered insignificant. They would have beneficial impacts on wildlife habitat by restoring native vegetation and reducing or preventing spread of undesirable plant species.

Prescribed Fire

The use of prescribed fire would be implemented in conjunction with other treatment methods. Prescribed fire could impact some individuals that occur in areas of treatment through disturbance from burning, direct mortality in some cases, and temporary loss of habitat until burned areas recover. The intent of most burn plans is to mimic natural fire regimes and burn in a mosaic pattern with areas of no treatment, light burning, or intensive treatment. The mosaic pattern often provides improved habitat quality for wildlife. Moreover, prescribed fire for control of undesirable plant species would occur in areas where habitat suitability is already compromised. Therefore, the long-term effects would be beneficial by restoring native vegetation and reducing or preventing spread of undesirable species. Project design features would limit short-term impacts to threatened, endangered, or sensitive species and other key wildlife and plant species.

With these control methods and the ability to implement adaptive management to address changing circumstances and situations, the Nebraska will be able to better manage the direct and indirect effects that undesirable plants can have on wildlife and their native habitats. The treatments described above will allow for best management practices to protect habitats for threatened, endangered, and sensitive species.

Cumulative Effects

Past actions generally include livestock grazing practices, infrastructure developments, past undesirable plant species treatments by both the agency and adjoining landowners, timber harvest and removal, road and trail construction and maintenance, recreational activities, and the unintended spread of undesirable species from these actions. Current and reasonably foreseeable activities that could contribute to the degree of effects include the continuance of past actions into the reasonably foreseeable future. Future projects and actions to sustain the health, diversity, and productivity of the Nebraska to meet the needs of future generations will inevitably include expansion of past actions. Such actions could include additional trail and road improvements, recreational developments and use, and increased management of the lands using proposed actions from this project.

Events such as severe wildfire, drought, and erosion would continue to create disturbances that help undesirable plant species establish and spread. These events have the potential to introduce new undesirable plant species, advance the spread of undesirable plant species to new locations, or accelerate the spread of existing infestations. Climate change is also likely to stress native plant communities and perhaps create an ecological advantage for undesirable plant species. Most undesirable plant species flourish because they can cope with challenging growing conditions.

Analysis assumptions and project design features were developed to protect federally listed species and their habitat. Implementation design feature 1 requires annual implementation meetings for all undesirable plant management treatments to determine which treatments require use of implementation checklist(s). Implementation design feature 2 states that individual treatments would not be implemented until necessary project implementation checklist(s) have been completed and a responsible official has authorized the treatment. These design features ensure that annual proposed activities would be reviewed for their effects on federally listed species and habitats, sensitive species, and other wildlife present in the project area. Additionally, proper consultation and coordination with appropriate agencies would occur based on determinations of effect(s). Therefore, effects to all species considered in the analysis should be minimal to nonexistent.

Federally Listed Species

- Per communications with the Fish and Wildlife Service (letter dated February 25, 2023), the Nebraska does not contain federally listed or proposed critical habitats; therefore, both alternatives would have “No effect” on critical habitat.
- Based on the analysis assumptions and project design features, both alternatives should have “No effect” on federally listed species that could potentially occur within the project area.

No Further consultation is required with the Fish and Wildlife Service based on the determinations above.

Sensitive Species and Management Indicator Species

Table 16 lists all Region 2 sensitive species and forest plan management indicator species identified as, carried forward for analysis, in table 15.

Table 16. Region 2 sensitive species and forest plan management indicator species carried forward for analysis

Species common name	Status
Rocky Mountain Bighorn sheep	Sensitive
Black-tailed prairie dog	Sensitive and Management Indicator Species
Brewer's sparrow	Sensitive
Burrowing owl	Sensitive
Chestnut-collared longspur	Sensitive
Ferruginous hawk	Sensitive
Grasshopper sparrow	Sensitive
Greater prairie-chicken	Sensitive and Management Indicator Species
Lark bunting	Sensitive
Loggerhead shrike	Sensitive
Long-billed curlew	Sensitive
Thick-billed longspur	Sensitive
Northern harrier	Sensitive
Pygmy nuthatch	Management Indicator Species
Pinyon jay	Sensitive
Sharp-tailed grouse	Management Indicator Species
Short-eared owl	Sensitive
Monarch butterfly	Sensitive (Endangered Species Act Candidate Species)
Regal fritillary	Sensitive
Western bumblebee	Sensitive
Lesser panicled sedge	Sensitive
Slender bristlegrass	Sensitive
Yellow widelip orchid	Sensitive
Barr's milkvetch	Sensitive
Visher's buckwheat	Sensitive
Lesser bladderwort	Sensitive

For the no-action alternative, a determination of 'May adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide' was reached for Regional Forester sensitive species. Rationale for this determination is based on undesirable plant management continuing to occur and the possibility that individual animals could be negatively impacted by equipment or by encountering herbicides used for treatments.

For the modified proposed action, a determination of 'May adversely impact individuals, but not likely to result in a loss of viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide' was again reached for sensitive species. Rationale for this determination is based on the fact that there is a suite of tools that can be used to control undesirable plant species including biocontrol, chemical applications (ground based and aerial), mechanical, and prescribed fire. In general, these activities are expected to enhance habitat for many sensitive or management indicator species. However, during the implementation phase of the project, some of these activities can be stressful for wildlife if conducted within a certain proximity to individuals or cause wildlife to disperse into less desirable areas making them more susceptible to death or harm due to predation and other environmental factors. Equipment used to control undesirable plants could be fatal to wildlife if it was to collide with individuals, and some of the chemicals used in these treatments can be toxic to wildlife causing allergic reactions, sickness, or death when contacted or consumed by individuals.

For both the no-action and modified proposed action alternatives a determination of 'neutral effect on population trend' was reached for all management indicator species. Although some of the proposed activities could adversely impact individuals from each management indicator species, the general effects from project activities should increase the long-term sustainability of existing habitat for management indicator species and other species that use similar habitats through the removal of undesirable plants and the maintenance or re-establishment of healthy desirable plant communities. Generally, the project activities are expected to be beneficial for all management indicator species, but they are not expected to significantly increase or decrease species population trend trajectories over time, thus the neutral effect determination for population trend.

Soils, Riparian, and Aquatic Resources

Issue 3: Treating undesirable plants could harm soils, riparian, and aquatic resources and could adversely impact the quality of surface and groundwater.

Measurement indicators:

- Soil health.
- Riparian health and function.
- Surface and ground water quality.
- Effects of management activities on aquatic resources.

Methodology

The indicators for analyzing effects to this issue are soil health, riparian health and function, surface and ground water quality, and effects of management activities on aquatic resources. All soils found on National Forest System lands within the Nebraska were considered in the analysis. Evaluation of effects to water resources and watershed functions was considered at the 6th-level sub-watershed scale and includes an evaluation of both on-site and downslope or downstream watershed effects. The analysis area for groundwater resources includes two different spatial boundaries – one for surface ground water dependent resources, and the second for deeper, underground aquifers. Potential effects to ground water dependent ecosystems at the land surface, such as springs, wetlands, and gaining and losing streams, were considered for those resources that exist within the Nebraska. Effects to groundwater were considered for a larger area extending outside the boundary of the Nebraska.

Effects to soil and water resources were considered for up to 5 years following the anticipated completion of project implementation, by which time the body of literature notes that ground cover has recovered, and any sediment production and erosion has typically stabilized. Since the project is anticipated to be implemented for at least the next 10 years across the Nebraska, the analysis period was carried to 15 years (projected project time span plus 5 years post-treatment). For the purposes of the soil and water resource analyses, temporary effects are those lasting less than one year; short-term effects are those lasting 1 to 5 years; and long-term effects are those persisting for more than 5 years. More specific information about chemical interactions within soils or water, persistence, and fate or transport may be found in the individual Syracuse Environmental Research Associates worksheets or Environmental Protection Agency labels.

Erosion modeling was performed using the Forest Service Watershed Erosion Prediction Project (WEPP), disturbance model (Elliot et al 2010a) to determine if the modified proposed action's prescribed fire activities would increase upland runoff, erosion, and sediment transport and deposition into streams and water bodies downslope and downstream of potential treatments. The other proposed control methods (biological control, chemical control, mechanical control) were not modelled because they do not significantly disturb soils or expose bare mineral soil across larger areas.

One-hundred-foot buffers were used during erosion modeling to model the lower overland flow element corresponding to the 100-foot Aquatic Management Zone (also referred to as the Water Influence Zone specified in Region 2 Watershed Conservation Practices) associated with all water features. Three-hundred-foot buffers were used to represent the upper overland flow element corresponding to upland hill slopes on either side of modeled streams based on topography. These buffers were used to determine representative hill slope percentages for the model's upland hill slope areas and valley bottom riparian habitats. Representative slopes of 5 to 25 percent were used to model the upper hill slopes based on each stream's drainage topography, with the gentler slopes associated with the rolling terrain of the grasslands, and the steeper slopes associated with the Nebraska's Pine Ridge Escarpment found on the Pine Ridge Ranger District (figure 7). Representative slopes of 0 to 5 percent were used to model the lower slope for all modeled streams. Model results would be reviewed during annual implementation meetings if projects affecting upland hill slopes are selected for implementation.

The surface soil texture selected for erosion modeling varied for each modeled stream and ranger district based on soil properties and textures in the Natural Resources Conservation Service soil surveys (Natural Resources Conservation Service, 2023). Although soils on the Bessey Ranger District (including the McKelvie National Forest) are true sands, and some areas across the South Dakota ranger district units are pure clays, the Forest Service Watershed Erosion Prediction Project model does not allow for sand and clay soils inputs. Instead, these were modeled as sandy loam and clay loam respectively.

Finally, projects associated with the modified proposed action would be reviewed during annual implementation meetings, as required by the checklists. The purpose of the project reviews would be to identify appropriate control methods and project design features, potential timing restrictions, and level of survey required. This information would then be incorporated into the necessary implementation checklist(s), as required by Appendix D. The annual implementation meetings and completion of the requisite checklists are expected to highlight any project concerns, ensure that concerns are addressed appropriately prior to project implementation, and ultimately minimize impacts to the soils, riparian, and aquatic resources.

Affected Environment

Soil Health

Soils on the Nebraska are relatively young and weakly developed, having formed from weathered underlying bedrock; alluvial, colluvial, or aeolian (wind) deposits; or various combinations of these materials. Geologic parent materials are primarily limestones, sandstones, and shales for the South Dakota and western Nebraska ranger districts. The Bessey Ranger District units are situated on sand dune deposits associated with the Nebraska Sandhills ecosystem. Soils are thin to absent on rock outcroppings; generally shallow on steep hills lopes; and relatively deep on the gentler hill slopes and in alluvial valley bottoms.

Most soils developed under grassland communities, while some soils on portions of the Pine Ridge Ranger District and the Fall River Ranger District also developed under open ponderosa-pine forest conditions. Soils are generally classified as clay loams on the Fall River, Ft. Pierre, Wall, and forested portions of the Pine Ridge Ranger Districts, with some nearly pure clay soils in places; sandy loams on the Oglala National Grasslands portion of the Pine Ridge Ranger District; and pure sands on the Bessey Ranger District, including the Samuel R. McKelvie National Forest.

Riparian Health and Function

Numerous riparian areas are present throughout the Nebraska. The Fish and Wildlife Service's National Wetlands Inventory dataset indicates that riparian areas are associated with river and stream corridors; freshwater forested wetlands; and freshwater ponds and emergent wetlands. These wetlands typically include ponds created by humans and beavers, marshes, swamps, wet meadows, peatlands such as fens and bogs, and other wetland sub-types.

Peatland, bogs, and fens are considered unique riparian ecosystems because they are rare and irreplaceable due to the slow rate of peat accumulation that occurs over thousands of years. Three peatlands have been identified on the Pine Ridge Ranger District to date and include spring-fed wetlands at Hudson-Meng Bison Bonebed and two unnamed springs in the nearby area. Other peatlands likely exist on the Pine Ridge Ranger District and on the Nebraska Sandhills units on the Bessey Ranger District (including the Samuel R. McKelvie National Forest) based on research studies of Sandhill peatlands by the University of Nebraska-Lincoln. Forest Service personnel continue to perform groundwater dependent ecosystem field inventories, locating additional springs and groundwater-fed wetlands, as well as validating potential peat-forming wetlands identified by other sources each year. Peatlands on the Nebraska have not been extensively researched, so little is currently known regarding ages of the peatlands and peat accumulation rates.

Project design features and adherence to applicable Forest Service best management practices and Forest Service Region 2 Watershed Conservation Practices would ensure protection of riparian and wetland ecosystems. Soils, Riparian, and Aquatic design feature 4 requires a 100-foot Aquatic Management Zone buffers around all water features to prevent and control non-point source pollution (USDA Forest Service 2006 and 2012). Mechanical treatment, construction of fire line (by hand or equipment), operation of heavy equipment, or ignition of prescribed fire are generally not allowed within these buffers due to Forest Service best management practices and Forest Service Region 2 Watershed Conservation Practices requirements.

Surface and Ground Water Quality

The State of South Dakota, Department of Agriculture and Natural Resources, and the State of Nebraska, Department of Environment and Energy Water Quality Divisions have assessed water quality for streams, rivers, and other waterbodies across the two states (South Dakota Department of Agriculture and Natural Resources 2022; Nebraska Department of Environment and Energy 2020). The State of South Dakota has developed total maximum daily load plans for all the impaired waterbodies overlapped by the project, except for the Rapid Creek Reach 5. The State of Nebraska has developed total maximum daily load plans for all impaired waters overlapped by the project, except for the Middle Loup River and the Dismal River.

The Nebraska overlaps 15 impaired water bodies, 6 within South Dakota, and 9 within Nebraska. These waterbodies are listed as impaired due to arsenic, E. coli, pH (acid or base level), temperature, total dissolved solids, and specific conductance.

Forest Service Manual 2880 – Geologic Resources, Hazards, and Services (USDA Forest Service 2009) requires inclusion of measures to manage and protect ground water quality and quantity, as well as groundwater dependent ecosystems. Although springs and peatlands (fens and bogs) require additional protections to prevent any loss of these rare ecosystems from occurring, it would not be necessary to eliminate entire treatment units due to the presence of a spring or peatland. Rather, avoidance of spring and peatlands, and the associated areas contributing and sustaining their groundwater “plumbing system”, along with project design features and best management practices would be sufficient to preserve these fragile ecosystems.

Aquatic and Water Resources

The Nebraska contains over 11,200 stream and river miles that provide conditions suitable for riparian area, wetlands, and floodplains. Many streams are classified as intermittent streams meaning that they contain water for only part of the year, but for more than just after rainstorms or snowmelt. Approximately 600 miles of ephemerally flowing streams are present, conveying water only during or after a local rainstorm or heavy snowmelt. Perennial flowing streams total about 214 miles and contain water throughout the year, except for periods of severe drought. According to the National Hydrography Dataset, approximately 46 miles of canals and ditches are also present on the Nebraska.

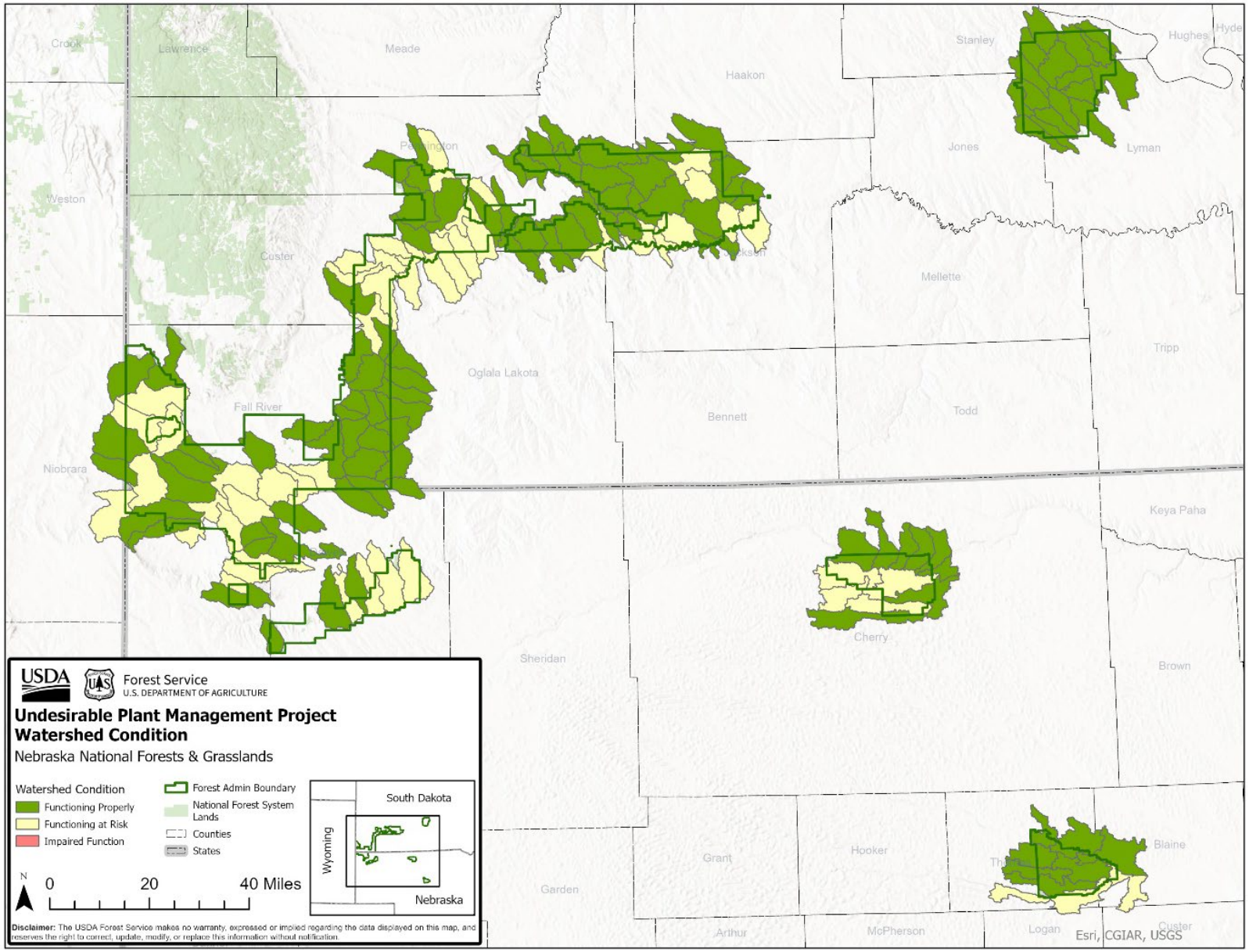


Figure 7. Watershed conditions on the Nebraska

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects to Soil

Natural disturbance events such as wildfire, drought, and erosion would continue to create disturbances that help undesirable plant species establish and spread. These events have the potential to introduce new undesirable plant species, facilitate those species' spread to new locations, or increase the size of existing infestations. Climate change is also likely to further stress native plant communities and perhaps create an ecological advantage for undesirable plant species, as most undesirable plant species flourish because they can cope with challenging growing conditions.

Increase in undesirable plant communities tends to result in more exposed bare soil, increased runoff, erosion, and sediment delivery to water features, and to have a negative impact to riparian and wetland vegetation. Without stable, intact riparian and wetland ecosystems, overall water availability and quality for human consumption and use can also be expected to be adversely affected.

Effects to soil and water resources are expected to be minimal based on direction contained in the decisions that authorize current management activities and the low number of acres generally treated under the no-action alternative (see table 4, no-action alternative).

Ground disturbing activities associated with removal of plant growth or soil disturbance treatment methods, have the potential to create areas of increased soil disturbance (compaction and rutting), soil displacement (erosion and topsoil mixing), and surface organic matter removal. These actions can reduce infiltration, increase runoff erosion, alter soil water holding capacity (depending on soil texture), change organic matter input into the soil, and restrict root growth needed for healthy, resilient vegetation. The temporary removal of vegetation cover can cause increased impacts by rain drop splash impact and concentrated water flow. This in turn can cause increased displacement of soil particles, erosion, and sediment transport into streams. Each of these changes affects soil functions which, in turn, affects soil productivity.

Continued use of biological agents to control undesirable plant species would have little to no effect on soils because no ground disturbance is involved. Insects or plant pathogens that are proven natural control agents of specific weed species would be released to selectively suppress, inhibit, or control herbaceous and woody vegetation.

The use of herbicide treatments to control undesirable plant species would not involve direct or intentional ground disturbance but would have the potential to alter the chemical properties of the soil. It is anticipated that soil disturbance would occur only through use of ground-based mechanical equipment and vehicles, as discussed below.

Watershed conditions across the Nebraska are shown above in figure 7. Herbicide applications to control competing vegetation do not disturb the topsoil layer, do not create additional bare soil, and do not adversely affect watershed condition when used responsibly (Neary and Michael 1996). By utilizing herbicides as opposed to mechanical methods, the soil organic matter is left in place, and off-site soil movement does not increase the loss of nutrients.

The effect of herbicide treatment on the soil depends on the chemical used, how it is applied, and the physical, chemical, and biological condition of the soil. In general, primary herbicide routes in soil are leaching, hydrolysis (chemical breakdown of a compound due to interaction with water), and adsorption onto soil particles, and biological degradation. Soil characteristics affect the length of time an herbicide is present through drainage and adsorptive capacities. Highly drained soils have greater propensity to transfer herbicides to groundwater stores. Organic rich soils and finer texture soils have higher adsorption potential for holding herbicides. Herbicides will vary in the degradation potential based on their chemical structure and the biologic potential of the soil.

The treatment of sites with herbicides could also indirectly affect site productivity in the short-term through changes in total organic production on site and annual organic input into the soil. Chemically treated plants would die and become incorporated into the soil as organic matter during the first years following treatment. Annual organic input in subsequent years would be limited by the number of non-target species interspersed between undesirable plants or the rate at which desirable vegetation returned to the site.

Direct and Indirect Effects to Riparian and Aquatic Resources

Removal of plant growth through mechanical methods such as mowing, cutting, or pulling, do not typically cause ground disturbance to the point of resulting in erosion and sediment delivery to water bodies. Forest Service best management practices and Forest Service Region 2 Watershed Conservation Practices require 100-foot buffers surrounding all water features and restrict the type and intensity of mechanized equipment operations within those buffers. Therefore, no adverse effects to water resources are expected to result from mechanical treatments under the no-action alternative.

The use of biological agents to control undesirable plant species has no direct or indirect effects on water resources because no ground disturbance is involved and no chemicals are used.

Since aquatic application of herbicides was not fully analyzed within current Nebraska undesirable plants management analysis, chemical control in riparian and aquatic ecosystems was not included under the no-action alternative.

Modified Proposed Action

Direct and Indirect Effects to Soil Resources

Biological Control

The use of biological agents to control undesirable plant species would have little to no effect on soils because no ground disturbance is involved. Insects or plant pathogens that are proven natural control agents of specific weed species would be released to selectively suppress, inhibit, or control herbaceous and woody vegetation.

When implemented properly targeted livestock grazing can have beneficial effects by reducing undesirable plant species in an area. Targeted livestock grazing can also contribute to undesirable plant establishment and spread through selective eating, redistribution of undesirable plant seeds in scat, fur, and hooves, and through soil disturbance. The same can be said for desirable native plant species. Vegetation 8 design feature would, however, control the season, location, and intensity of grazing to minimize susceptibility to compaction, erosion and or transport to waterbodies so that significant detrimental disturbance to soil and water resources does not result.

Chemical Control

Please see the discussion provided under the no-action alternative for soil resources.

The methodology in which chemical controls are applied would create minimal changes to the effects on soil health. The addition of aerial application for chemical controls may only increase the overall surface area of treatment, but if following label instructions and applied accurately the effects to soils would be the same as the no-action alternative. Other forms of aerial application using unmanned aerial vehicles would mimic application using other ground-based methods such as broadcast and spot spraying. Additionally, project design feature Soils, Riparian, and Aquatic 5 address the importance of the aerial application checklist to ensure proper consideration of these resources.

Mechanical Control

Please see the discussion provided under the no-action alternative for soil resources.

Prescribed Fire

The use of prescribed fire has the greatest potential to alter the physical, chemical, and biological properties of soils and adversely affect long-term soil productivity. Prescribed fire has the potential to create areas of high soil burn severity due to the length of time heat occurs in concentrated areas, causing short- and long-term loss of soil physical, biological, and chemical functions. A decrease in organic matter required for future soil nutrient stores needed to support healthy vegetation growth also occurs. The temporary removal of vegetation cover can cause increased impacts by rain drop splash and concentrated flow of water. This in turn can cause increased displacement of soil particles, erosion, and sediment transport into streams from increases in concentrated flow and runoff. However, project design features, including the need for annual implementation meetings to review specific components of each individual project, have been developed to ensure soil functions, and therefore soil quality, is maintained (see Appendix D: Implementation Checklists). An implementation checklist has also been developed to ensure that soil resources are addressed prior to selecting areas for prescribed fire and associated treatments. Therefore, effects to the soil resource from prescribed fire are expected to be minimal.

Direct and Indirect Effects to Riparian and Aquatic Resources

Biological Control

As noted in the soil analysis direct and indirect effects, domestic and wild grazing animals contribute to undesirable plant establishment and spread through selective eating, redistribution of undesirable plant seeds in scat, fur, hooves and soil disturbance, therefore creating conditions favorable for seed germination. Historical grazing, either by domestic or wild grazing animals, occurred over much of the project area, but recent livestock grazing activities are much more defined and concentrated on managed allotments. Livestock grazing is currently used in areas where other treatments cannot be applied, or are prohibitively expensive (such as, large infestations). It is often most effective as a control of undesirable plants when used in conjunction with other methods.

Grazing practices would be implemented on a site-specific basis where monitoring indicates a need. In general, wetland, riparian, and groundwater-dependent ecosystems are expected to remain in their current condition as grazing has been and will continue to be used on the landscape. Livestock grazing would cause removal and damage of riparian and wetland vegetation; alteration of stream and wetland substrates and soils; alteration of pool to riffle ratios and widening of stream channels; and continue to affect water quality. The risk and level of impact to water resources from livestock grazing would vary across the project area and would be most severe in areas that are heavily used, provide easy access to livestock, or are very susceptible to disturbance. However, these impacts would either be avoided or minimized through use of project design criteria (Appendix E: Project Design Features) and adaptive management practices; thus, overall impacts from the use of livestock grazing as a biological control method are expected to be minimal.

A livestock grazing strategy that incorporates timing, intensity, and duration as well as meeting forest plan standards and guidelines would minimize the risk of increased fine sediment, streambank alteration, over utilization of riparian vegetation, or altering plant communities. This would also provide for the protection and maintenance of upland and riparian areas.

Please see the discussion provided under riparian and aquatic resources no-action alternative for further analysis of host specific insects as biological controls.

Chemical Treatments

The modified proposed action has a very low potential to influence stream flow and channel morphology due to the small portion of any watershed that would be treated. Treating undesirable plants would improve riparian stability where these species have colonized along stream channels and outcompeted native species. All undesirable plant treatments carry some risk that removing plants could exacerbate stream instability, however best management practices tell us to implement streambank stabilization and erosion control measures to mitigate this until natural vegetation has re-established.

The use of chemical treatments to control undesirable plants has the potential to alter the chemical properties of water features and impact overall water quality. The routes for herbicide to contaminate water include direct application, drift into streams from spraying, runoff from a large rainstorm soon after application, and leaching through soil into shallow ground water or into a stream. Spot spray treatments are far less likely to deliver herbicide to water than broadcast or aerial treatments because the herbicide is applied to targeted plants or locations which minimizes drift, runoff, and leaching. See table 6 for current (2023) approved active chemical ingredients and purpose of ingredient for those chemicals approved by the U.S. Environmental Protection Agency as an aquatic-use herbicide. Project design feature Soil, Riparian, and Aquatic 1 directs applicators to apply herbicides using selective treatments and methods that minimize risk of entry to surface and ground water.

Herbicides affect lakes and wetlands differently than flowing bodies of water such as streams and rivers. Dilution by flow or tributary inflow is generally less effective in lakes. Decreases in herbicide concentration in lakes, ponds, and other lentic water bodies are a function of chemical and biological degradation processes or preferential adsorption of the herbicide into the lake sediments rather than from dilution. The primary pathways for herbicide to enter lakes would be from drift or runoff from land application, or directly as in the case of in-water chemicals to control undesirable aquatic plant species. To assist in protection of these resources project design feature Soil, Riparian, and Aquatic 4 was developed that includes a 100-foot buffer of all water sources unless the formulations are approved for aquatic application (see table 6).

Through application of applicable project design features and adherence to Forest Service best management practices, Forest Service Region 2 Watershed Conservation Practices, and forest plan standards and guidelines, the effects described above are expected to be minimal. Implementation checklists, which are mandatory for aerial application of herbicide, would further ensure that water resources are protected and addressed prior to selecting areas for treatment.

Mechanical Treatments

Please see the discussion provided under the no-action alternative for riparian and aquatic resources.

Prescribed Fire

Prescribed fire scenarios were modeled using the Forest Service Watershed Erosion Prediction Project (WEPP), Disturbed model (Elliot et al 2010a). The results indicate that there would be no significant increase in potential for upland runoff, erosion, and sediment delivery to downslope and downstream water features above existing un-burned conditions. None of the model scenarios resulted in significant runoff, erosion, of sediment delivery above natural background levels from typical precipitation events. Based on the modeling results, it is assumed that erosion rates would be negligible from prescribed fire and impacts to water quantity and quality would not approach a threshold of significance. Detailed erosion modeling inputs and results for each representative water body and management scenario are contained in the Water Resources Supplemental Information Forest Service WEPP modeling document in the project file.

Riparian and wetland vegetation would be protected during project implementation and would continue to provide shading to water features. There may be some riparian or wetland buffers where riparian prescribed fire treatment is desired to manage undesirable plant species to improve or maintain ecological functions. Watershed personnel would consult with prescribed fire planners to identify riparian and wetland areas that are desirable for prescribed fire treatments. Direct ignitions would not occur within the buffer zones and fire tactics would be used to result in low fire intensity during the burn and minimize soil heating and damage to riparian and wetland vegetation species.

Cumulative Effects

Cumulative effects of the modified proposed action on soil, riparian and aquatic resources are expected to be negligible. Project design features, Forest Service best management practices, and Forest Service Region 2 Watershed Conservation Practices are expected to prevent or minimize any potential short- or long-term adverse effects to protect soil and water resources and overall watershed functions. Restoring or maintaining soil functions and productivity and vegetation characteristics also ensures that key components of watershed function are intact and resilient to assimilate both natural and human disturbances. Where proposed treatments are implemented to restore riparian and wetland ecosystems, activities would maintain adequate physical, biological, and chemical properties so that these ecosystems remain resilient.

Events such as severe wildfire, drought, and erosion would continue to create disturbances that help undesirable plant species establish and spread. Climate change is also likely to stress native plant communities and perhaps create an ecological advantage for undesirable plant species. Most undesirable plant species flourish because they can cope with challenging growing conditions. This in turn tends to result in more exposed bare soil, increased runoff, erosion, and sediment delivery to riparian or aquatic features, creating a negative impact to vegetation. Without stable, intact riparian and aquatic ecosystems, overall water availability and quality for human consumption and use can also be expected to be adversely affected.

Human Health and Safety

Issue 4: Treating undesirable plants with herbicide could be toxic or harmful to people due to drift, residue, or direct application.

Methodology

The indicators for assessing effects to this issue are allowable worker exposure limits and allowable public exposure limits. For this analysis, the human health and safety risks from the use of herbicides are based on Human Health and Ecological Risk Assessments (risk assessments) conducted by Syracuse Environmental Research Associates and on the U.S. Environmental Protection Agency's risk assessments for herbicides. Risk assessment methodology is well documented and generally accepted by the scientific community. The Syracuse Environmental Research Associates risk assessments are incorporated into this analysis by reference and can be found at http://www.fs.fed.us/foresthealth/pesticide/risk.shtml or in the project file.

For each risk assessment, researchers analyze a set of general exposure scenarios based on the low, typical, and maximum label rates of the herbicides. For workers, exposure analyses are based on application method, application rate, and acres treated. For the public, general exposure scenarios include encountering sprayed vegetation and consumption of contaminated fruit, fish, or water.

A limitation of the risk assessments is the method used to estimate exposure from aerial spraying. The Syracuse Environmental Research Associates exposure estimates for aerial application are higher than those found in field conditions because of the calculations used. Other approved aerial application methods, such as unmanned aerial vehicles, may also be used to aerially apply herbicides. Methods such as these are not included in the modeling but are considered as an aerial application tool. For the purposes of this analysis, we assume the risk to herbicide mixers, loaders, and pilots is the same for all types of aircraft. The operator of the aircraft is not exposed because the spraying apparatus is mounted on a boom attached below the enclosed cockpit. The same consideration of no exposure to the operator would be interpreted for the use of unmanned aerial vehicles.

All herbicide applicators must follow the label directions for application rate and usage. The herbicide label is the primary communication for safe handling and use of the product. The label reflects the numerous scientific studies and regulatory reviews generated by the U.S. Environmental Protection Agency registration process, which provides reasonable assurance that the potential benefits of use outweigh any potential risks, and that when used according to label directions, the herbicide will not cause unreasonably adverse effects on humans, fish, and wildlife, or on the environment. The law requires herbicide users to read and follow label specifications. The Federal Insecticide, Fungicide, and Rodenticide Act, as currently amended, allows use of an herbicide at rates up to those approved on the label.

In addition to following label directions, the Forest Service requires an additional level of risk assessment. The inherent hazard (toxicity) of the herbicide, an estimate of exposure, and the response of the individual organism under consideration to that exposure (dose response) are modeled to generate an estimate of risk (that is, the hazard quotient) for each scenario. The herbicides in this analysis are evaluated based on the hazard quotient, which is the ratio between the estimated dose (the amount of herbicide received from a particular exposure scenario) and the reference dose. When a predicted dose is less than the reference dose, and the hazard quotient (estimated dose/reference dose) is less than 1.0, which is below the level of concern, then significant toxic effects are unlikely for that specific herbicide application.

Potential techniques for minimizing human exposures to herbicides include selecting herbicides with low toxicity and using them at the lowest effective application rate to achieve the project's objective; using application methods that minimize off-target movement and nontarget exposures; for streams, using buffer areas for herbicides not classified for aquatic use; providing personal protective equipment for applicators; and posting signs at treated areas to inform the public. The previous minimization efforts are addressed within design features developed for the implementation of this project. Under both alternatives, treatments would be accomplished according to strict safety and health standards as required by the U.S. Environmental Protection Agency pesticide regulations, which are rendered on herbicide labels through the instructions for appropriate use.

Herbicides can move through the atmosphere via spray drift, which occurs during herbicide application, and by volatilization, which occurs after application. Volatility depends on the physical properties of the herbicide, primarily vapor pressure, while spray drift depends on the sprayer parameters, such as nozzle orifice size, boom height and pressure, and wind speed (Hanson; Branham 1987).

Spray drift cannot be eliminated; however, with proper management, drift levels can be minimized to levels that do not cause harm (Felsot 2001). For aerial applications, liquid formulations of are applied using specially designed spray nozzles and booms designed to reduce turbulence and maintain large droplet size to reduce drift. Applications may only be performed under favorable weather conditions, which include low wind speeds and not during temperature inversions. Label instructions include recommended spray nozzle configurations, boom lengths to reduce turbulence and maintain droplet size, drift control systems, or drift control additives to reduce the chances of non-target applications.

Affected Environment

For human health and safety, the description of the affected environment is restricted to herbicide use. No attempt was made to list all possible environmental factors or outdoor activities that could affect human health and safety of individuals or groups that might be using the Nebraska.

The Undesirable Plant Management Project encompasses the entirety of the Nebraska National Forests and Grasslands. Consideration of all ranger districts, allotments, pastures, or lands managed by the Nebraska within these boundaries is reflected within this analysis. Again, only the effects of the resource concern for the use of chemical control (herbicides) and their effects on human health and safety is being analyzed.

To date, the Nebraska has inventoried approximately 148,100 acres of known undesirable plant species located across approximately 1.1 million acres. The Nebraska, in conjunction with county governments, grazing associations, and others has been treating undesirable plants on or near the Nebraska for decades. Treatment methods have gradually developed over the years to embrace the current integrated treatment approach which includes controls such as chemicals, biological agents, mechanical methods, targeted grazing with livestock, and prescribed fire. Over the last five years the Nebraska has been treating between 3,400 and 13,200 acres annually using specifically ground based herbicide application (table 4).

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

The direct and indirect effects of the no-action alternative on human health and safety are likely to mimic those of the modified proposed action, as described below, with one exception -- only the methodology of ground-based applications would remain under the no-action alternative. Application of herbicides approved in previous National Environmental Policy Act decisions would continue by following label instructions, safety requirements, and regulations set forth by the U.S. Environmental Protection Agency and Forest Service. Direct and indirect effects on human health and safety would not change from existing methods of application and current chemicals used to control undesirable plant species.

Changes in formulation and use of new chemicals and application methods would be limited due to the ability to only use previously approved chemicals. Previous analysis under the 1993 Environmental Analysis for Management of Undesirable Plant Species included what limited information on human health risks that was available at that time (USDA Forest Service 1993; Appendix VIII). More recent information with detailed studies for approval of herbicides and their adjuvants have been completed for approval of use by the U.S. Environmental Protection Agency (see existing conditions). This information would not be included in further analysis under the no-action alternative, and information from the year 1993 would be the guiding standard for application of chemical controls.

The no-action alternative would not include aerial application; therefore, no consideration of its effects on human health and safety were analyzed. This method of chemical control would not be reviewed for implementation in future undesirable plant species management.

Additionally, the use of aquatic herbicides to treat undesirable plant species was limited in the 1993 analysis. Mitigation measures included the statement, "Only herbicides registered for aquatic use may be used in riparian and wetland areas." This statement still holds true today and would be carried forward in this alternative as well as all others. Chemical exposure to workers and public risks to human health and safety would be considered similarly pre- and post-application.

Modified Proposed Action

Direct and Indirect Effects

Past and present U.S. Environmental Protection Agency requirements include toxicity tests for pesticide registration comprising acute (short-term) or chronic (longer-term) exposures. Herbicides are subjected to long-term animal studies that test for effects and compliance with federal safety standards for human health. Toxicity classifications, ranging from high to very low, have been assigned to five U.S. Environmental Protection Agency toxicity categories. Toxicity category 1 characterizes a high toxicity classification while toxicity category 5 characterizes a very low toxicity classification.

During the herbicide registration process, the U.S. Environmental Protection Agency evaluates carcinogenicity, teratology (birth defects), endocrine-system disruption, and mutagenicity studies of herbicide effects to animals. The study data is used to make inferences relative to human health. Table 17 displays the categories under human hazards based on acute toxicity for herbicides assessed in this analysis, while table 18 displays human hazards based on chronic toxicity for assessed herbicides. Acute toxicity is a function of the amount of toxicant received, the route of administration, and the type of animal tested. Acute reactions tested include oral, dermal, and inhalation toxicity, along with eye and dermal irritation. Data is from the respective Syracuse Environmental Research Associates reports and National Pesticide Information Center (2003).

Table 17. Human hazards based on acute toxicity categories for assessed herbicides

Herbicide	Acute oral toxicity	Acute dermal toxicity	Acute inhalation toxicity	Primary eye irritation	Primary skin irritation
2,4-D amine	Moderate	Moderate	Low	High	Very low
Aminocyclopyr-achlor	Very low	Very low	Very low	Low	Very low
Aminopyralid	Very low	Very low	Very low	Very low	Very low
Chlorsulfuron	Very low	Low	Low	Low	Very low
Clopyralid	Low_1	Low	Low	Moderate	Very low
Dicamba	Low	Low	Very low	Moderate	Moderate
Glyphosate	Low	Low	Low	Low	Very low

Herbicide	Acute oral toxicity	Acute dermal toxicity	Acute inhalation toxicity	Primary eye irritation	Primary skin irritation
Endothall	Low	Low	Low	Moderate	Very low
Flumioxazin	Very low	Low	Moderate	Low	Very low
Fluridone	Low	Low	Very low	Low	Very low
Fluroxypyr	Moderate	Very low	Moderate	Low	Very low
Imazamox	Very low	Very low	Very low	Moderate/very low[2]	Very low
Imazapic	Very low	Very low	Low	Low	Very low
Imazapyr	Very low	Very low	Low	Low	Very low
Indaziflam	Low	Low	Low	Very low	Very low
Metsulfuron methyl	Very low	Low	Moderate	Low	Low
Oxyfluorfen	Very low	Very low	Very low	Very low	Very low
Picloram	Low	Low	High/moderate	Low	Very low
Sulfometuron methyl	Very low	Very low	Low	Low	Low
Tebuthiuron	Moderate/low	Very low	Low	Very low	Very low
Triclopyr	Low	Low	Low	High	Low

1. Low for technical grade, which is not used by the Forest Service; very low for formulation used by the Forest Service.
2. Moderate for technical grade; very low for formulation used by the Forest Service.

Table 18. Human hazards based on chronic toxicity categories for assessed herbicides

Herbicide	Carcinogen	Teratogen*	Reproductive*	Mutagen*	Endocrine disruptor*
2,4-D amine	Not classifiable	Unlikely	Unlikely	Unlikely	Little or no impact
Aminocyclopyr-achlor	Not likely to be carcinogenic	No effects	No effects	No effects	No evidence
Aminopyralid	Not likely to be carcinogenic	No effects	No effects	No effects	No evidence
Chlorsulfuron	Evidence of noncarcinogenicity	No effects	No evidence	No effects	No evidence
Clopyralid	Evidence of noncarcinogenicity	No effects	No effects	No effects	No evidence
Dicamba	Not classifiable	Unlikely	No effects	No effects	No information
Endotholl	Not likely to be carcinogenic	Unlikely	No effects	No effects	No evidence
Flumioxazin	No evidence of carcinogenicity	No effects	Unlikely	No effects	No evidence
Fluridone	No evidence of carcinogenicity	Unlikely	Unlikely	No effects	No evidence
Fluroxypyr	Not likely to be carcinogenic	No evidence	Unlikely	No effects	No evidence
Glyphosate	Evidence of noncarcinogenicity	Unlikely	Unlikely	No effects	Unlikely
Imazamox	Not likely to be carcinogenic	No effects	No effects	No effects	No effects

Herbicide	Carcinogen	Teratogen*	Reproductive*	Mutagen*	Endocrine disruptor*
Imazapic	Evidence of noncarcinogenenicity	No effects	No effects	No effects	Unknown
Imazapyr	Evidence of noncarcinogenicity	No effects	No effects	No effects	No evidence
Indaziflam	Not likely to be carcinogenic	No evidence	Unlikely	No effects	No evidence
Metsulfuron methyl	Not likely to be carcinogenic	No effects	No effects	No effects	No evidence
Oxyfluorfen	Possible	No evidence	No evidence	No effects	No evidence
Picloram	Evidence of noncarcinogenicity	No effects	No effects	No effects	No effects
Sulfometuron methyl	No evidence of carcinogenic activity	Unlikely	Unlikely	No effects	No evidence
Tebuthiuron	Not classifiable	No effects	No effects	No effects	No evidence
Triclopyr TEA	Not classifiable	No effects	No effects	No effects	No evidence

*** Not classifiable** = Inadequate evidence of carcinogenicity or for which no data are available; **Unlikely** = Inconsistent or isolated effects have been shown in laboratory tests; not considered a hazard to humans at expected exposure levels; **Unknown** = Laboratory tests are inconclusive or further testing is required; **No effects** = No effects have been shown in laboratory tests; not considered a hazard to humans.

The adaptive management strategies available under the modified proposed action would result in fewer risks to human health than under the no-action alternative. New technology and herbicides are likely to be developed within the life of this project. Under this alternative these new methods and chemicals could be considered if they are more species-specific than what is currently used (no-action), less toxic to non-target vegetation, capable of reducing human health risks, less persistent and less mobile in the soil, or more effective.

Allowable Worker Exposure Limits

Under the modified proposed action, aerial spraying would be used to treat undesirable plant species. Limitations, regulations, and project design features found within an aerial application checklist would assist in guiding the use of this method. In the future, aerial spraying may be used to treat undesirable plant species with more effective herbicides that pose less risk to health and safety. Aerial application would also pose less risk to workers than under the no-action alternative because it offers the option of aerial spraying which reduces exposure to the herbicide. The person who mixes and loads the herbicide has less contact time and the pilot who applies it is protected by the enclosed cockpit of the aircraft. The use of unmanned aerial vehicles for application would also provide a protective distance for the operator to avoid the risk of exposure to chemicals.

Because aerial herbicide application is more efficient than ground-based application, backpack or vehicle spraying, for control of difficult to access terrain or broad areas of infestation, the modified proposed action could reduce the number of treatments and thus the likelihood of exposure to workers over the long-term. Aerial application with a manned aircraft can treat hundreds, potentially thousands based on equipment, of acres per day. Unmanned aerial application, depending on equipment size used, can also treat hundreds of acres per day. A person can hand treat about 2 acres per day under optimal conditions. At this application rate, multiple treatments would be necessary.

Worker exposure to herbicides is affected by the application rate of the herbicide, the number of hours per day the herbicide is applied, the number of acres treated per hour, hygiene used, and personal protective equipment worn. During broadcast and spot treatments, workers can encounter herbicides primarily

through exposed skin, but also through the mouth, nose, and lungs. Minimization of worker exposure by following safe work practices, label instructions, and advisories is the best method to reduce any negative effects to health.

Allowable Public Exposure Limits

The aerial spraying option under the modified proposed action could expose the public to drift from spraying; however, this potential exposure would be reduced by following the herbicide label instructions. Herbicide labels describe conditions in which spraying, ground or aerial, should not be done to protect all resources, including humans.

Public exposure scenarios assume that a person has contact with the herbicide from direct spray, skin contact with sprayed vegetation, or from consumption of such things as contaminated fruit, water or fish. The public, and worker, exposure scenarios evaluated in the Forest Service risk assessments are purposefully extreme. Such scenarios as a child or woman of child-bearing age being directly sprayed during chemical application is highly unlikely, but to ensure safe use of products the extreme must be considered. It is assumed that there is some edible forest product collection within the Nebraska but that it is not extensive. People who harvest and consume edible forest products may be exposed through directly handling contaminated plant material, then chewing or eating it. Such doses are unlikely to exceed a threshold of concern unless consumed directly after application. This would be considered another scenario that is highly unlikely with required notice of application if chemical use occurred in high visitor use areas or known edible forest product locations.

Aquatic risks for application or spills are considered in Forest Service risk assessments. Two hypothetical drinking water exposures could include (1) a stream, contaminated with herbicide residues by runoff or leaching from an adjacent herbicide application; or (2) a pond, into which a large amount of herbicide solution is spilled or improper application of aquatic herbicide occurred. In these two instances the only herbicide scenarios of concern would involve a child drinking from the pond contaminated by a spill of a large tank of herbicide solution. The risk of a major accidental spill is not linked in a cause-and-effect relationship to how much treatment of undesirable plants is projected for a particular herbicide; a spill is a random event. A spill could happen whenever a vehicle carrying herbicide passes a body of water. The potential risk of human health effects from large herbicide spills into drinking water are mitigated by safety protocols and instructions when hauling, storing, or using chemicals. Pesticide spill prevention and clean-up, as well as storage, transport, and disposal procedures are covered in detail in Forest Service Handbook 2109.14, chapter 60, Pesticide Storage, Transportation, Spills, and Disposal. Any herbicide projects would follow the direction given in this handbook (USDA Forest Service 2016).

Cumulative Effects

The Syracuse Environmental Research Associates risk assessments identified connected actions and cumulative effects for each of the herbicides reviewed in these risk assessments. Connected actions include actions or the use of other chemicals that are both necessary and in close association with the use of the analyzed herbicide. Cumulative effects are analyzed within the context of the Food Quality Protection Act of 1996, which requires the assessment of chemicals with similar modes of action. It is beyond the scope of the analysis to identify and consider all agents that might interact with, or cause cumulative effects in conjunction with, each analyzed herbicide.

To analyze cumulative effects, public information from the State of Nebraska and South Dakota regarding pesticide use, tracking which herbicides are used, or in what quantity, on private land adjacent to or near National Forest System lands was researched. This data is not readily available; however, county weed and pest board partners do track that information for their activities, to varying degrees. The county weed and pest boards treat private, State, and County managed lands. County weed and pest board partners are licensed pesticide applicators; therefore, herbicides have been applied in compliance with label directions. In addition, adjacent National Park Service, Bureau of Land Management, Tribal, and State property owners and managers treat undesirable plants adjacent to the project area. These undesirable plant treatment programs are very similar to the modified proposed action.

The extent of herbicide applications for undesirable plant management on lands adjacent to or near the Nebraska cannot be quantified in all instances; only some of these activities are known to the Nebraska, and no reporting to State or other government agencies is required. Because other private and governmental undesirable plant management entities do not collect usage data to the extent that the Nebraska may (nor in the same manner), comparison can, in some instances, be difficult. Moreover, the State of Nebraska and South Dakota do not require private applicators to collect application data to the same degree as commercial or professional applicators.

Additionally, management of these areas may change over the 15-year timeframe of this project. County and State road rights-of-way are treated with herbicides. The Bureau of Land Management, Nebraska Game and Parks, South Dakota Game, Fish, and Parks, both states Departments of Transportation, and all project area Counties engage in undesirable plant control measures, as do many private landowners, particularly ranchers and other agricultural producers. It is expected that undesirable plant control efforts, including aerial and ground applications of herbicides, will continue State owned, privately owned, and public lands surrounding the Nebraska.

The total land mass of the 12 counties in the project area is 14,761,353 acres. Private land comprises 11,693,872 acres, or 79 percent, of the counties (table 19). Even without knowing how much herbicide is applied to private land, the proportion of private land in relation to the 12 countywide area is high. In addition, the applications of these herbicides are spatially distinct.

Table 19. Project area ownership (in acres) by county

County and State	Private	State	Bureau of Land Mgmt.	Forest Service	Other Federal	Tribal	Other	Total acres
Thomas County, NE	376,783	0	254	79,721	0	0	0	456,758
Dawes County, NE	811,682	22,936	79	60,468	1,518	0	0	896,683
Cherry County, NE	3,605,527	18,480	388	115,843	105,799	0	0	3,846,037
Blaine County, NE	445,752	675	194	10,553	0	0	0	457,174
Sioux County, NE	1,207,739	26,092	1,756	84,472	3,045	0	0	1,323,104
Stanley County, SD	816,143	27,268	15,745	35,374	70,021	35,791	645	970,987
Pennington County, SD	1,034,926	27,745	16,327	199,986	502,958	2	0	1,781,944
Fall River County, SD	832,422	39,454	7,226	229,886	10,430	11	0	1,119,429
Jackson County, SD	390,900	4,261	235	106,127	14,070	682,031	0	1,197,624
Lyman County, SD	750,676	21,754	0	60,470	39,891	219,616	0	1,092,407
Custer County, SD	824,588	82,676	3,677	50,918	35,975	2	0	997,836
Jones County, SD	596,734	4,724	0	19,913	0	0	0	621,371

Climate Change and Greenhouse Gas

Methodology

Climate change is analyzed in this document based on the interim guidance from the Council on Environmental Quality published January 9, 2023, with the understanding that this guidance may be updated in the future. The interim guidance recommends that agencies address climate change by considering the following: (1) agencies leverage early planning processes to integrate greenhouse gas emissions and climate change considerations into the identification of proposed actions, reasonable alternatives (as well as the no-action alternative), and potential mitigation and resilience measures; (2) agencies use projected greenhouse gas emissions associated with proposed actions and their reasonable alternatives to help assess potential climate change effects; (3) agencies provide additional context for greenhouse gas emissions, including through the use of the best available social cost of greenhouse gas estimates, to translate climate impacts into the more accessible metric of dollars, allow decision makers and the public to make comparisons, help evaluate the significance of an action's climate change effects, and better understand the tradeoffs associated with an action and its alternatives; (4) discussing methods to appropriately analyze reasonably foreseeable direct, indirect, and cumulative greenhouse gas emissions; (5) guiding agencies in considering reasonable alternatives and mitigation measures, as well as addressing short- and long-term climate change effects; (6) advising agencies to use the best available information and science when assessing the potential future state of the affected environment in environmental analyses and providing up to date examples of existing sources of scientific information; (7) agencies use the information developed during the National Environmental Policy Act review to consider reasonable alternatives that would make the actions and affected communities more resilient to the effects of a changing climate; (8) outlining unique considerations for agencies analyzing biogenic carbon dioxide sources and carbon stocks associated with land and resource management actions under the National Environmental Policy Act; (9) advising agencies that the ''rule of reason'' inherent in NEPA and the Council on Environmental Quality Regulations should guide agencies in determining, based on their expertise and experience, how to consider an environmental effect and prepare an analysis based on the available information; and (10) reminding agencies to incorporate environmental justice considerations into their analyses of climate-related effects, consistent with Executive Orders 12898 and 14008 (Council on Environmental Quality 2023).

The Forest Service continues to determine how best to meet the above considerations recommended by the Council on Environmental Quality. The Forest Service is developing further guidance and additional staffing is being sought to fill these needs. At the time of this analysis, the tools and internal guidance is not available to achieve all recommended evaluations of the overall effects of the proposed actions on climate change and specifically greenhouse gas emissions. The following is the use of best available scientific information at the time of this analysis to meet the interim guidance put out by the Council on Environmental Quality.

A comprehensive literature review of current scientific research was completed. There is an abundance of research and reviews in the recent effort to understand and engage the effects of climate change and its relation to greenhouse gas emissions. The Nebraska, in cooperation with the Forest Service Office of Sustainability and Climate, has been developing a Forest and Grassland Carbon Assessment Whitepaper specific to the project area. The following relies heavily on the information gathered in this assessment that can be found in the Project Folder.

Affected Environment

Climate change and greenhouse gas emissions are an ever evolving and changing topic. On the Nebraska, the primary vegetation management actions are, and would continue to be, focused on protecting, maintaining, or restoring the lands to desirable native vegetation. Current guidance for this management limits the tools for which these actions can be carried out, essentially limiting the ability to adapt to vegetation changes that may be brought on by climate change. Limiting management actions to what currently exists also limits the Nebraska from evolving to meet the need to address the increase in greenhouse gasses in the atmosphere and adapting to a changing environment due to climate change.

The focus on climate change and greenhouse gas management on the Nebraska is a topic of discussion and concern but has not directly shifted the way best available science tells us to manage undesirable plant species. Current management practices, although not directly focused on climate change and greenhouse gas emissions, are inadvertently a positive contributor in helping to reduce negative effects.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

The no-action alternative is not expected to result in noticeable impacts to greenhouse gas emissions above current conditions because it does not allow for prescribed fire or aerial application of herbicide.

Modified Proposed Action

Direct and Indirect Effects

Biological Control

Biological control such as targeted grazing and the release of species-specific insects, is expected to have beneficial effects to climate change by replacing undesirable species with native vegetation. Native vegetation is known to absorb more carbon from the atmosphere than it releases (Ontl 2017). Biological controls such as insects would tend to leave limited greenhouse gas emission footprints. Forage quality for livestock plays an important role in digestibility. This subsequently effects greenhouse gas emissions, such as methane, produced from livestock. Increased forage quality with the management of undesirable species has been shown to reduce the overall greenhouse gas emissions from livestock by approximately 5 percent (Grossi et al. 2019). The Nebraska manages livestock grazing as a tool to increase native plant diversity and not for economic production. This should limit the overall concentrated numbers of livestock, ultimately limiting the overall negative effects to greenhouse gas emissions and climate change factors. For more information on livestock management on the Nebraska see the Livestock Grazing section below.

Chemical Control

Chemical control effects would be like those described under biological control. With the expected changes to species composition due to climate change throughout the Nebraska, the use of chemical application, along with all other listed methods, would be expected to increase. Increases in use of all methods would depend on many variables. This increase may raise the level of greenhouse gas emissions due to higher use of chemical controls to manage undesirable plant species. At this time, it is unknown what the tradeoff of restoring native vegetation, that is scientifically proven to increase carbon sequestration, and the increase in greenhouse gas emissions due to increased chemical control would contribute to climate change. Scientific information varies on the direct effect of chemical control for vegetation management on greenhouse gas emissions and climate change. One would expect future analysis of specific chemicals through the agencies that manage their commercial and private uses.

Mechanical Control

Mechanical control such as cutting, mowing, or haying, would predominately remove the aboveground biomass. With the consideration that grasslands contain much of their carbon stocks belowground, loss of photosynthesizing plants would be short term and temporary in nature. Undesirable woody species that would be mechanically removal would still meet the definition of invasive, noxious, non-native, or undesirable native species under this project. However, it is unlikely that large, forested areas of undesirable species would be mechanically removed since much of the landscape is dominated by grasslands, native forested areas, or man-made forest plantations.

Prescribed Fire

Prescribed fire is expected to increase soil carbon by converting undesirable plant species to desirable native species, thereby increasing soil carbon, sequestration of greenhouse gases, and resiliency to climate change. Forest and grassland ecosystems evolved with frequent fire and grazing, both of which are often important for maintaining the desired species composition and ecosystem function. By attempting to mimic the evolution of natural wildfire across the landscape Nebraska resource specialists are able to manage the resources in more natural process. Air quality factors that relate to prescribed fire are discussed later in the document under the Clean Air Act compliance.

Although undesirable plant treatments using any of the control methods may cause harm to non-target plants, potential impacts to native vegetation, composition, and structure are more likely if undesirable plants are not treated through the proposed early detection, rapid assessment, and rapid response strategy associated with the modified proposed action. The implications on climate change and greenhouse gasses from not treating undesirable plant species would likely be more detrimental to climate change and greenhouse gasses found in the atmosphere.

Cumulative Effects

Given the complex interactions among forest and grassland ecosystem processes, disturbance regimes, climate, and nutrients, it is difficult to project how forests and grasslands carbon trends would respond to climate change conditions. No matter, the effects of future conditions on forest and grassland species diversity, growth patterns, and carbon dynamics are expected to change over time. As climate change persists for several decades, critical thresholds may be exceeded, causing unanticipated responses to some variables like increasing temperature and greenhouse gas concentrations. The effects of changing conditions would almost certainly vary by species and ecosystem type. Some factors may enhance vegetation growth and greenhouse gas sequestration, whereas others may hinder the ability of forests and grasslands to act as a carbon sink, potentially causing various influences to offset each other. Thus, it will be important for Nebraska resource specialists to continue to monitor forest and grassland responses to these changes and potentially use adaptive management to alter treatments, control methods, or responses to undesirable plant species expansion to better enable forests and grasslands to adapt.

Cultural Resources

Methodology

Data used for this analysis includes the Nebraska's cultural resource records, geographic information, and cultural resource overview. Records of cultural resource inventories date from the mid-1970s to present. The cultural resources inventories cover approximately 142,100 total acres of land across the five Nebraska ranger districts, representing approximately 13 percent of the land managed by the Nebraska.

The first two assumptions listed in the beginning of this chapter apply in the assessment of environmental effects of treating undesirable plants, as related to cultural resources. Additionally, design features such as the annual implementation meetings, implementation checklists, review of relevant previous National Environmental Policy Act decisions, requirement to have cultural resource specialist review, and the requirement to consider traditional plant gathering areas would identify cultural resources in the treatment areas and ensure that National Historic Preservation Act Section 106 compliance occurs. Heritage staff would review planned treatments and follow stipulations and protocols within applicable programmatic agreements. The implementation checklist includes a cultural resource section further ensuring that effects on heritage resources are considered.

The Section 106 Programmatic Agreements with South Dakota and Nebraska State Historic Preservation Offices each have various stipulations and appendices which set up inventory, consultation, and reporting protocols for many of the proposed treatment categories including biological, chemical, mechanical, and prescribed fire. Many of these treatments are routine in nature and have been in use prior to this analysis. Aerial and aquatic applications have not previously occurred. Section 106 reviewers within the South Dakota and Nebraska State Historic Preservation Offices agreed that aerial treatment would fall under previously existing stipulations within the Programmatic Agreements for weed treatments using non-motorized application or motorized when ground is dry or frozen (phone conversation between Heather Horobik and Jenna Carlson Dietmeier, April 20, 2023; phone conversation between Heather Horobik and John Swigart, May 3, 2023). Aquatic treatments may have similar effects to potential cultural resources as when located outside aquatic or riparian environments. The programmatic agreement with South Dakota contains a stipulation relating to activities aimed at controlling or eradicating aquatic invasive species.

Affected Environment

The Nebraska manages approximately 1.05 million acres of public land and is entrusted with the stewardship of many South Dakota and Nebraska's historical and cultural resources. A variety of cultural resource site types are present within the Nebraska and represent at least 10,000 years of human history (Prentiss and Rosenberg 1996: iv).

The land includes traditional homeland, hunting and gathering areas, and travel corridors of many indigenous tribes and their ancestors. Known Native American site types include lithic procurement areas, lithic production areas, camp sites, artifact scatters, bison kill/processing sites, cairns, and stone circles. Common artifacts and features include stone materials (Prentiss and Rosenberg 1996: 81-139). Hearths, ceramic, faunal remains, and post contact trade goods occur less frequently (Prentiss and Rosenberg 1996: 81-130). A single rock art location has been recorded (Prentiss and Rosenberg 1996: 89). These cultural materials and site types represent thousands of years of history and the connection of many indigenous peoples to the land.

Cultural resources are considered irreplaceable and nonrenewable. As such, these resources are managed for preservation due to their cultural value and special concern to the public. Many laws and regulations relate to the protection and management of these resources. The Nebraska Forest Plan includes standards and guidelines that take the cultural value and protection of these resources into account.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

Removal of plant growth or soil disturbance treatment methods could include techniques such as mowing, cutting, or pulling. Motorized equipment could run over surface artifacts or features which could smash, break or bend them. Mowing could also cause damage to above surface artifacts and features and could make some features, such as old homesteads, more visible to the public. Pulling could dislodge buried cultural materials from the ground. These treatment methods could also result in temporary loss of vegetation in some areas and increased erosion. These effects would be like those described under biological control.

Chemical control would include using ground-based motorized equipment to apply agency-approved herbicides. Motorized equipment could run over surface artifacts or features which could smash, break or bend them. However, this has minimal potential to affect historic properties. Chemicals themselves also have the potential to affect stone, concrete and brick masonry (Dewey 1999; Oshida 2011). Effects of herbicides on masonry include acid dissolution of calcareous stone, such as sandstone and limestone, the introduction of soluble salts, and the formation of insoluble salts causing the destruction of the microstructure, decreasing the cohesive strength and durability of the stone, changing the stone color (Dewey 1999: 84-86). Additionally, use of herbicides could temporarily decrease vegetation causing higher ground visibility thereby increasing the likelihood of some features and surface artifacts being noticed, moved, damaged, or taken by humans.

Modified Proposed Action

Direct and Indirect Effects

Biological Control

Targeted grazing could increase potential for trampling, including smashing, breaking, bending, and moving artifacts and features. Examples of this could be cattle rubbing against a wall or post or stepping on an arrowhead or historic bottle. Targeted grazing could also cause temporary loss of vegetation in some areas thereby increasing ground visibility and the potential for artifacts being noticed, moved, damaged, or taken by humans. Targeted grazing has the potential to increase erosion. Artifacts and buried features could be at higher risk for movement and damage if erosion were to occur.

Host specific insects as biological controls would have the same effects as those represented in the no-action alternative above.

Chemical Control

The effects of chemical control would be the same as those represented in the no-action alternative above. The addition of aerial application is not expected to change the direct or indirect effects to cultural resources as compared to ground based application.

Mechanical Control

The effects of mechanical control would be the same as those represented in the no-action alternative above.

Prescribed Fire

Prescribed fire would introduce high heat and flame to potential cultural resources. Fire could burn, melt, damage, and destroy artifacts and features. Often prescribed fires are of short duration with low to moderate level of fire severity. Organic artifacts and features made from wood or plant materials may burn and be destroyed. Glass and plastic artifacts could melt. Metal and stone artifacts and features are less likely to be damaged by low to moderate fire over short periods of time. Long duration with moderate to high level fire severity could potentially have more effect on all artifact and feature types including metal and stone. Intense high heat over long periods could also impact buried resources as the heat penetrates the ground. By controlling undesirable plants in locations of high fuel loading, with the potential to cause higher severity wildfires, an overall benefit exists to preserving cultural resources, known and unknown, within the affected area. Prescribed fires for vegetation management are typically planned during periods of low to moderate fire severity potential to meet objectives, but this does not eliminate the potential of effects to cultural resources. Prescribed fire could also result in temporary loss of vegetation in some areas could lead to increased ground visibility and erosion. Artifacts and buried features could be at higher risk for movement and damage if erosion were to occur. Decrease in vegetation would cause higher ground visibility which may make some features and surface artifacts more likely to be noticed, moved, damaged, or taken by humans.

Cumulative Effects

The cumulative effects would be the combined effects of the modified proposed action as well as the other actions related to the continued use and management of the public land. In general, the treatment of undesirable plants under the modified proposed action would overlap with past, current, and reasonably foreseeable future environmental events, grazing, transportation, recreation and other actions. The cumulative effects to cultural resources would vary by location and planned treatment. The cumulative effects of the modified proposed action would likely be temporary as the removed undesirable plants would be replaced with other vegetation over time. However, where various management actions overlap cultural resource locations, the potential for damage to cultural resources increases. This is due to the increase of people, machinery, and animals that are brought into proximity to resources. The increase of traffic, people, and animals could increase the potential for discovery, movement, and damage to cultural resources. Cumulative effects of the control types could lead to a temporary, higher chance of the exposure, movement, or loss of cultural resources in certain high impacted areas until vegetation regrows and stabilizes the soil and lowers the ground visibility. However, the analysis assumptions, design features, and the National Historic Preservation Act compliance process would ensure that effects to cultural resources are minimized and that effects and mitigations would be consulted on prior to implementation. As designed, the modified proposed action should have no significant impact to cultural resources.

Fire and Fuels

Methodology

A comprehensive literature review of current and accepted methodology using prescribed fire as an undesirable plant management tool was completed. The professional judgement of a Forest Service Zone Fire Management Officer with over 25 years of fire management experience was also incorporated in the analysis. Additionally, project design features and assumptions were reviewed to assist in making effects determinations for the effects of undesirable plant management on the fire and fuels resource. All undesirable plant treatment methods that include, but are not limited to, prescribed fire, mowing, haying, pile burning, cutting or other fuel removal methods will be hereafter known as fuel management. The focus of this analysis included these methods for fuels management as they relate to undesirable plant species management. The use of biological and chemical controls is not a standard method for fuels management on the Nebraska and therefore was not included in this analysis.

Affected Environment

The Nebraska encompasses a variety of different vegetation communities when considering fuels management. These communities include mixed grass prairies, forested areas predominately made up of ponderosa pine trees, river and stream bottoms consisting of mixed hardwoods and grassland ecosystems, and the handplanted mixed-species forests found in the historic plantations of the Bessey Ranger District and the Samuel R. McKelvie National Forest. All these vegetation communities present opportunities for the spread of different undesirable plant species and the use of multiple forms of fuels management for control. Variations of undesirable plants are present throughout the Nebraska that can affect fuels management and the control methods used to treat specific species. This could include examples such as Rocky Mountain juniper and eastern redcedar encroachment into grassland ecosystems, non-native cool season grass encroachment throughout the grasslands, or woody encroachment of Russian olive into riparian areas. The Nebraska consists of a variety of challenging landscapes and a diversity of ecosystems when planning for the use of fuels management techniques as a control method for undesirable plant species.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

Current fuels management techniques analyzed under the no-action alternative to treat undesirable plant species include mechanical controls such as mowing, haying, and cutting. Another example may include the mechanical cutting and piling of undesirable woody species for future pile burn measures. The action of vegetation pile burning would be required to be cleared under separate environmental analysis under the no-action alternative. Mechanical controls are a large part of fuels management and is conducted in various locations throughout the Nebraska to reduce the fuel loading and assist in meeting desired conditions. These areas may include high-use Forest Service roads, parking and camping areas, and along prescribed fire unit control lines. Effects to fuels management by the use of mechanical controls for undesirable plant species would be positive in nature. Many species that are considered undesirable on the Nebraska can be attributed to increase in fuel loading and wildfire dangers they may cause. Examples of this are discussed in the following Forestry analysis as they relate to undesirable tree species creating ladder fuels in forest environments. By mechanically removing these undesirable species the management for the desired conditions on the landscape can be better achieved and the risk of severe wildfire can be reduced.

As previously stated, the use of biological and chemical controls is not a standard practice for fuels management on the Nebraska. Chemical control is typically occurring post-fuels management and the effects would be covered under other analysis for this project. Affects to fuels management by controlling undesirable plant species using these two control methods would mimic other controls, creating positive effects by reducing fuel loading and creating wildfire resilient native ecosystems.

No effects from prescribed fire, as this technique is not included in the no-action alternative.

Modified Proposed Action

Direct and Indirect Effects

Biological, chemical, and mechanical control direct and indirect effects would match those described under the no-action alternative. Under this alternative Vegetation 3 design feature includes guidance that states, “where biocontrol agents have become successfully established, protect those sites from other forms of weed control to promote spread of the biocontrol agents and provide collection locations for release at other sites.” This design feature would regulate the use of fuels management in areas of known biological control implementation. This would primarily include the use of targeted insect released and not pertain to livestock grazing management.

Under the modified proposed action prescribed fire would be added as a control method for undesirable plant management. Fuel management by prescribed fire is used to reduce the existing material available to burn and create an environment to either encourage dominant native species regrowth, or an environment in which undesirable species are susceptible to post-fire treatments. Most often the primary objective of fuel management is to reduce the amount of fuel available to burn in case a wildfire would begin in or near the management area. Secondary objectives have been to traditionally reduce the number of undesirable plant species. During management of undesirable plant species all control methods would presumably create an initial reduction in available fuels in the treated area by reducing vegetation structure.

An example of an undesirable species prescribed fire objective would be to burn 50 percent of the available 3-foot-tall cedar trees or burn 80 percent of the available fuels in a burn unit and to reduce the flammability of the unit for up to 2 years. Management objectives for woody encroachment using fuel management techniques such as the previous example have been used successfully in the past on the Nebraska, but additional opportunities exist. Future use could help redirect areas throughout the Nebraska seeing the significant spread of undesirable woody species into grassland ecosystems. Only fire has the potential to manage the entire process of woody encroachment (Twidwell et al. 2021).

Prescribed fire implementation timing and use as a control method will be dictated by undesirable plant management priorities and objectives. As stated previously, the Nebraska has a wide variation in ecosystems to adapt management planning to in order to meet desired conditions and objectives. Prescribed fire variables between all of these ecosystems can differ dramatically. To adjust to these variables and meet objectives project specific burn plans will be developed by Forest Service Fire Program staff. Fire and Fuels 1 design feature states, “Any prescribed fire activity will require an approved prescribed burn plan.” A burn plan is a site-specific plan in which defined parameters are required to meet the resource objectives for specific hazardous fuels management or to restore the health of the targeted ecosystem. Just as with all other control methods, current design features, implementation checklists, implementation meetings, and resource coordination would be used to address concerns with prescribed fire as a control method.

An additional resource is considered while developing burn plans. Air quality is a key concept when incorporating smoke management into the planning stages. In support of the Clean Air Act, coordination may occur with regional air quality specialists and federal, State, Tribal, air pollution control district or county regulatory authorities to ensure compliance. All prescribed fire activities are conducted using smoke management guidance published by the National Wildfire Coordinating Group (2020). Smoke can adversely impact public health and welfare, public safety, regional haze, transportation corridors, commerce and tourism, day-to-day activities at nearby communities, and the health and safety to the public and fire personnel. Planning for and applying the appropriate smoke management practices can help minimize air pollution impacts from prescribed fires used to manage our natural resources. By applying the appropriate smoke management, the Forest Service can reduce the risk of causing smoke impacts to the public and environment and yet still achieve planned resource benefits from prescribed burning.

Additional fuels management activities and undesirable plant management control methods are formally guided by laws, rules, regulations, or Forest Service direction. Therefore, negative direct effects are anticipated to be negligible. Overall, positive indirect effects from the management of undesirable plants across the Nebraska could be presented in the form reducing hazardous fuel loading in areas of extreme encroachment.

Cumulative Effects

Cumulative effects associated with the modified proposed action are anticipated to be minimal, given the limited direct and indirect negative effects described above. Past actions generally include livestock grazing practices and associated developments, undesirable plant species treatments by both the agency and adjoining landowners, timber sales, road and trail construction and maintenance, recreational activities, and the continued spread of undesirable plant species. Current and reasonably foreseeable activities that could contribute to the degree of effects include travel management and potential reconstruction and decommissioning of routes, livestock grazing, anticipated increases in recreation use and developments such as campgrounds and trails, and continued use biological, mechanical, chemical, and prescribed fire to control undesirable plant species by the Nebraska and adjoining landowners.

Events such as severe wildfire, drought, and other severe weather events would continue to create disturbances that help undesirable plant species establish and spread. These events have the potential to introduce new undesirable plant species, advance the spread of undesirable plant species to new locations, or accelerate the spread of existing infestations. Climate change is also likely to stress native plant communities and perhaps create an ecological advantage for undesirable plant species. All of these contributing actions and activities have the potential to increase fuels management to reduce the risk of wildfire and fuel loading across the Nebraska. Implementing undesirable plant management is just one way to accomplish these objectives to meet the desired conditions.

Forestry

Methodology

Current Nebraska geographic information system layers were used for this analysis. The Forest Service database known as Field Sampled Vegetation was used to synthesize and present stand-level forest data including cover type and tree size. The data program stores data about trees, fuels, surface cover, and understory vegetation and supports the business of common stand exam and other vegetation inventory collection processes. The database data was imported into the geographic information system and overlayed with Nebraska Forest Plan management areas. Further information on the desired conditions of Management Areas was taken from the Nebraska Forest Plan.

General knowledge of the area and silvicultural practices were used to help determine effects to the resource. Additional research was conducted through a literature review to determine possible effects of herbicides on coniferous and woody tree species known to the Nebraska. Finally, although forestry was not identified as a resource concern through the National Environmental Policy Act's scoping process, management indicators were developed to help quantify the affected environment and to assess the potential effects of the alternatives. These include harm to desirable native woody species; effects of undesirable plants on forest structure; and effects of undesirable plants on timber species regeneration. Larger, mature trees are not greatly affected by either the presence of undesirable plants or by undesirable plant treatments, so this analysis focuses on seedlings and saplings as a component of stand structure.

Affected Environment

The Nebraska has 36,144 acres of forested land, not including eastern redcedar, identified in the Field Sampled Vegetation database. However, due to the lack of recent Common Stand Exams[6], the database does not reflect recent wildfires in 2006 and 2012. According to the database, 67 acres are made up of small trees (seedlings, saplings, and openings in historically forested stands); 2,510 acres have pole-sized, or medium diameter, young trees; and the remaining 33,567 acres have large diameter mature trees. Due to the lack of recent wildfire information being incorporated into the database it is expected that most of the mature stands have been reduced to the seedling or sapling stand re-initiation structural stages. Both the Field Sampled Vegetation database and on-the-ground conditions reveal that there is no old growth.

Table 20 provides an overview of the affected environment as related to forestry management indicators.

Table 20. Resource indicators and measures for the existing condition

Resource element	Resource indicator	Measure	Existing condition
Harm to desirable native woody species	Likelihood of desirable woody plant mortality	Desirable plant mortality from mechanical, chemical, and biological control methods.	25 percent, 10 percent*
Effects of undesirable plants on forest structure	Encroachment of eastern redcedar	Acres suffering from eastern redcedar encroachment	500 acres (primarily on the Bessey Ranger District)
Effects of undesirable plants on timber species regeneration	Current stocking levels in timber stands	Percent of stands meeting desired minimum stocking (150 trees per acre)	Unknown

*Current prescribed fire burn plans on the Nebraska place a mortality limit of 25 percent on trees less than 10 inches in diameter and 10 percent on trees greater than 10 inches in diameter. These limits have been determined to be acceptable and reasonable and are subject to change as technology and research progresses.

[6] Common Stand Exams are intensive field surveys that record forest stand information, tree information, and regeneration and groundcover data.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

The no-action alternative would maintain undesirable plant treatments at current levels. There is little direct harm to seedlings, both naturally occurring and planted, from current mechanical, chemical, and biological treatments. Where natural and artificial regeneration occurs, these stands would continue to mature and progress toward minimum acceptable stocking levels.

Encroachment of undesirable plant species would continue in timber stands under the no-action alternative. The encroachment of undesirable plants, particularly eastern redcedar, would reduce the ability of desirable plants to establish regeneration and would present a fire hazard that could jeopardize existing and future natural and artificial regeneration, as seen in the following photograph (figure 8). Midstory encroachment of undesirable plant species would also continue to move stand structural stages away from the desired distribution.



Figure 8. Encroachment of midstory eastern redcedar, creating dense ladder fuels and preventing pine regeneration. The line illustrates the height of the eastern redcedar canopy

Modified Proposed Action

Direct and Indirect Effects

Biological controls

Biological controls are largely host-specific and targeted, such as the release of insects and targeted grazing, and are not likely to cause any direct or indirect effects on timber species.

Chemical, mechanical, and prescribed fire controls

Chemical, mechanical, and prescribed fire controls can include both targeted and broad control methods. The direct and indirect effects are the result of the scope and scale of vegetation impacted by the activity and are not driven by the type of control method itself. While targeted controls would not have direct or indirect effects on timber species, broad control methods are likely to cause both direct and indirect effects. Direct effects may include removal of eastern redcedar, but also the incidental removal of desirable pine regeneration located in the stand. Indirect effects include the reduction of competition and encroachment from undesirable plants, thereby increasing growing space for desirable species. Table 21 provides some examples of targeted and broad control methods for each type of control, along with the direct and indirect effects of each.

Table 21. Targeted and broad control methods by method type, and potential direct and indirect effects of each on desirable timber species

Control method type	Control methods	Scale	Direct effects	Indirect effects
Biological	Insect release, grazing	Targeted	None anticipated	None anticipated
Chemical	Species-specific herbicide, ground-based application	Targeted	None anticipated	None anticipated
Chemical	Broad-spectrum herbicide, broadcast or aerial application	Broad	Removal of undesirable woody species Incidental removal of desirable woody species	Reduction in competition and encroachment Increased growing space for regeneration
Mechanical	Hand-pulling	Targeted	None anticipated	None anticipated
Mechanical	Mowing	Broad	Removal of undesirable woody species Incidental removal of desirable woody species	Reduction in competition and encroachment Increased growing space for regeneration Soil disturbance from equipment will also benefit natural regeneration
Prescribed fire	Broadcast Burn	Broad	Removal of undesirable woody species Incidental removal of desirable woody species	Reduction in competition and encroachment Increased growing space for regeneration Soil disturbance from equipment will also benefit natural regeneration

Design features in the modified proposed action would minimize incidental removal of seedlings and saplings in the broad-scale control methods. Consultation with the Forester prior to implementation would ensure that the timing of broad-scale treatments does not interfere with artificial regeneration and will ensure that minimum stocking levels can be maintained after implementation. Vegetation design features would ensure that an appropriate chemical is chosen for the location to minimize the incidental mortality of desirable species, and that it is applied according to the label specifications. Many of the identified chemicals target broad-leaved species and should not affect the desirable conifer species. The Fire and Fuels 1 design feature requires an approved burn plan that contains a silvicultural prescription within to ensure that the mortality of desirable species remains at an acceptable level to maintain stocking.

Cumulative Effects

The cumulative effects of the modified proposed action include potential redistribution of stand habitat structural stages to bring the forest in line with the forest plan desired conditions, reduced ladder fuels, and improved natural regeneration of desirable timber species. In conjunction with ongoing timber stand improvement and fuels reduction activities, more stands would be converted to open-canopied stands that favor regeneration and stand re-initiation structural stages. The reduction in undesirable plants, both understory forbs and midstory eastern redcedar, would reduce canopy cover, increase growing space, and promote the germination and initiation of desirable timber regeneration. It would also reduce ladder fuels, lowering fire hazard and improving the survival of newly established seedlings. The intensity of likely effects is relatively low because regeneration is driven by many compounding factors. Canopy closure and growing space is only one of many; climate and drought, seed source, and seed bed conditions also affect regeneration.

About 1,500-2,000 acres of timber stand improvement and fuels reduction activities occur each year on the Nebraska, which also reduce canopy closure and stand density, altering the habitat structure stage and improving growing conditions for regeneration. Many of these activities also have the potential to introduce new undesirable plant populations or improve the growing conditions for existing undesirable plants, which would require follow-up treatment. Desirable natural regeneration is often treated within 30-50 years with follow-up pre-commercial thinning and additional timber stand improvement activities, again a potential source for undesirable plants.

Overall, the cumulative effects of past, present, and reasonably foreseeable projects would benefit forest resources and bring the forested stands in line with the forest plan.

Livestock Grazing

Methodology

The Nebraska's Geographic Information System layers and other Forest Service databases that contain livestock grazing information were used for this analysis. General knowledge of the area from previous site visits were used to help determine effects to the resource. Livestock grazing is an important vegetation management tool on the Nebraska. General effects determinations to livestock grazing as a management action is the focus of this portion of the analysis. The effects to livestock themselves by the proposed control methods that accompany each alternative where not part of this analysis. Other projects completed with similar proposed activities were also reviewed to help determine effects to the livestock grazing.

Affected Environment

Livestock grazing has occurred on the Nebraska since its establishment. The specific Animal Unit Months authorized can fluctuate from year to year, mostly depending on weather patterns. On average, 340,000 Animal Unit Months are authorized across approximately 350 livestock grazing allotments. Most of the livestock grazing that occurs is from cattle, but there are a few allotments that permit bison. Historically, there has been very little grazing from sheep and, currently there are no allotments that authorize sheep to graze. Most allotments on the Nebraska are grazed using some type of deferred rotational grazing system. Forage from the Nebraska is an important part of business operations for over 300 livestock producers that are permitted to graze these federal lands.

There are numerous rangeland structural features associated with the allotments. Across the entire Nebraska there are approximately: 400 cattleguards, 8,000 water developments, and 4,000 fence segments. Some allotments have a higher density of range improvements while others have fewer or none.

Livestock grazing can create conditions favorable for undesirable plants to become established. The Nebraska minimizes negative impacts to native plant communities by properly managing livestock grazing. There may be small, localized areas near rangeland structures where bare ground has been created which can lead to undesirable plant infestations.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

This alternative would limit the control methods and species that can be treated which will allow existing infestations to expand and new undesirable populations to be introduced. The presence and spread of undesirable plants are a concern in relation to livestock grazing. Most undesirable plants are unpalatable to cattle, and some can be poisonous. Undesirable plants can be fierce competitors, crowding out native grasses, forbs, and shrubs that inhabit the area. As undesirable plants expand, they impact the livestock industry by lowering yield and quality of forage which can slow animal weight gains, poisoning livestock or reducing the quality of meat, and increasing costs of managing livestock (DiTomaso 2000). Forage production can be reduced by as much as 75 percent on grassland communities that have transitioned to woodland species such as eastern redcedar (Fuhlendorf et al. 2008).

Modified Proposed Action

Direct and Indirect Effects

The modified proposed action could treat up to 50,000 acres of undesirable plants annually using a mix of control methods that are selected to effectively treat each infestation. There would be more desirable livestock forage available under this alternative then under the no-action alternative. By maintaining or increasing available forage, this alternative would have beneficial effects on livestock grazing. Better nutrients would be available in the forage allowing livestock to maintain body condition and increase rate of gain weights on offspring. This would indirectly have a beneficial economic return for livestock permittees. Design features have been created to address livestock grazing following prescribed burning and restoration and rehabilitation treatments. Table 22 summarizes the direct and indirect effects to livestock grazing by each proposed treatment method.

Table 22. Direct and indirect effects from each proposed treatment to livestock grazing

Proposed treatment	Direct effects	Indirect effects
Preventative measures	This would prevent the introduction of new undesirable plant infestations within livestock grazing allotments.	This should maintain desirable livestock forage that is available for grazing.
Early detection and rapid response	This would limit the spread of undesirable plants within livestock grazing allotments.	This should maintain desirable livestock forage that is available for grazing.
Biological control	The release of host specific natural enemies for treating undesirable plants would not have any impacts to livestock grazing. Targeted grazing of undesirable plants may interfere with normal livestock grazing operations. Timing and duration of permitted livestock may need to be adjusted depending on the situation and species being targeted. Some targeted grazing may have a beneficial impact to permitted livestock.	This should improve desirable livestock forage that is available for grazing.

Proposed treatment	Direct effects	Indirect effects
Chemical control	Some herbicides require livestock to remain off the treated area for a specified time according to the product label. This may impact livestock grazing. Normal livestock operations may need to be adjusted when using aerial application.	This should improve desirable livestock forage that is available for grazing.
Mechanical control	There should be minimal impacts to livestock grazing from this activity. Forage reduced by mechanical control methods would not normally be grazed by livestock.	This should improve desirable livestock forage that is available for grazing.
Prescribed fire	Normal livestock operations may need to be adjusted during implementation of prescribed fires. Livestock may need to be deferred from grazing following prescribed fire to allow for resource recovery.	This should improve desirable livestock forage that is available for grazing. Depending on the size of the prescribed fire, an alternate pasture may need to be used for livestock grazing. This could indirectly affect livestock grazing in other allotments.
Rehabilitation and restoration	Livestock may need to be excluded from grazing rehabilitation areas until the site is restored to desired condition.	Same effects as described under Prescribed Fire.
Implementation and effectiveness monitoring	Livestock grazing would not be impacted by this activity.	No effects to livestock grazing from this activity.

Cumulative Effects

Undesirable plant populations may continue to increase under this alternative due the constraints of personnel or budget and the continual physical disturbance to native plant communities by natural or human caused actions. Events such as wildfire, drought, or erosion can create disturbances that help undesirable plant species become established and spread. These events have the potential to introduce new undesirable plants or plants to new locations. However, the number of infested acres is not expected to increase as rapidly as under the no-action alternative due to more control options being available.

Recreation

Methodology

A combination of Forest Service data and professional experience were used to predict effects to the recreation resource. Data from the Nebraska Field Sampled Vegetation database was used to predict quantifiable effects while personal experience was used to predict qualitative effects. To aid in the analysis, specific indicators for recreation were developed; these include Potential area closures and Recreational experience. This analysis focuses on the potential effects to the recreational experience itself, not the people engaging in recreation. See the Human Health and Safety section for more information on those effects.

Affected Environment

The Nebraska manages just over one million acres of noncontiguous public land across the central and western portions of Nebraska and South Dakota. Landscapes vary from rugged badlands to vast rolling prairie, forested hills, ridges, and river valleys. Farm and ranch buildings, windmills, roads, fences, and power lines are common human elements in the landscape.

Most of the Nebraska is undeveloped and open to a variety of dispersed recreational uses. Some of these include camping, hunting, hiking, fishing, riding off-highway vehicles, horseback riding, wildlife viewing, rock collecting, and some mountain biking. Developed recreation sites, which are few, range from modestly developed campgrounds and trailheads to full recreation complexes and visitor centers.

Matching trends seen nationally, recreational use on the Nebraska continues to increase. Developed campgrounds are typically close to full throughout summer and hunting season weekends.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

Continuing with the Nebraska's current treatment of undesirable plants would cause little change in the frequency, duration, and size of area closures (table 23). Over the next 10 to 20 years, however, the undesirable plants could create conditions where hunting, viewing nature and wildlife, and being outdoors is less enjoyable and fulfilling. Some undesirable plants, such as poison ivy, also cause severe discomfort to some people.

With the changes in undesirable species encroachment into developed and undeveloped recreation areas, what was once a favorable visitor use area may someday become unfavorable. Changes to available habitat due to the presence of undesirable species currently occurs in areas of the Nebraska. This causes wildlife to alter their movements and presence from an area that may have been favorable to hunting or viewing by recreationalists in the past (Stewart et al. 2021). Visitors wanting to see the wide expanses of National Grasslands or tall stands of ponderosa pine in the National Forests may be disappointed in the encroachment of undesirable species, such as the native eastern redcedar, into these ecosystems. This is also true for the expansion of non-native species, such as smooth brome or Kentucky bluegrass, into areas or the National Grasslands. These are just some examples of how the expansion of undesirable plant species may indirectly affect the recreational experience for visitors if current management is left in place.

Table 23. No-action alternative area closures by type of control

Control type	Closure frequency	Closure size (acres)	Closure duration (days)
Biological	Almost never	Not applicable	Not applicable
Chemical (ground-based equipment)	Almost never	Not applicable	Not applicable
Mechanical	Almost never	Not applicable	Not applicable

Effects to The Recreational Experience – Perception of Quality and Enjoyment

Any control methods (table 23) that occur in a dispersed setting could be perceived as a disturbance while it is happening (for example, noise, smoke, encounters with unexpected species, like goats). Given that the Nebraska has treated less than 1 percent of its overall acreage on average per year, it is unlikely that substantial numbers of visitors would encounter this work. If they do, effects could last for up to 3 days.

Control methods in developed campgrounds, where other regular maintenance occurs, is expected. However, these effects would generally be minimal.

Some control methods may limit the treatments of undesirable plants, both in acreage and species. However, failing to treat undesirable plants is likely to decrease the enjoyment of hunting, recreating, and viewing nature as infestations develop and species diversity and habitat decreases.

Modified Proposed Action

Direct and Indirect Effects

The frequency, size, and duration of area closures is likely to increase from the existing condition; however, the increase is expected to be minimal.

Biological Control

Biological control, such as the release of pathogens that attack undesirable plants, is expected to be like those described under the no-action alternative. Targeted livestock grazing would be added as a biological control method and is not likely to cause any direct or indirect effects to area closures.

Chemical Control

Chemical control, using ground-based methods, is expected to result in minimal area closures. An increase in durations of closer would be expected with the implementation of aerial spraying. This would entail closing areas for durations based on label instructions and safety direction from the Nebraska's Risk Management Specialist. Duration of closures are expected to be short, typically three days or less. Similar treatment methods used by other area federal agencies traditionally include closures for up to 3 days in the area of application (Bureau of Land Management 2021).

Mechanical Control

Possible increases in frequency, size, and duration of closures if heavy equipment is used in densely vegetated areas, like the Pine Ridge Escarpment or hand-planted forests of the Nebraska National Forest. No change from the no-action alternative would occur when hand tools is the method employed.

Prescribed Fire

Prescribed fire is expected to slightly increase the frequency, but not duration, of area closures. Prescribed fire, on a project-by-project basis, is used regularly on the Nebraska for a variety of reasons, resulting in the closures shown in table 24. While it is reasonable to expect that more prescribed fire will occur with the approval of the modified proposed action, the ability to conduct prescribed fire is also limited by weather conditions and staff availability. Thus, the predicted increase in the number and size of prescribed fires is slight, but not to a degree that would adversely affect recreational resources.

Recreational Experience

Modified Proposed Action

By increasing the tools available to treat undesirable plants in a timely manner, the modified proposed action should maintain or improve the recreational experience in 10 years and beyond. This is because preventing undesirable plants that form monocultures would retain the beauty and diversity for which the Nebraska is known. Additionally, plants that cause problems for people, such as poison ivy and sandburs, could be more readily treated in developed campgrounds and heavily used dispersed recreational sites with the addition of available control methods.

Table 24. Modified proposed action area closures by type of control

Control type	Closure frequency	Closure size (acres)	Closure duration (days)
Biological	Almost never	Not applicable	Not applicable
Chemical (ground and aerial application)	1 – 2 times per year (aerial spraying) Almost never (ground equipment)	Larger acreages, more than 100 Not applicable – rarely closed	1 day
Mechanical	Never	Not applicable	Not appliable
Prescribed fire	0 - 10 days per year on average; usually only one closure at a time (no multiple closings throughout the Nebraska at the same time)	100 – 5,000 acres based on average burn size.	1 – 3 days
Rehab and restoration	1 – 2 times per year	Up to 500 acres	Up to one month to allow seed to set

Effects to The Recreational Experience – Perception of Quality and Enjoyment

Control methods (table 24) that occur in a dispersed setting could be perceived as a disturbance while it's happening (such as, noise, smoke, unexpected species like goats).

Control methods in developed campgrounds, where other regular maintenance occurs, is expected. However, these effects would generally be minimal.

The quality of the recreational experience on the Nebraska would be maintained or improved because undesirable plants should be reduced or eliminated more quickly and effectively.

Cumulative Effects

This project would overlap in space and time with other efforts across the Nebraska to maintain or restore grassland and forested habitats and landscapes, which would serve to benefit the recreating public. The amount by which the modified proposed action would aid in this effort is hard to quantify without knowing exactly what each treatment would entail; however, being able to prevent the spread of undesirable plants before they become a large problem is expected to be beneficial. The following table discloses cumulative effects to the recreational resource indicators.

Table 25. Cumulative effects to area closures and recreational experience

Effect	Past, present, and reasonably foreseeable future actions that overlap in space and time	Cumulative effect
Increase in frequency, size, and duration of area closures	None. A closed area is discrete in space and time.	None.
Maintenance or improvement in species diversity	Restoration projects, such as Cedar Creek, eastern redcedar removal, pine ridge forest replanting, as examples Wildfire recovery projects, such as Bovee, 201 East, and Natick Pollinator gardens and plantings Preventative measures such as vehicle washing, educational actions about transporting seeds on shoes and pets, and requiring certified weed-free hay.	Cumulatively, the modified proposed action is expected to contribute to on-going restoration and recovery projects and, perhaps more importantly, prevent the need to restore areas at all. Cumulative effects include increasing species diversity and thus improving the recreational experience across the Nebraska.
Fewer encounters with nuisance plants (poison ivy, poison hemlock, sandburs)	None. Removing nuisance plants in an area is a discrete action that does not overlap in space or time with anything else.	None.

Socioeconomics and Environmental Justice

Methodology

Socioeconomics analysis was completed using a literature review that included the use of livestock as a grazing management tool. Additional information for recreational use was based on personal observations and discussions with Forest Service specialists familiar with the Nebraska National Forests and Grasslands history.

Analysis of environmental justice concerns consider minorities, minority populations, low-income, low-income populations, study area, and reference populations. This analysis uses analysis tools from Headwaters Economics (2023) to collect and summarize needed demographic information. The Headwaters Economics tools draw data on race, ethnicity, and income from American Community Survey five-year estimates from the Census Bureau (U.S. Department of Commerce 2022).

Comments and considerations for effects to the local economy and population during the notice of intent and public scoping period were reviewed for pertinent information as it relates to environmental justice. Comments regarding local populations and demographics were not received during this early notification of the project. Concerns about environmental justice impacts were not brought forward and were, therefore, not considered an issue during project development.

Affected Environment

Minority Populations

None of the project area counties in Nebraska have a population of racial or ethnic minorities that is meaningfully larger than the minority population in the state of Nebraska overall. The combined county minority population of 14.0 percent is far lower than the statewide percentage of 22.3 percent. Therefore, the data does not indicate that there are minority populations at the county level in Nebraska for further environmental impacts analysis based on Council on Environmental Quality standards.

The data from South Dakota show that while most of the project area counties do not contain large minority populations, Jackson and Lyman counties are both home to significant populations of American Indians. The overall minority populations in Jackson (64.7 percent) and Lyman (46.1 percent) counties are much higher than the South Dakota statewide average of 19.2 percent. This high percentage can be attributed to the presence of the Lower Brule Reservation (Lyman County) and Pine Ridge Reservation (Jackson County). Due to this factor, minority populations of American Indians should be expected and would not constitute a high degree of environmental justice concern for minorities.

Low-income Populations

None of the project area counties in Nebraska have a proportion of low-income people or families that is meaningfully larger than the low-income population in the state of Nebraska overall. The proportion of low-income people in the five counties combined (11 percent) is not meaningfully greater than the statewide percentage of 10.3 percent. Therefore, the data does not indicate that there are low-income populations at the county level in Nebraska for further environmental impacts analysis based on Council on Environmental Quality standards.

However, as with racial and ethnic minorities, the data from South Dakota shows that while most of the project area counties in South Dakota do not contain large populations of low-income individuals or families, Fall River, Jackson, and Lyman counties each contain a greater proportion of low-income individuals and families than South Dakota does overall. The proportions of families in poverty in Fall River (15.3 percent), Jackson (35.9 percent) and Lyman (18.6 percent) counties are much higher than the South Dakota statewide average of 7.7 percent, indicating the possible presence of communities with environmental justice concerns.

Environmental Consequences

No-Action Alternative

Direct and Indirect Effects

The no-action alternative is not expected to produce changes from the current condition.

Modified Proposed Action

Direct and Indirect Effects

Socioeconomic effects from this project are anticipated to be positive with the improvement in native vegetation and the management of undesirable plant species. These effects should be seen by recreationists who would enjoy experiencing native vegetation, wildlife and fisheries habitat, and healthy forest and grassland ecosystems. Economically, the positive effects should be seen by livestock grazing permit holders as livestock have a better forage base due to forest and grassland areas being managed for native species diversity.

While an evaluation of the demographic data revealed several counties in South Dakota that could potentially contain communities with environmental justice concerns, project activities are not expected to have disproportionate or adverse impacts on existing low-income or minority populations, including communities of American Indians. The Cultural Resources 2 design feature is in place to mitigate any potential impacts to traditional plant gathering, and to the extent that the proposed management actions may result in other short-term negative impacts, they would occur throughout the project area and affect all communities and populations alike.

Cumulative Effects

Any past, present, or reasonably foreseeable projects throughout the Nebraska, as related to vegetation management or overlapping actions could cumulatively affect minority or low-income populations previously identified. However, these effects are not expected to have disproportionate or adverse impacts on existing low-income or minority populations, including communities of American Indians.

Other Required Disclosures

National Environmental Policy Act at 40 Code of Federal Regulation 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."

Short-term Uses and Long-term Productivity

The National Environmental Policy Act requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 Code of Federal Regulation 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 (National Environmental Policy Act section 101).

Implementation of the modified proposed action may result in the short-term loss of non-target species and localized biodiversity in areas where herbicides, grazing, mechanical control methods, and prescribed fire treatment methods are used. While grazing and mechanical control treatments may affect non-target species through temporary loss of biomass, these plants are generally not killed by these types of treatment actions. Biological agents are host specific and do not influence non-target species. Overall, the modified proposed action is expected to increase biodiversity and restore the natural productivity of the Nebraska in the long-term through the eradication of undesirable plant species.

The no-action alternative may result in losses in biodiversity, forage production, and wildlife habitat due to the anticipated continued spread of undesirable plant species. Some species of sensitive plants and wildlife may be affected by this loss of habitat.

Unavoidable Adverse Effects

No unavoidable adverse effects are anticipated from the no-action alternative.

Treatment methods associated with the modified proposed action have the potential to result in 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 small amounts of herbicide would migrate from treatment sites, soils, riparian, and aquatic design features 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 modified proposed action have no known unavoidable adverse effects. Thus, under reasonably foreseeable circumstances, there would be no significant environmental effects.

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.

No irreversible and or irretrievable commitments of resources are expected from either the no-action alternative or the modified proposed action. While short-term impacts to non-targeted vegetation may occur, no populations would be decimated.

Clean Air Act

When prescribed fire activities are planned, coordination may occur with regional air quality specialists and federal, state, tribal, air pollution control district, or county regulatory authorities to ensure compliance with the Clean Air Act. All prescribed fire activities are conducted using Smoke Management Guidance. This guidance is published by the National Wildfire Coordinating Group and updated periodically. Smoke can adversely impact public health and welfare, public safety, regional haze, transportation corridors, commerce and tourism, day-to-day activities at nearby communities, and the health and safety to fire personnel. Planning for and applying the appropriate smoke management practices can help minimize air pollution impacts from prescribed fires used to manage our natural resources. By applying the appropriate smoke management practices, the Forest Service can reduce the risk of causing smoke impacts to the public and environment and yet still achieve planned resource benefits from prescribed burning.

Executive Order 11988 – Floodplain Management

Executive Order 11988, Floodplain Management, requires that federal activities generally avoid occupancy and modification of floodplains that would alter flood passage, stage, or velocities. The modified proposed action complies with Executive Order 11988 because it would not change floodplain functions or alter flood passage. Forest Service Region 2 Watershed Conservation Practices, and project design features are included so that no equipment or supplies would be stored within the 100-foot buffer surrounding springs, wetlands, and perennial and intermittent streams, which generally corresponds to the floodplain for smaller streams. These same restrictions also apply to the regulatory 100-year floodplains thus allowing any flood waters to flow as they would naturally, in the unlikely event that extreme flooding was to occur in the area. The implementation of project design features and best management practices is fully expected to protect any floodplain areas that may be adjacent or downstream of the proposed project activities. Any required floodplain permits or variances that are unforeseen at this time will be obtained prior to implementation through coordination with the appropriate State or County Floodplain Managers.

Executive Order 11990 – Protection of Wetlands

Executive Order 11990, Protection of Wetlands, requires that federal activities generally avoid modification or destruction of wetlands. The modified proposed action is consistent with Executive Order 11990 because proposed activities are not anticipated to result in a loss or conversion of wetlands, including rare groundwater dependent ecosystems such as springs and peat-forming fens and bogs. Measures are included to either avoid wetland features entirely or protect them through implementation of Forest Service Best Management Practices, Forest Service Region 2 Watershed Conservation Practices, forest plan standards and guidelines, and project specific design features. No ground-disturbing activities would occur within wetlands. Best Management Practices and Watershed Conservation Practices restrict activities within the Aquatic Management Zone buffers associated with all water features, including wetlands. Application of design features and consultation with forest soil/water specialists prior to implementation is expected to protect the integrity of wetland ecosystems and functions.

Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook, Region 2 Rocky Mountain Region Supplement

The modified proposed action complies with Forest Service Region 2 direction contained in Forest Service Handbook 2509.25 (USDA Forest Service 2006) due to required project design features and adherence to Forest Service Best Management Practices, and Forest Service Region 2 Watershed Conservation Practices to avoid or minimize negative impacts to soil and water resources.

Forest Service Manual 2500 – Watershed and Air Management

Forest Service Manual 2500 (USDA Forest Service 2010) requires inclusion of soil and water resource information and analysis of effects of management activities on soil function, water quality, watershed condition, and riparian areas for all Forest land and resource planning; conservation of soil and water resources; and cooperation with applicable local, state, and federal entities that manage water resources. The proposed action is consistent with Forest Service Manual 2500 because analysis of soil and water resources has been completed; project design features, Forest Service Best Management Practices, and Forest Service Region 2 Watershed Conservation Practices are included to protect soil and water resources and watershed functions; and the USFS will continue to cooperate with and follow all applicable federal, state, and local requirements for soil and water resources.

Pesticide Use and Worker Safety

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

Incomplete or Unavailable Information

The Field Sampled Vegetation database is fed by data collected from Common Stand Exams, which should be conducted according to national protocols and on a reoccurring basis (approximately every 10-15 years). Common Stand Exams are intensive field surveys that record forest stand information, tree information, and regeneration and groundcover data. Common Stand Exams on the Nebraska have been conducted infrequently, as funding and capacity allows, and have occasionally used modified protocols that make data comparison impossible. However, the distribution and stand conditions of desirable woody plant species (primarily ponderosa pine) are relatively uniform, where forest cover exists. It is therefore likely that the effects of the modified proposed action on the desirable timber species would be similar throughout the Nebraska. The forest plan also does not contain information on the timber suitability analysis conducted during plan development. Without accurate Common Stand Exam data and timber suitability analyses, no accurate record of timber stands currently affected by encroachment of eastern redcedar or other undesirable plant species exists. Additionally, there is no accurate record of current stocking levels.

Chapter 4: Consultation and Coordination

Table 26 identifies the interdisciplinary team of resource specialists who contributed to the analysis of the Undesirable Plant Management Project. Table 27 identifies the federal, state, and local agencies with whom consultation and coordination occurred, while the bulleted lists that follow identify the tribal entities and stakeholders who were invited to consult with or contacted, respectively.

Interdisciplinary Team

Table 26. Undesirable Plant Management Project interdisciplinary team

Team member	Area of responsibility
Bramblee, Kit	National Environmental Policy Act Coordinator; Socioeconomics and Environmental Justice Specialist; Climate Change Specialist; Human Health and Safety Specialist
Cumbow, Ryan	Fire and Fuels and Air Quality Specialist
Dolatta, Dean	Pine Ridge District Representative
Dolatta, Kim	Project Interdisciplinary Team Leader; Rangeland Ecology Specialist; Botany and Vegetation Specialist
Dobesh, Phil	Wildlife Specialist
Horobik, Heather	Heritage and Cultural Resources Specialist
Isaacs, Jack	Forest Supervisor; Responsible Official
Johndreau, Julie	Recreation Specialist
Waage, Kelly	Fort Pierre District Representative
Lucas, Matt	Hydrology, Aquatics, and Fisheries Specialist
Martin, Melissa	National Environmental Policy Act Coordinator; Primary author
McCormick, Sarlyn	Geographic Information Systems Specialist
Myers, Sarah	Forestry Specialist
Paprocki, Telca	Fall River District Representative
Rohrer, Jacob	Wall District Representative
Wright, Greg	Bessey District Representative

Federal, State, and External Organizations

Table 27. Federal, state, and local agencies contacted

Individual	Agency
Allen, Joe	Fall River County Commissioner, South Dakota
Baldwin, Mike	Custer and Fall River Weed and Pest Department
Baldwin, Mike	Custer Conservation District
Buhr, Jack	Sugarloaf Grazing Association
Buhr, Jack	Indian Cooperative Grazing District
BR Media	Share Trails Organization
Cantrell, Joan	Eastern Pennington County Cooperative Grazing District
Cantrell, Joan	White River Cooperative Grazing District
Carlson-Dietmeier, Jenna	South Dakota State Historic Preservation Office

Individual	Agency
Cope, Les	Fall River County Commissioner, South Dakota
Dierking, Ray	Nebraska Game and Parks
Falkenburg, Joe	Fall River County Commissioner, South Dakota
Flute, Dave	South Dakota Department of Tribal Relations
Gabrielle Michna	Chadron Chamber of Commerce
Goltz, Megan	State of South Dakota, Governor's Office
Greenough, Heath	Fall River County Commissioner, South Dakota
Hummel, Bryan	U.S. Environmental Protection Agency, Watershed Restoration
Kempema, Silka	South Dakota Game, Fish and Parks
Klosowski, Mike	South Dakota Game, Fish and Parks
Krolikowski, Tom	Nebraska Game and Parks Commission
Kulesa, Adam	South Dakota Game, Fish and Parks
McCarty, Shanna	United States Department of Agriculture
Michals, Stan	South Dakota Game, Fish and Parks
Morey, Hilary	South Dakota Game, Fish and Parks
Morley, Katie	Legislative Assistant, Congressman Adrian Smith (NE)
Morrison, Amanda	South Dakota Game, Fish and Parks
Moseman, Neil	Agriculture and Energy Policy Director, State of Nebraska
Murray, Katie	West River Director, Representative Dusty Johnson (SD)
Neiles, Brady	South Dakota Game, Fish and Parks
Norton, Mark	South Dakota Game, Fish and Parks
Olsen, Joilin	Legal Administrative Specialist, Forest Service
Reutter, Becky	Cottonwood Cooperative Grazing District
Roldan, Jonathan	Archeologist, Forest Service
Sanderson, Nick	Sioux County Weed and Road Department
Smith, Bill	South Dakota Department of Agriculture and Natural Resources
Smith, Cody	Central South Dakota Cooperative Grazing Association
State Historic Preservation Officer	South Dakota State Historic Preservation Office
Stockdale, Christopher	Mark Twain National Forest, Forest Service
White, Scott	Pioneer Grazing Association

Federally Recognized Tribes

- Cheyenne/Arapaho Tribes of Oklahoma
- Cheyenne River Sioux
- Crow Creek Sioux
- Crow Nation
- Eastern Shoshone
- Flandreau Santee Sioux
- Fort Peck Assiniboine and Sioux
- Iowa Tribe of Oklahoma
- Kiowa Tribe of Oklahoma
- Lower Brule Sioux
- Mandan, Hidatsa and Arikara Nation
- Northern Arapaho
- Northern Cheyenne
- Oglala Sioux
- Omaha Tribe of Nebraska
- Otoe-Missouria
- Pawnee Nation
- Ponca Tribe of Nebraska
- Potawatomi Nation
- Rosebud Sioux
- Sac and Fox Nation
- Santee Sioux Nation
- Sisseton-Wahpeton Oyate of South Dakota
- Spirit Lake Sioux
- Standing Rock Sioux
- Turtle Mountain Band of Chippewa
- Winnebago Tribe of Nebraska
- Yankton Sioux

Stakeholders

The notice of intent initiating the scoping process for the Undesirable Plant Management Project was sent to 92 stakeholders who have previously expressed interest in projects of this nature. The list of stakeholders is filed in the project record.

Distribution of the Environmental Impact Statement

This environmental impact statement has been distributed to all the federal, state, and local agencies, tribal entities, and stakeholders listed above.

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References identified in this section represent only those citations found in this environmental impact statement. For a complete list of references used in the project analysis see appendix H.

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Appendix A: Maps of Inventoried Undesirable Plant Species (2023)

Figure 9. Bessey Ranger District, Nebraska National Forest inventoried undesirable plants

Figure 10. Bessey Ranger District, Samuel R. McKelvie National Forest inventoried undesirable plants

Figure 11. Pine Ridge Ranger District, Nebraska National Forest inventoried undesirable plants

Figure 12. Pine Ridge Ranger District, Oglala National Grassland inventoried undesirable plants

Figure 13. Fall River Ranger District West, Buffalo Gap National Grassland inventoried undesirable plants

Figure 14. Fall River Ranger District East, Buffalo Gap National Grassland inventoried undesirable plants

Figure 15. Wall Ranger District West, Buffalo Gap National Grassland inventoried undesirable plants

Figure 16. Wall Ranger District East, Buffalo Gap National Grassland inventoried undesirable plants

Figure 17. Fort Pierre Ranger District, Fort Pierre National Grassland inventoried undesirable plants

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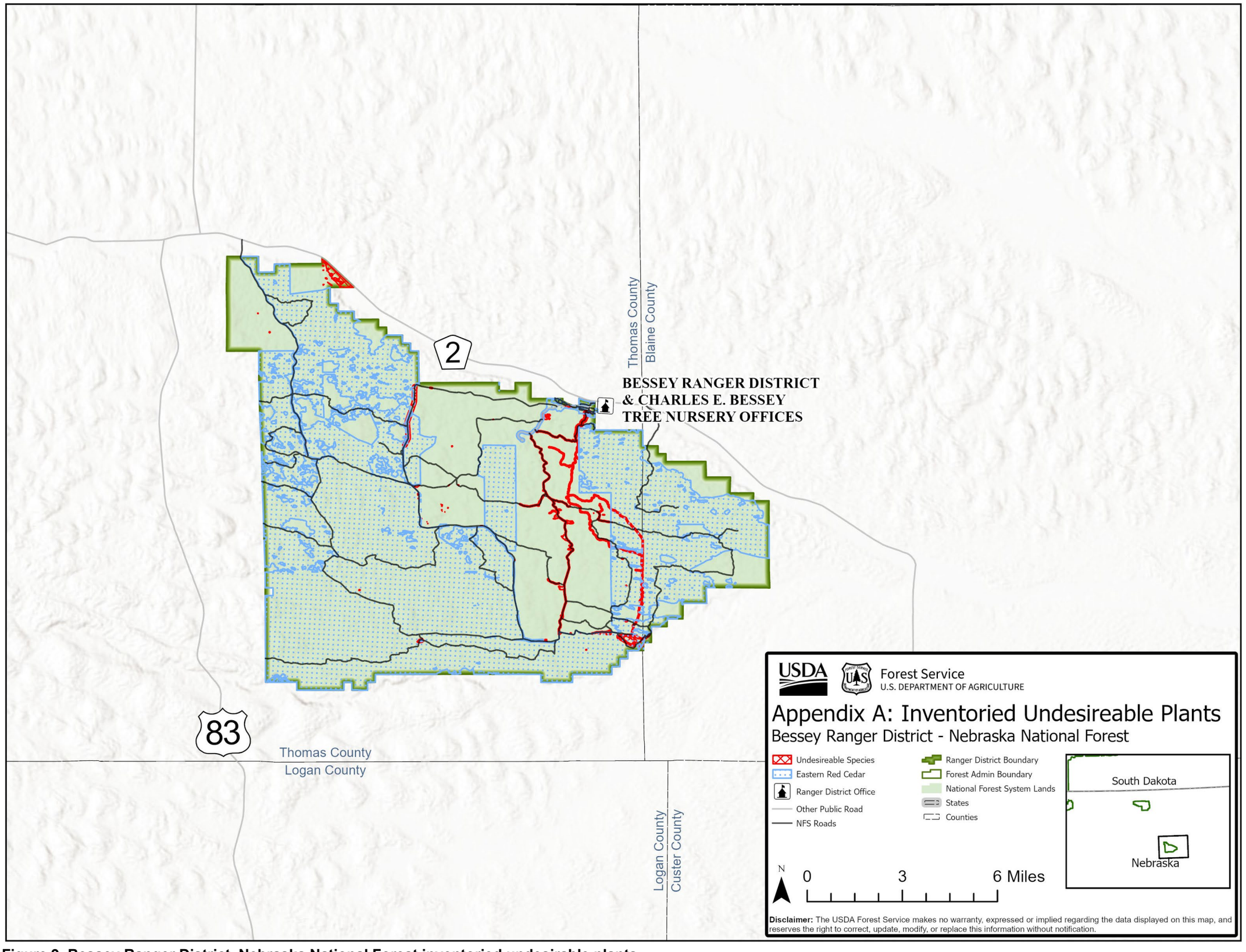


Figure 9. Bessey Ranger District, Nebraska National Forest inventoried undesirable plants

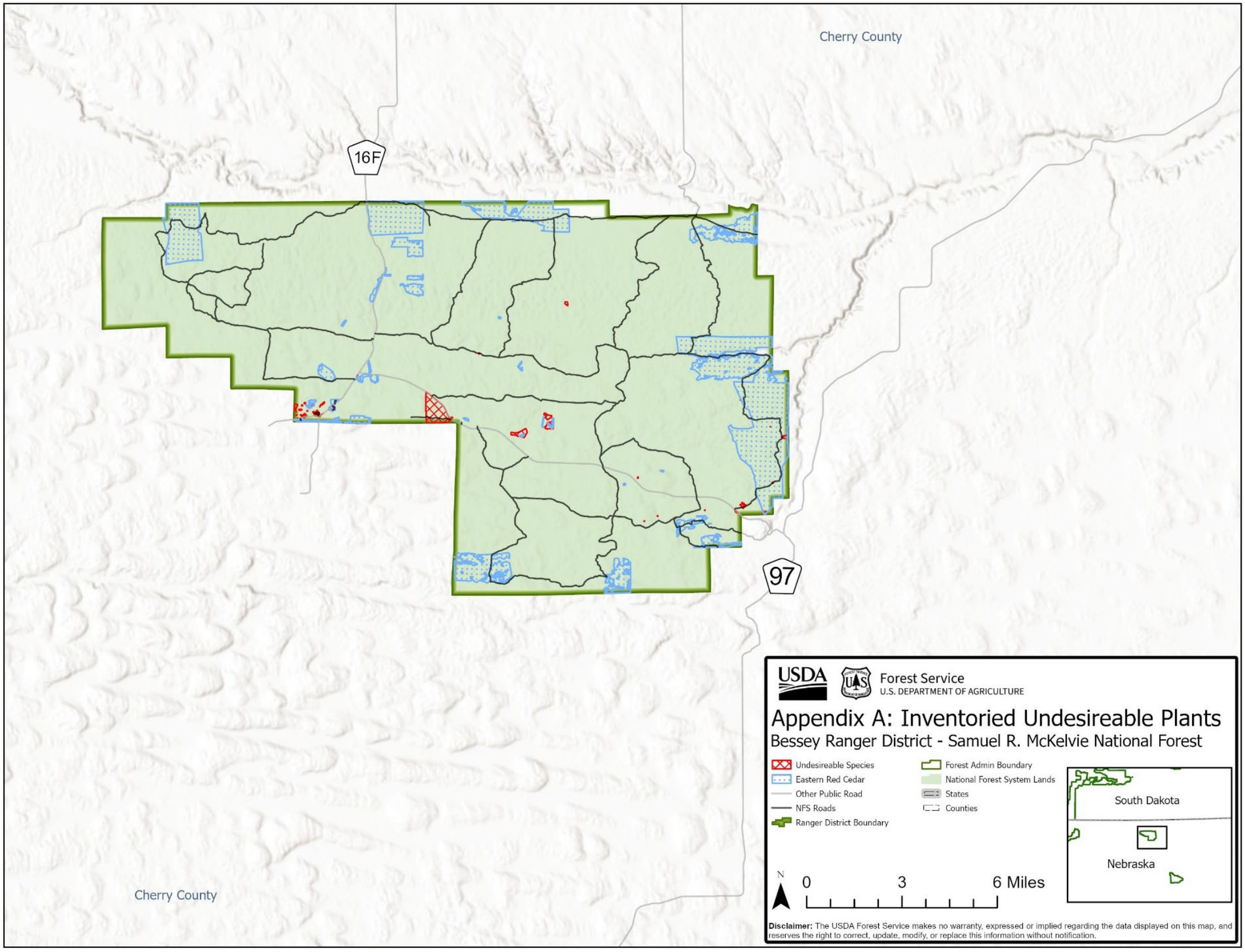


Figure 10. Bessey Ranger District, Samuel R. McKelvie National Forest inventoried undesirable plants

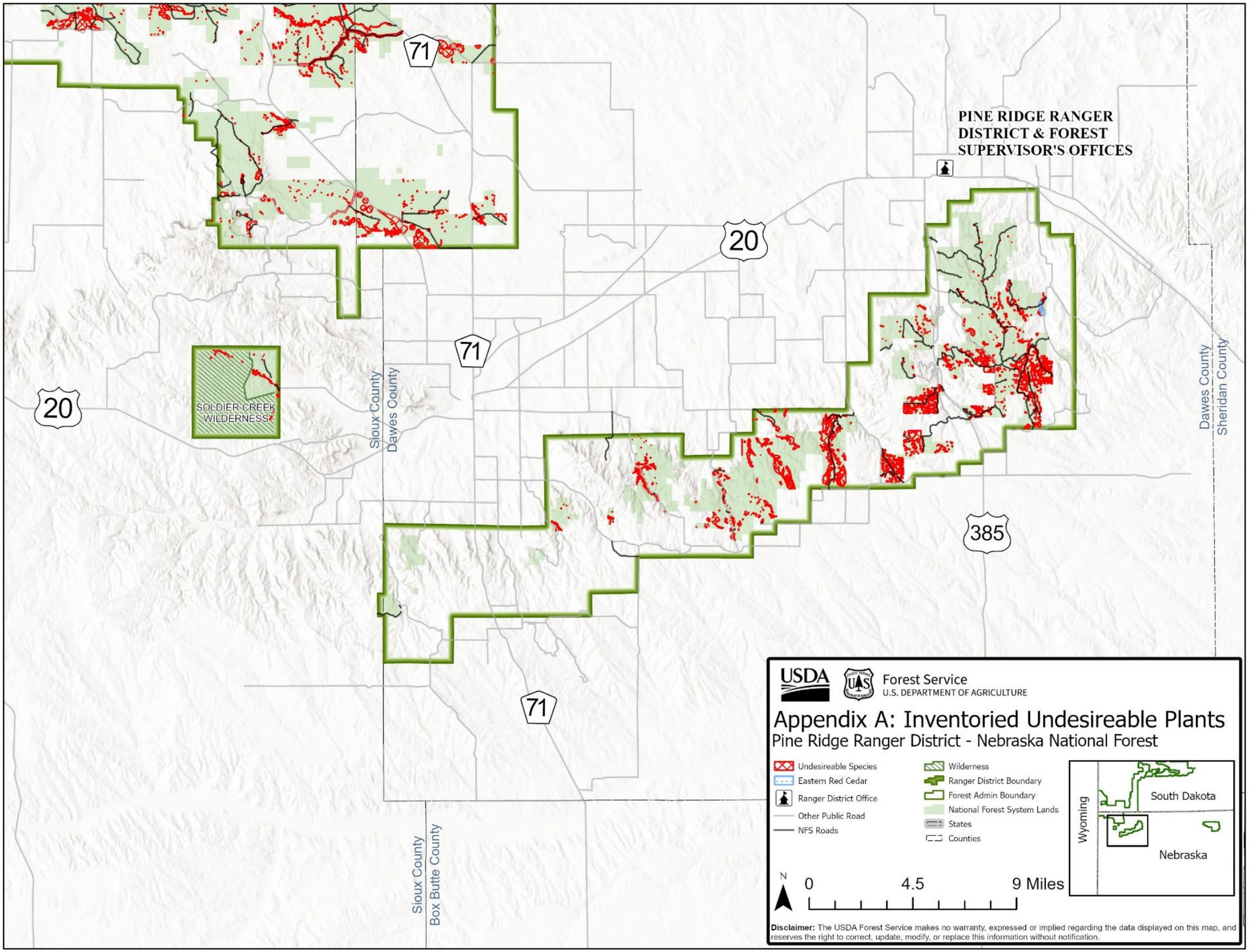


Figure 11. Pine Ridge Ranger District, Nebraska National Forest inventoried undesirable plants

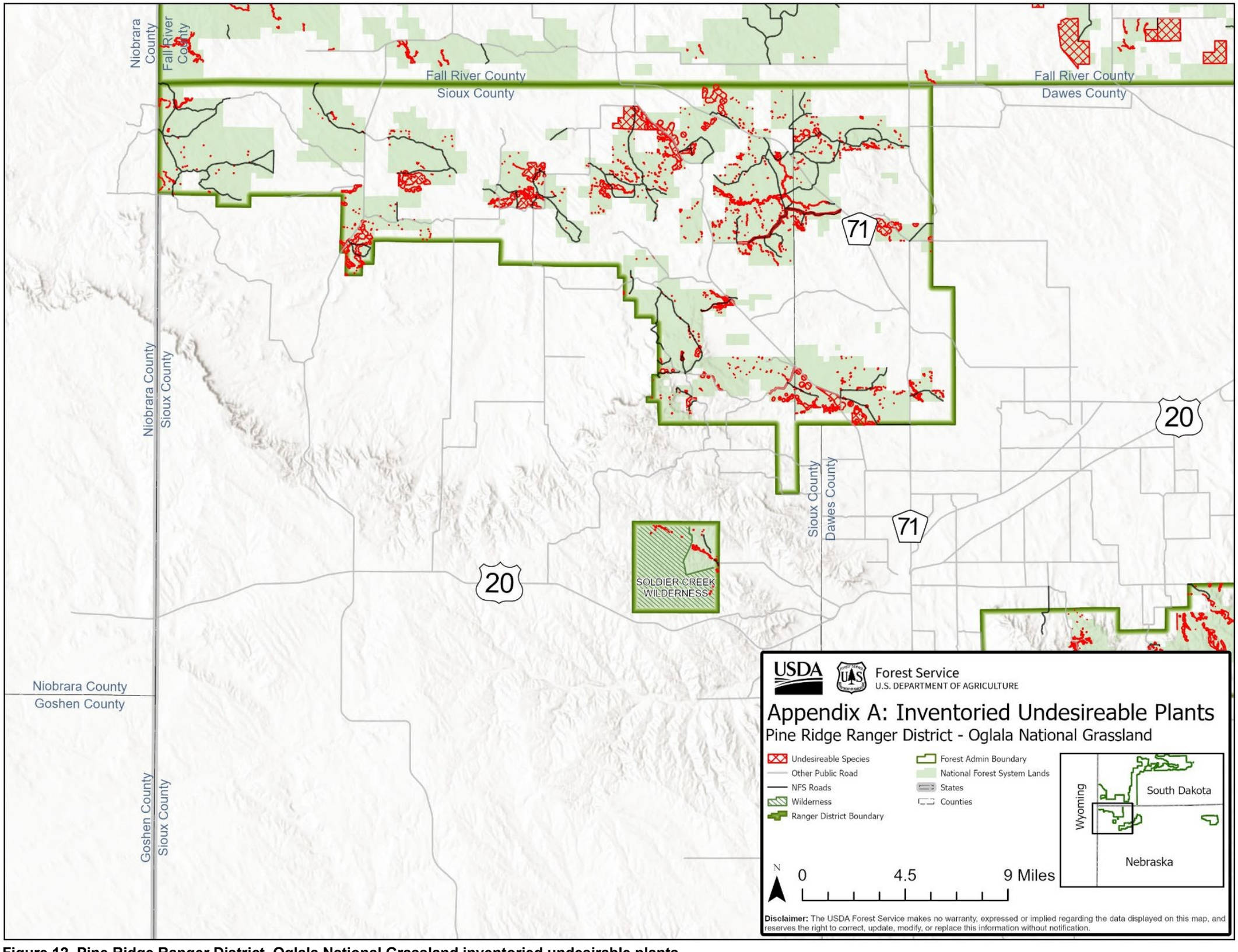


Figure 12. Pine Ridge Ranger District, Oglala National Grassland inventoried undesirable plants

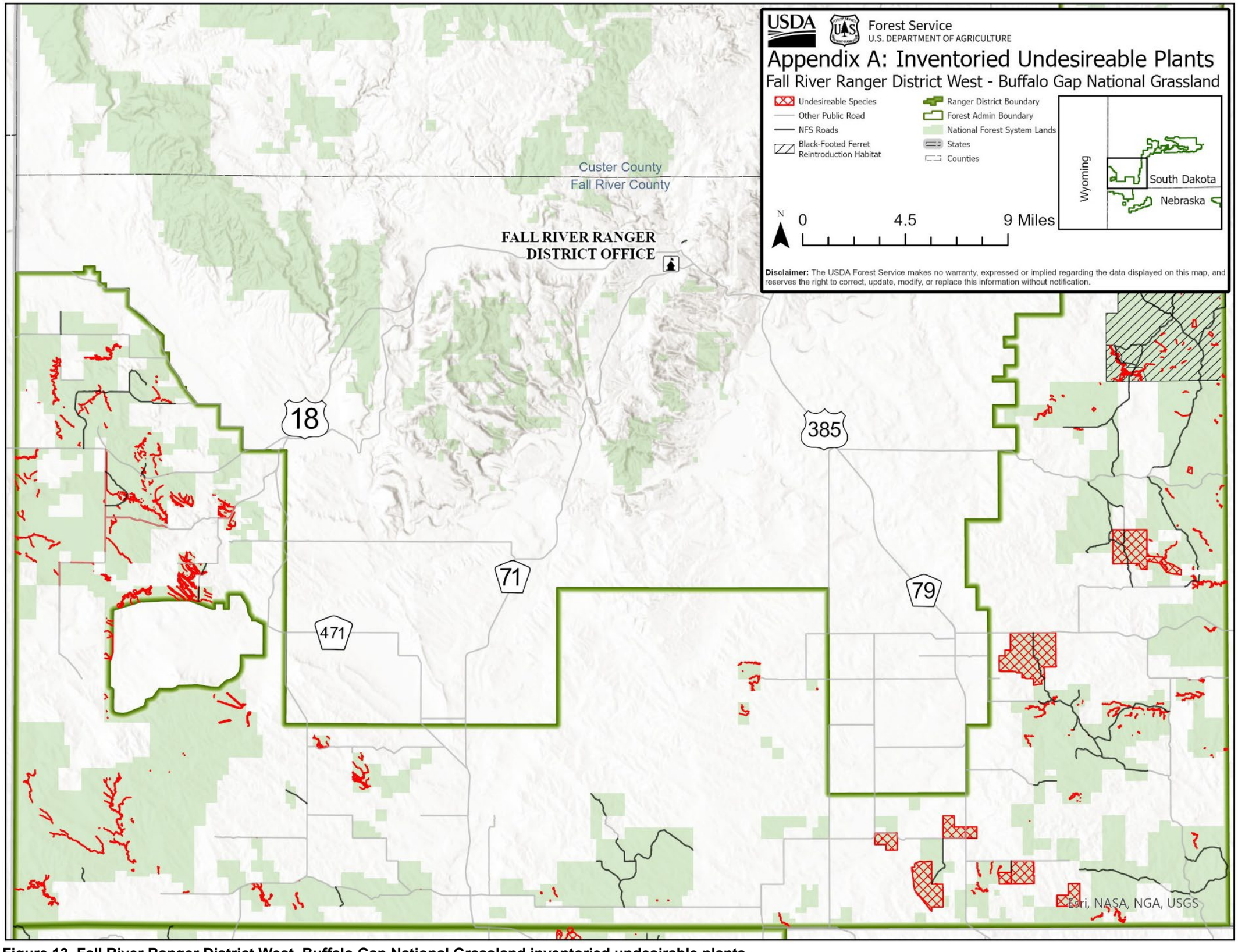


Figure 13. Fall River Ranger District West, Buffalo Gap National Grassland inventoried undesirable plants

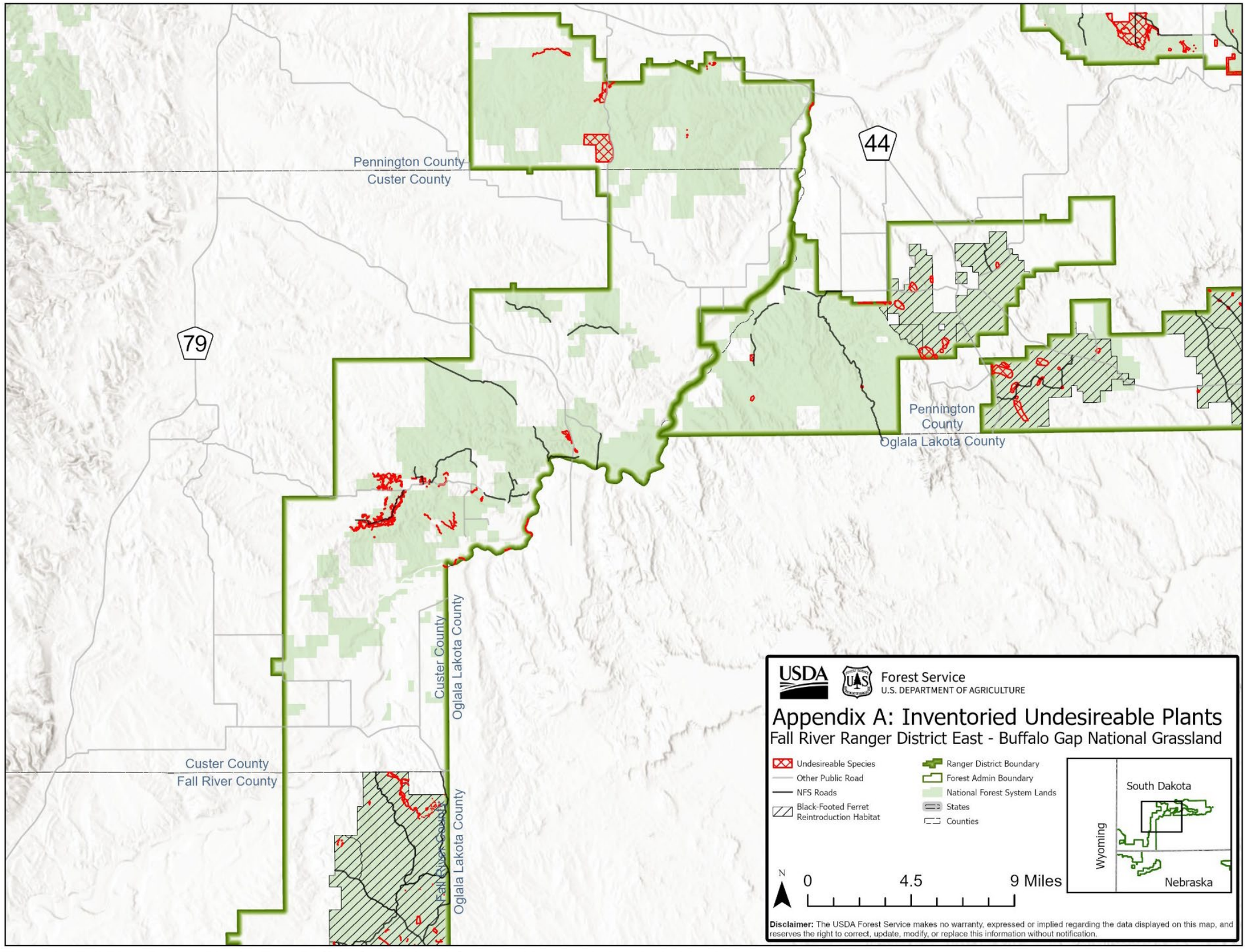


Figure 14. Fall River Ranger District East, Buffalo Gap National Grassland inventoried undesirable plants

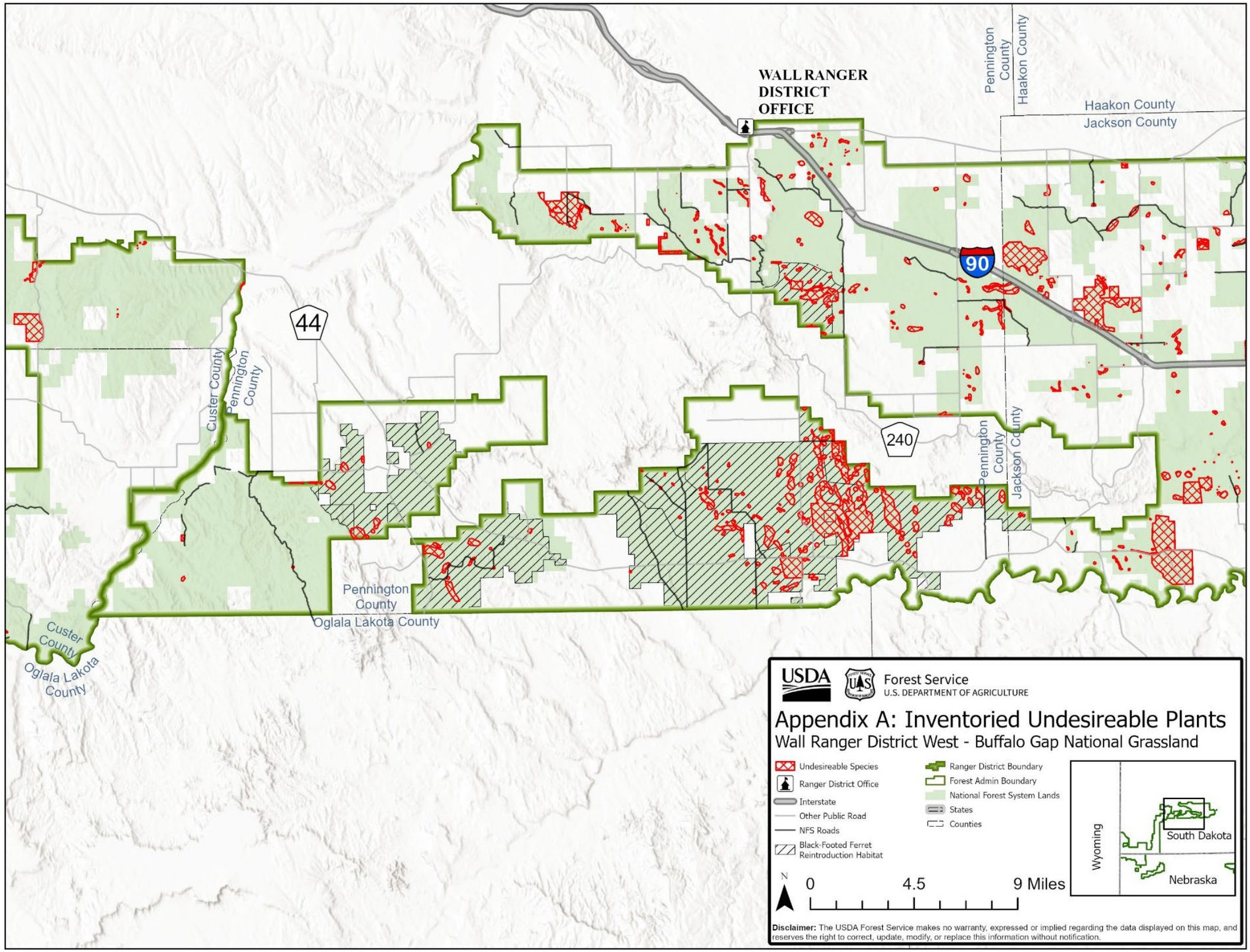


Figure 15. Wall Ranger District West, Buffalo Gap National Grassland inventoried undesirable plants

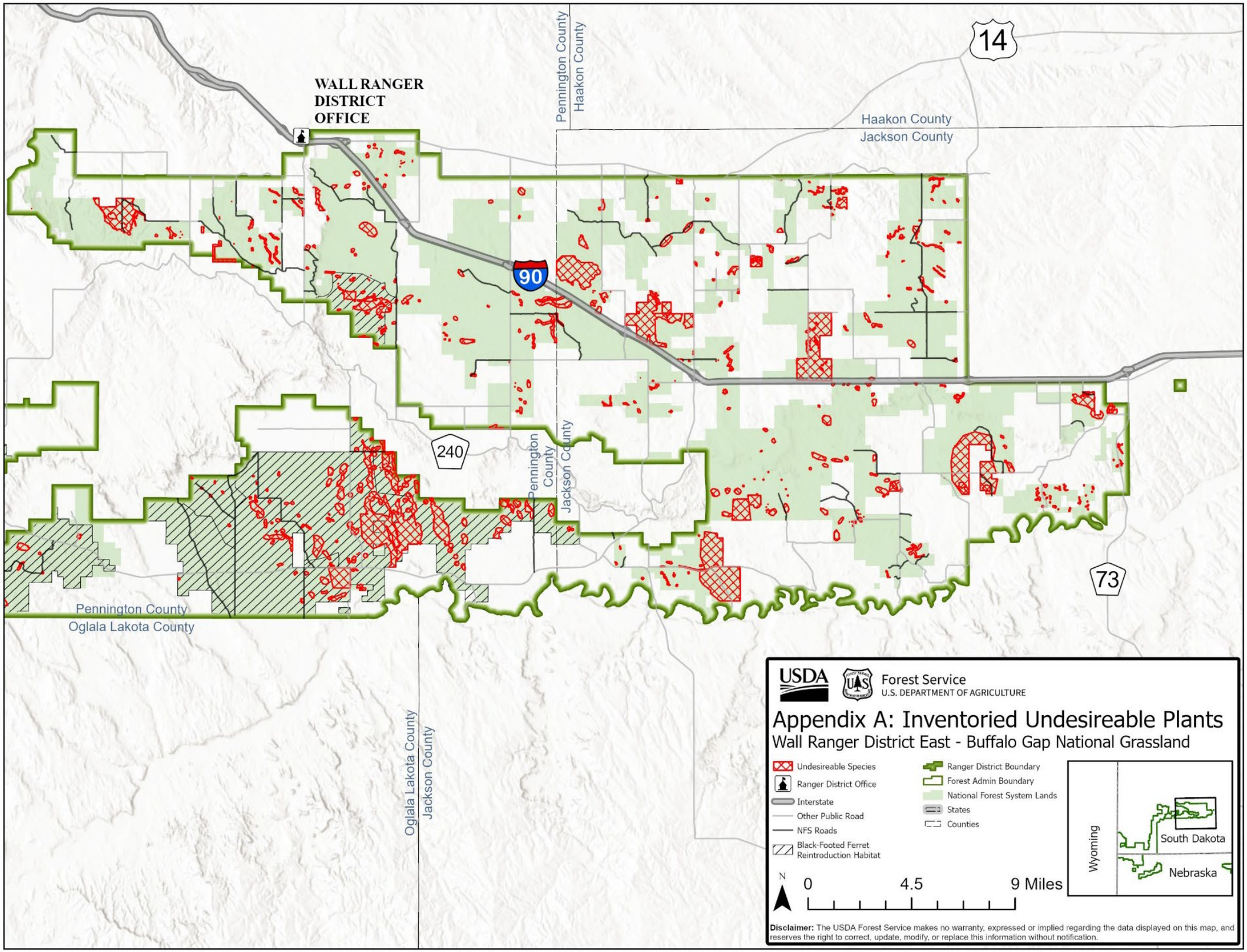


Figure 16. Wall Ranger District East, Buffalo Gap National Grassland inventoried undesirable plants

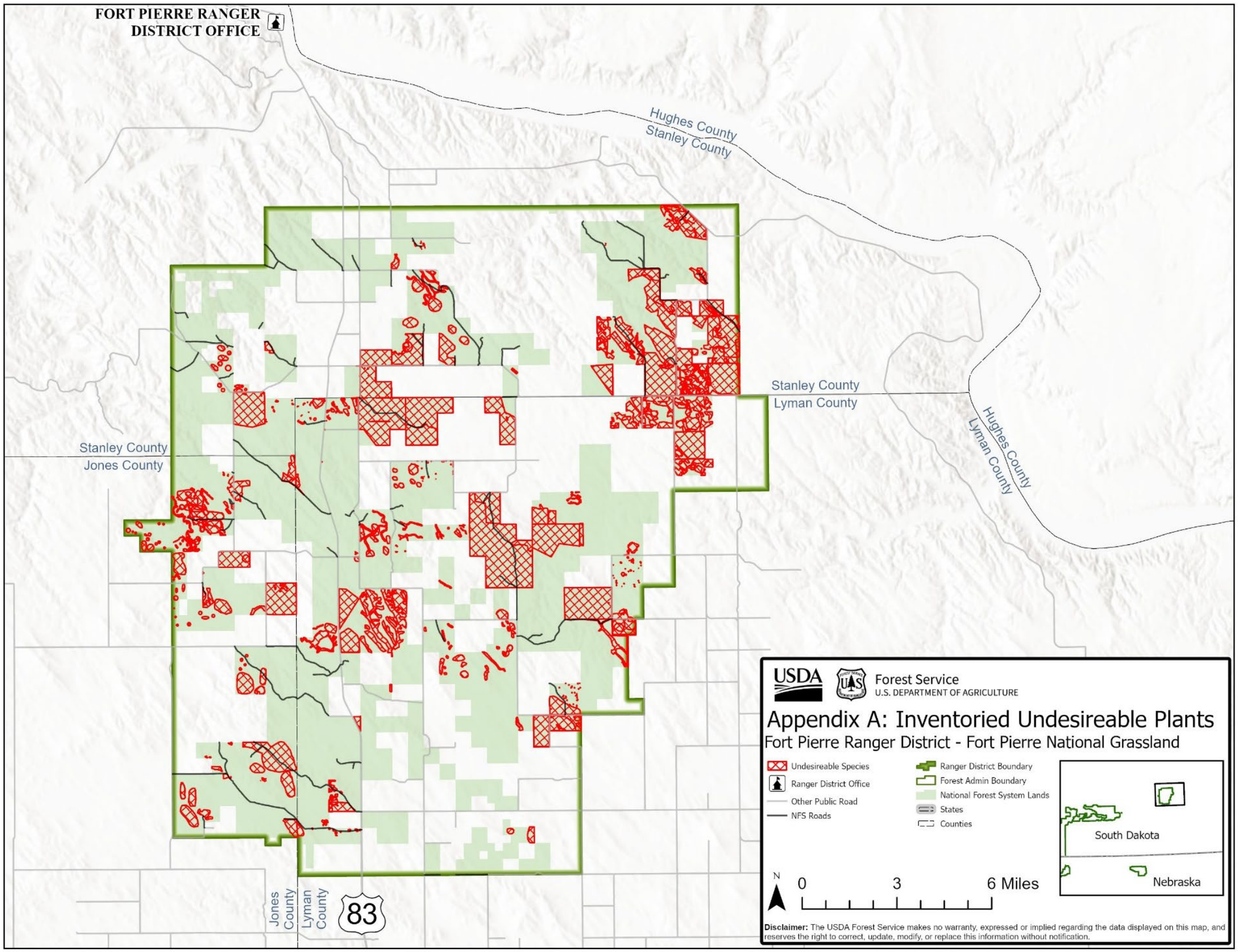


Figure 17. Fort Pierre Ranger District, Fort Pierre National Grassland inventoried undesirable plants

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Appendix B: No-Action Alternative – Mapped Location of Treatments by Control Methods

Figure 18. Bessey Ranger District, Nebraska National Forest location of treatments by control methods

Figure 19. Bessey Ranger District, Samuel R. McKelvie National Forest location of treatments by control methods

Figure 20. Pine Ridge Ranger District, Nebraska National Forest location of treatments by control methods

Figure 21. Pine Ridge Ranger District, Oglala National Grassland location of treatments by control methods

Figure 22. Fall River Ranger District West, Buffalo Gap National Grassland location of treatments by control methods

Figure 23. Fall River Ranger District East, Buffalo Gap National Grassland location of treatments by control methods

Figure 24. Wall Ranger District West, Buffalo Gap National Grassland location of treatments by control methods

Figure 25. Wall Ranger District East, Buffalo Gap National Grassland location of treatments by control methods

Figure 26. Fort Pierre Ranger District, Fort Pierre National Grassland location of treatments by control methods

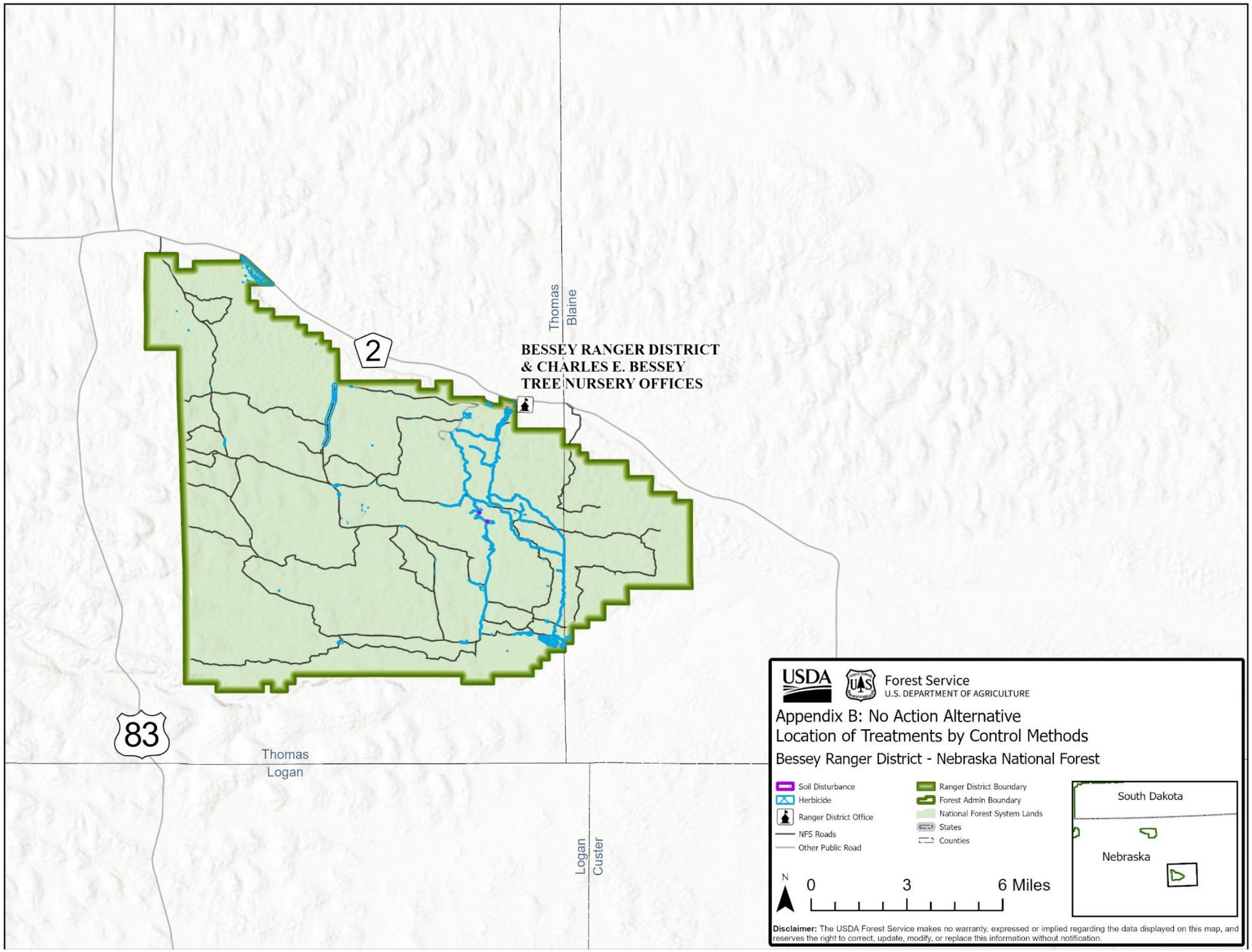


Figure 18. Bessey Ranger District, Nebraska National Forest location of treatments by control methods

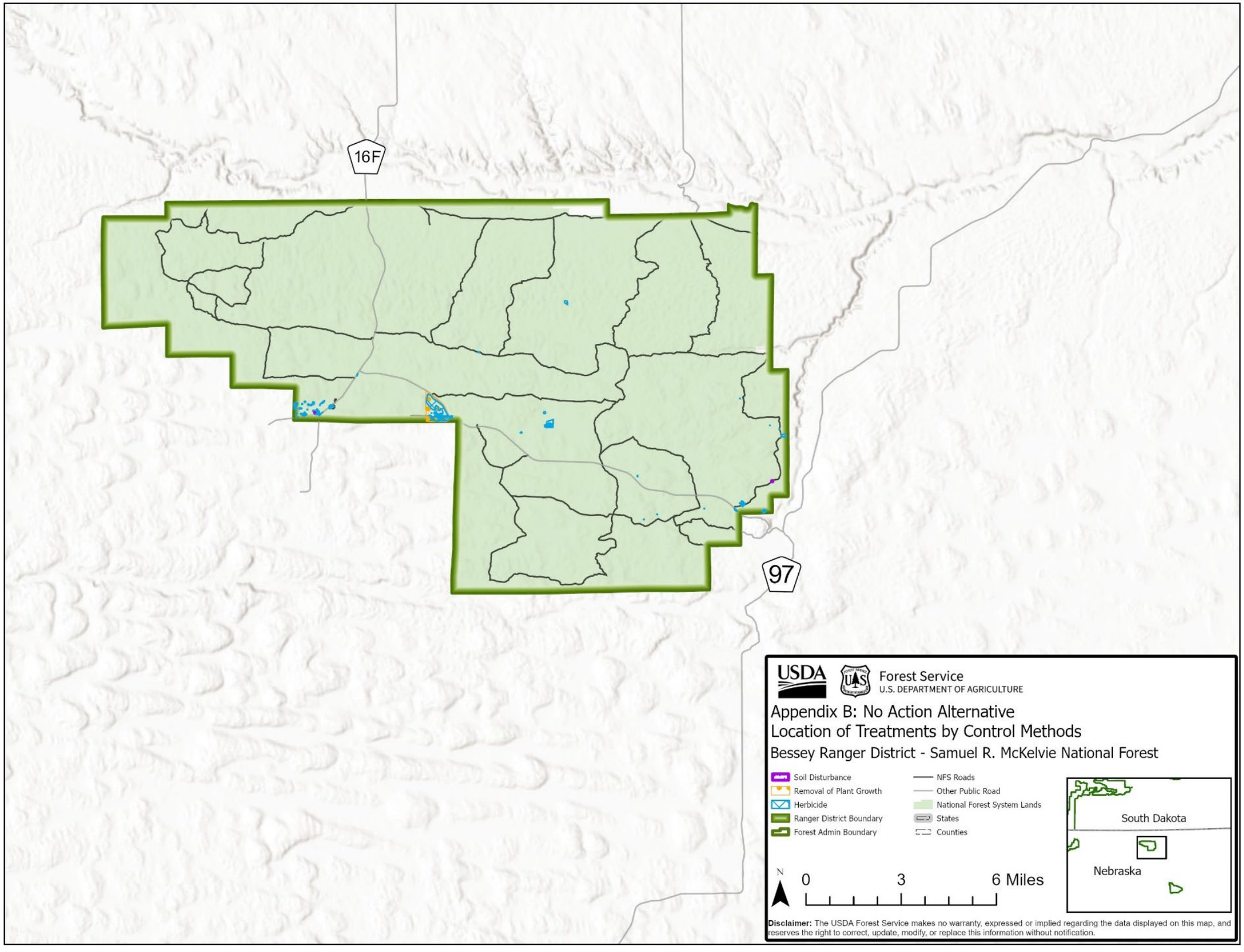


Figure 19. Bessey Ranger District, Samuel R. McKelvie National Forest location of treatments by control methods

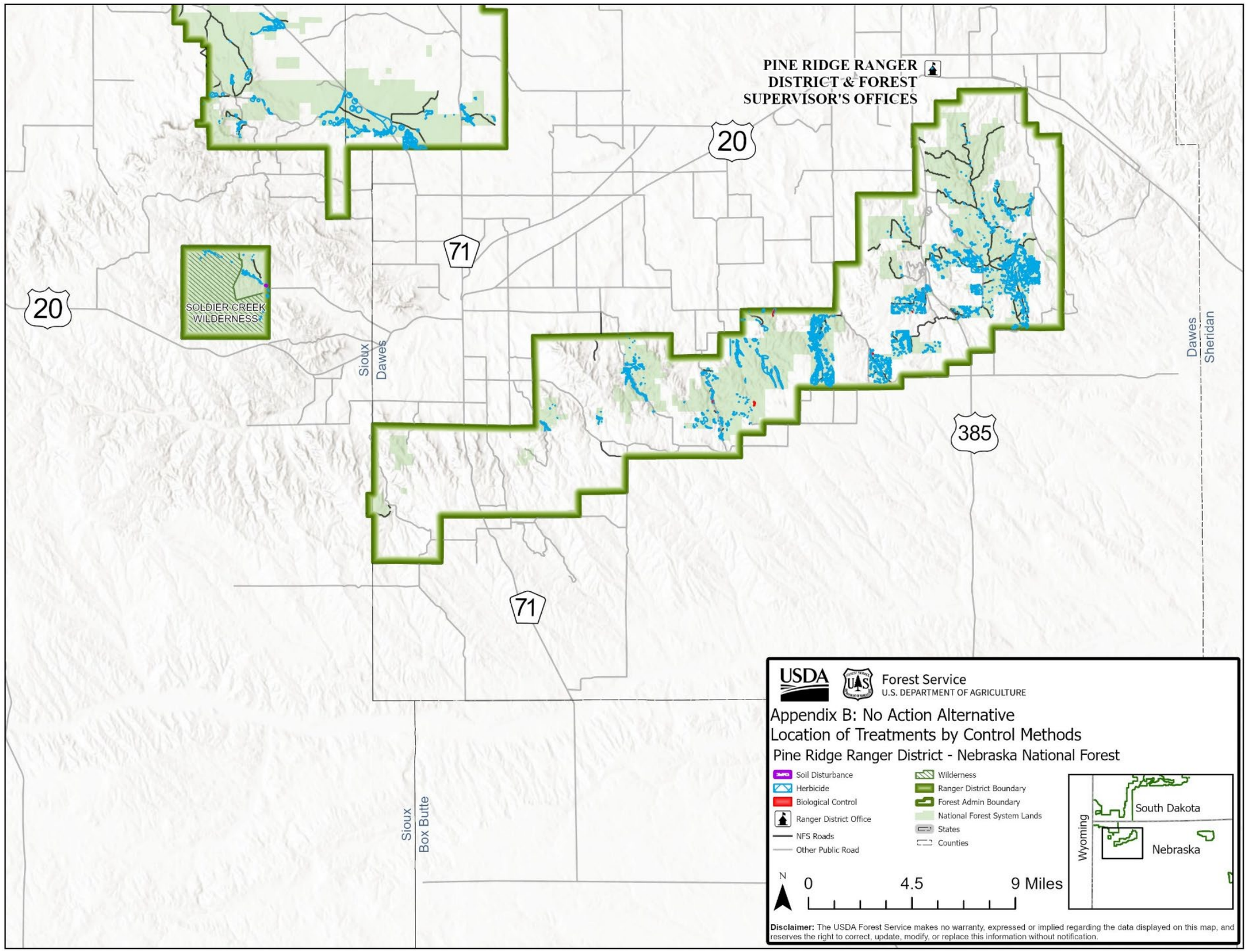


Figure 20. Pine Ridge Ranger District, Nebraska National Forest location of treatments by control methods

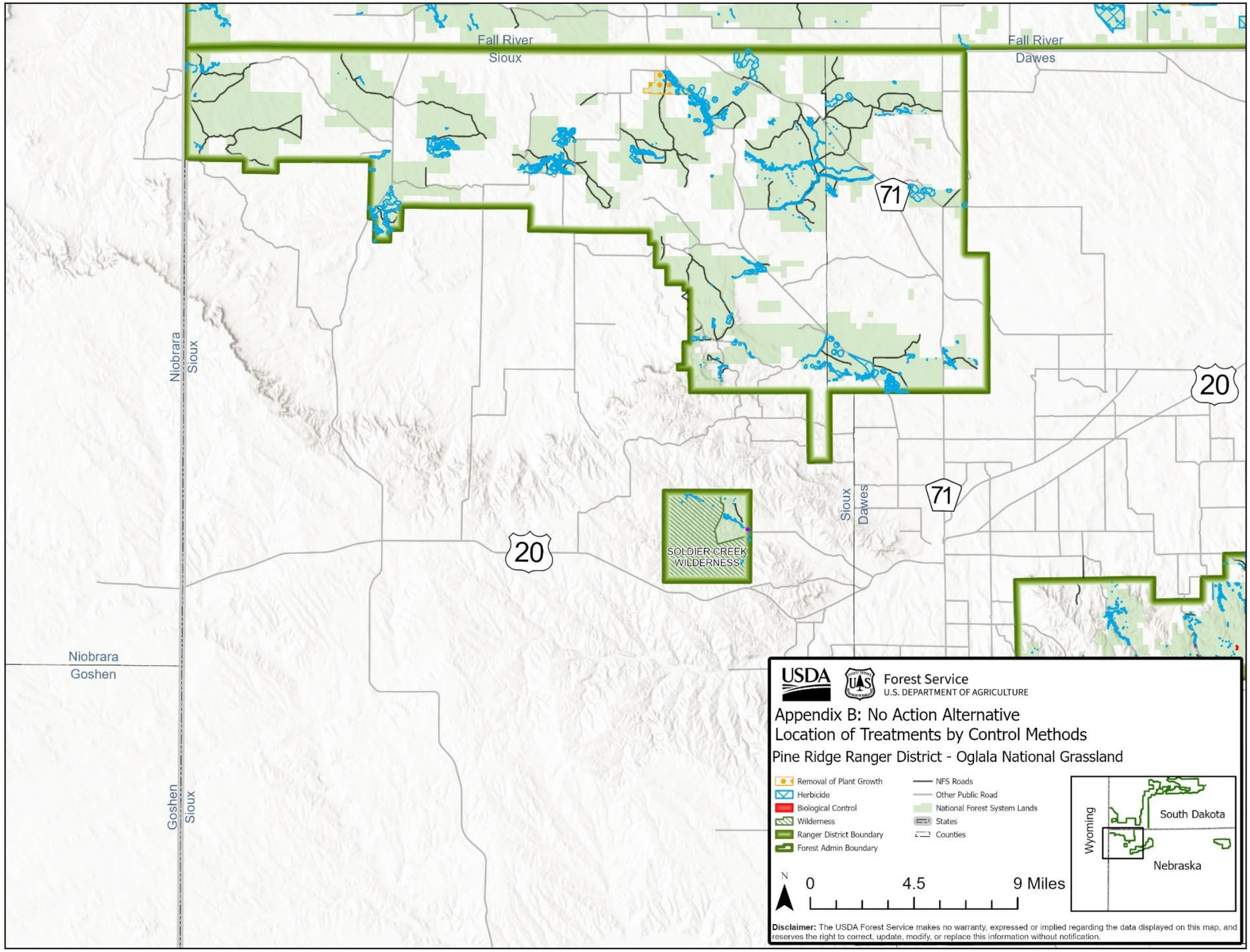


Figure 21. Pine Ridge Ranger District, Oglala National Grassland location of treatments by control methods

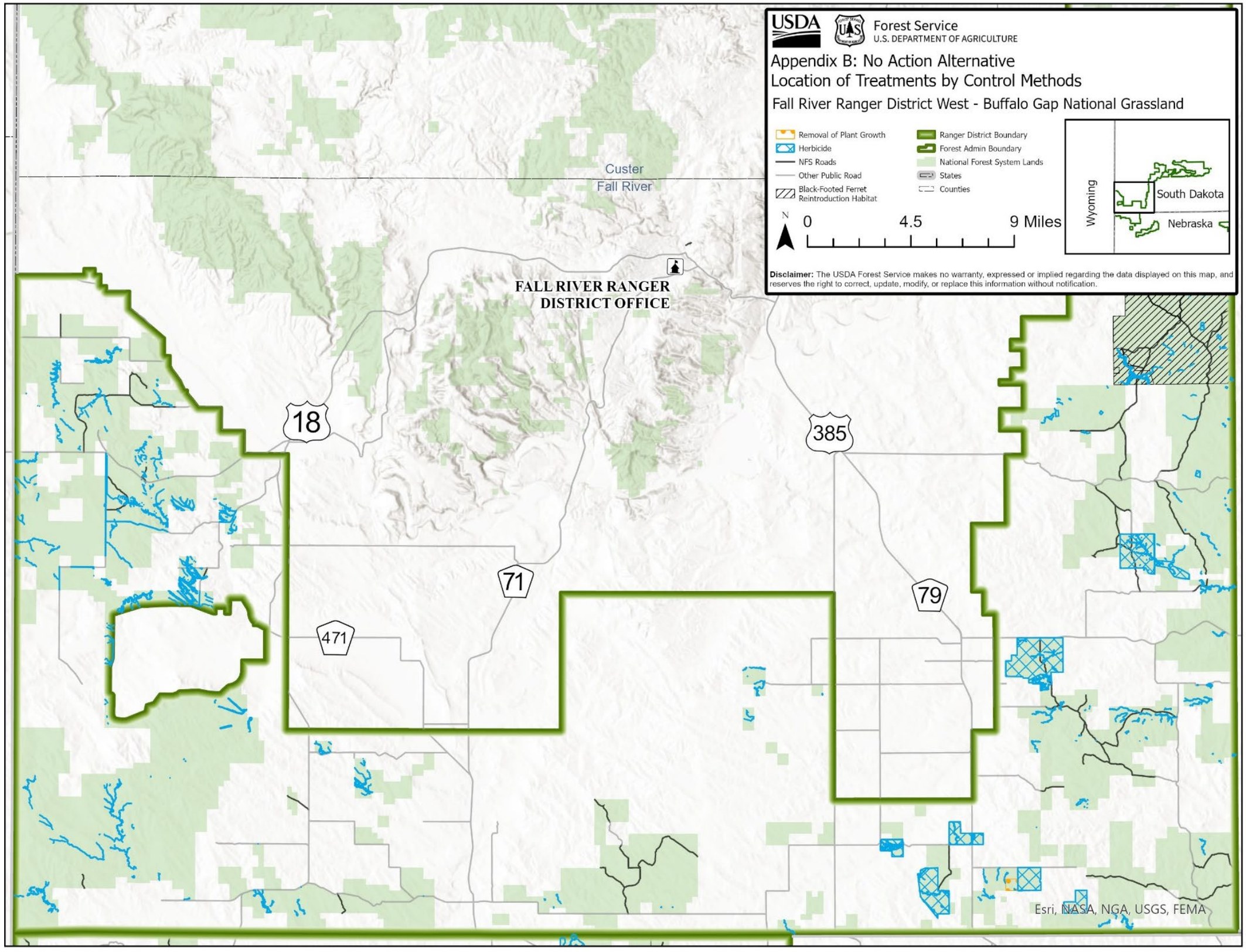


Figure 22. Fall River Ranger District West, Buffalo Gap National Grassland location of treatments by control methods

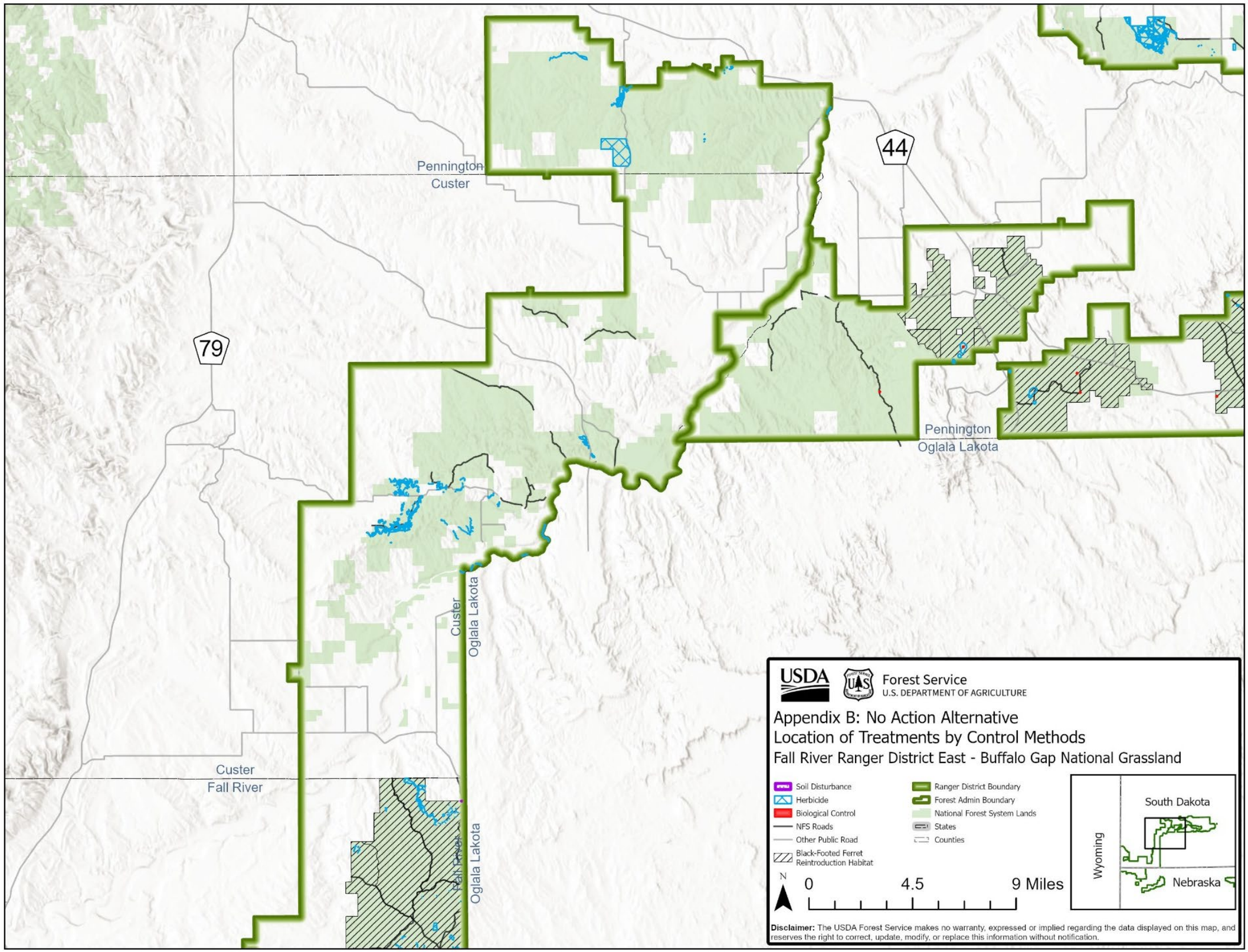


Figure 23. Fall River Ranger District East, Buffalo Gap National Grassland location of treatments by control methods

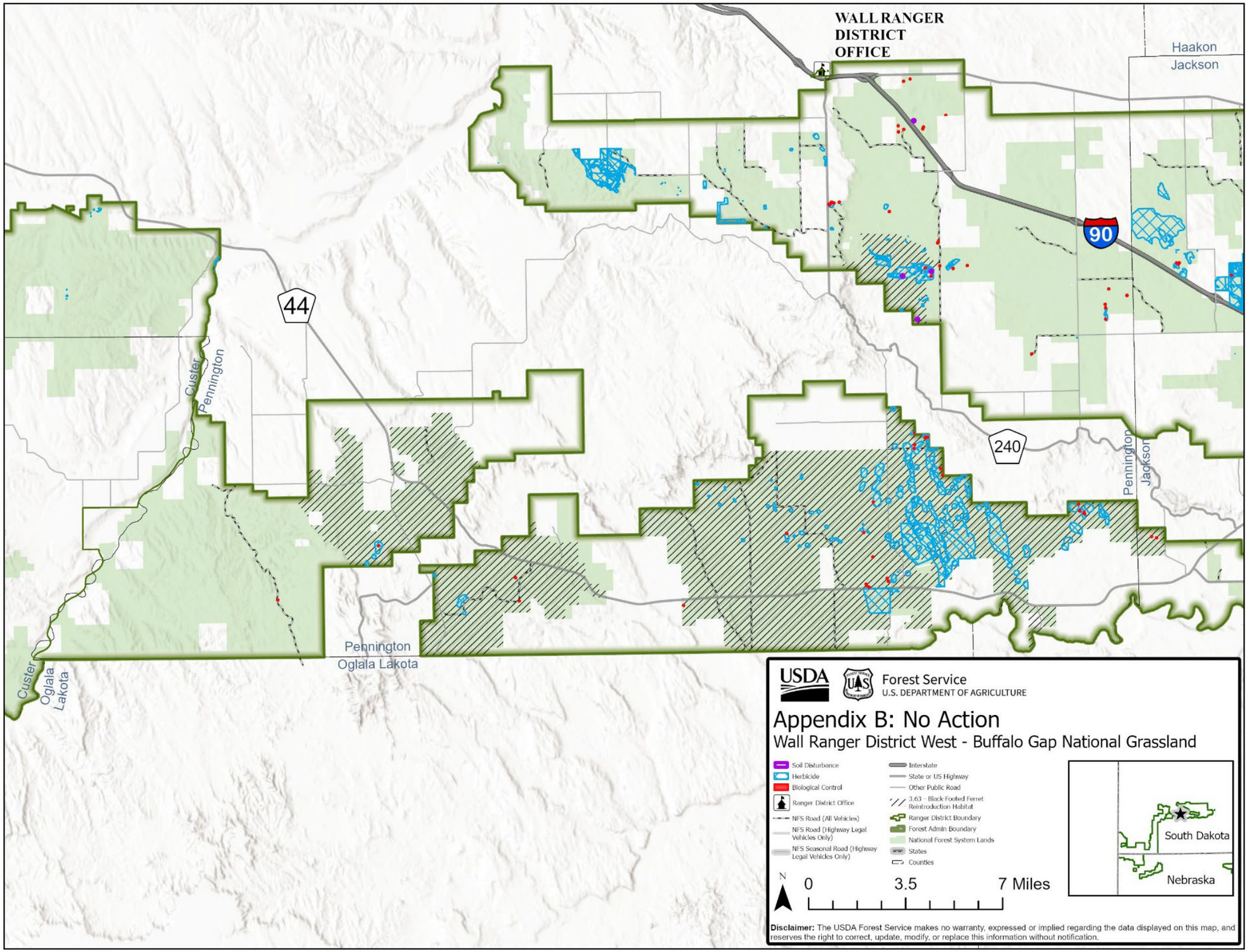


Figure 24. Wall Ranger District West, Buffalo Gap National Grassland location of treatments by control methods

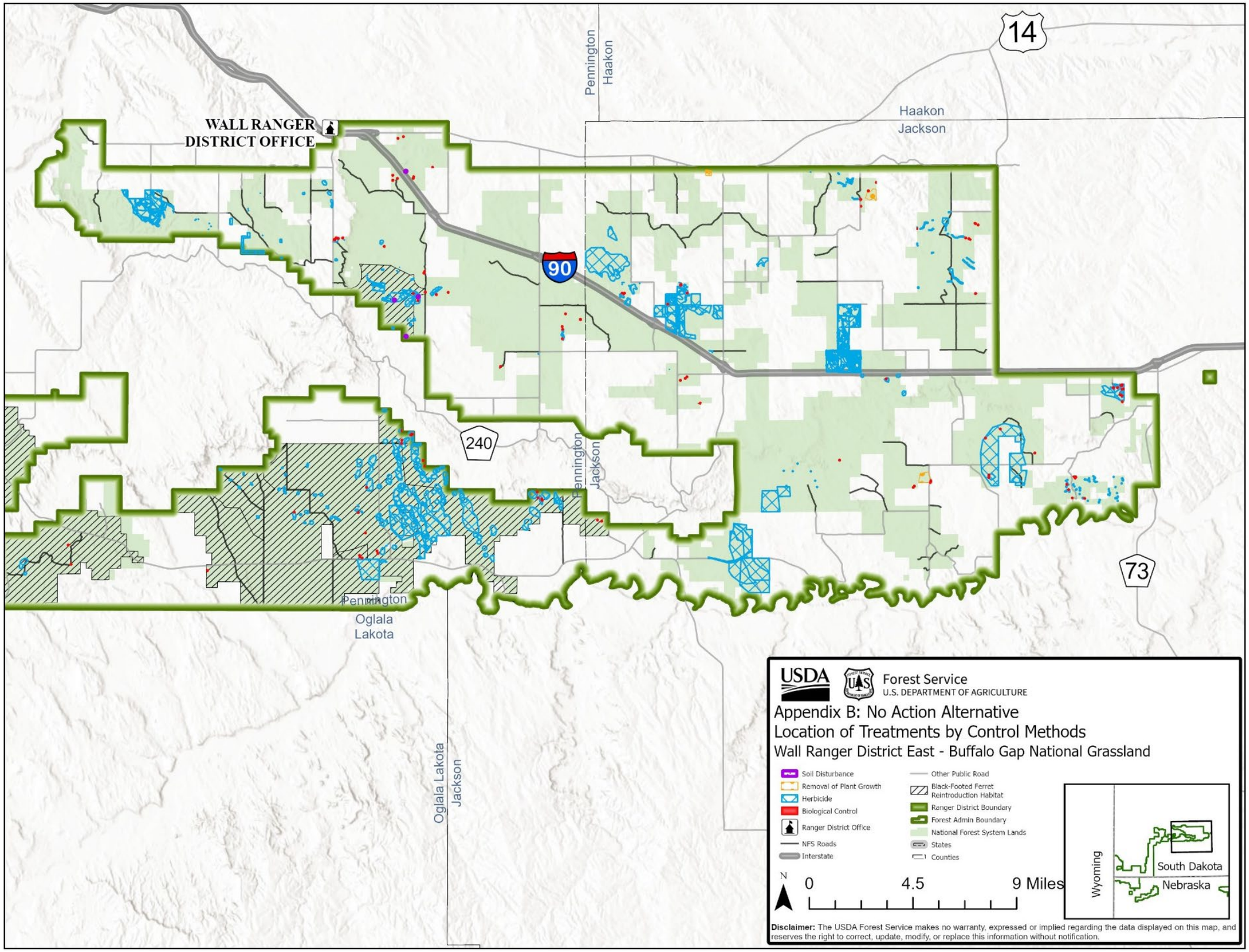


Figure 25. Wall Ranger District East, Buffalo Gap National Grassland location of treatments by control methods

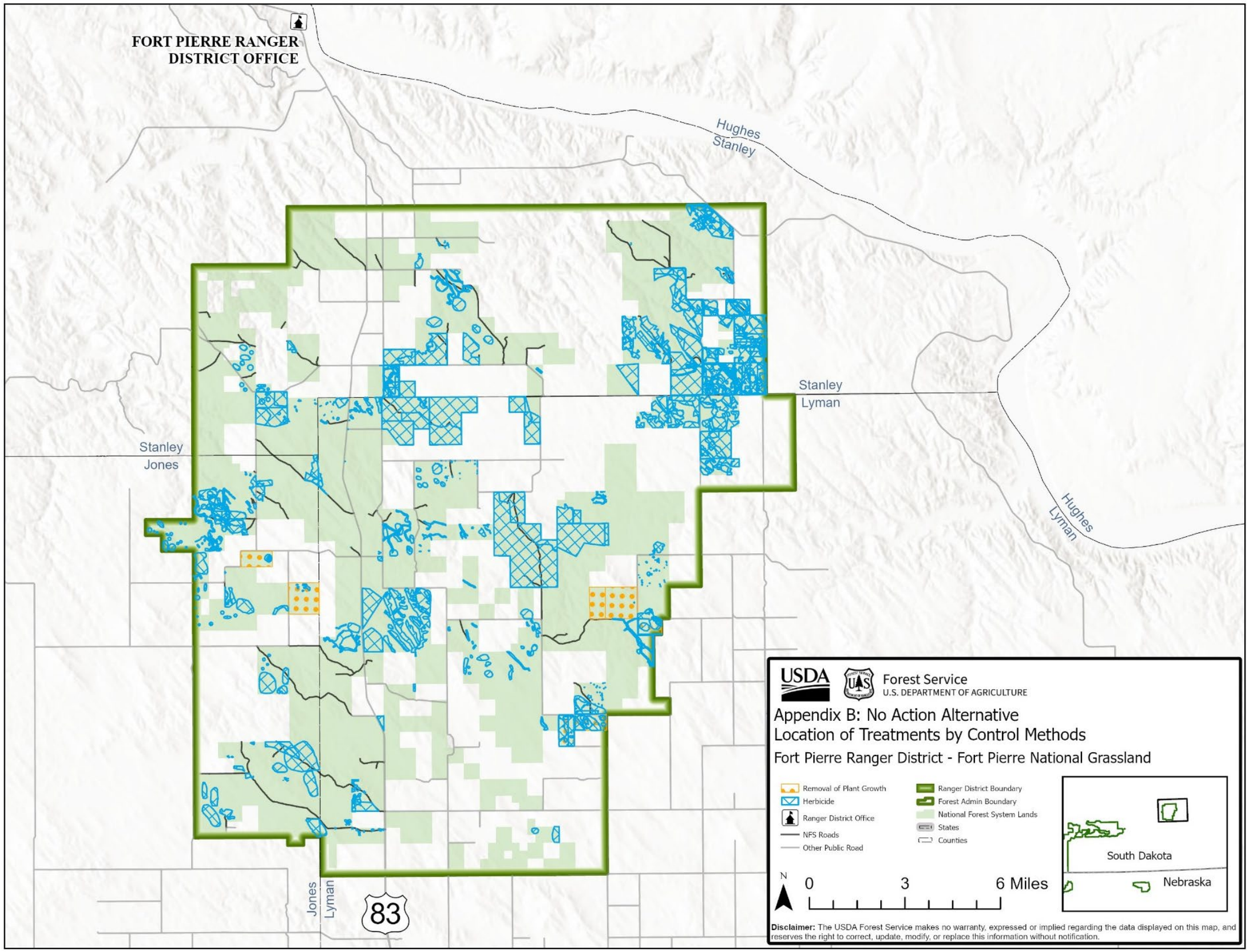


Figure 26. Fort Pierre Ranger District, Fort Pierre National Grassland location of treatments by control methods

Appendix C: Modified Proposed Action Alternative – Potential Undesirable Plant Species to be Targeted

Nebraska state designated noxious weed list was amended August 2014 and South Dakota noxious weed list was implemented July 27, 2020.

Nebraska County declared noxious weed lists were updated in June 2023 and South Dakota locally declared noxious weed lists were updated on July 26, 2023.

This is not an inclusive list of species to be treated. It is derived from state noxious, watch, or invasive plant lists, problematic species, previously treated species, and species known to occur in the project area or in surrounding counties and states.

Table 28. Modified proposed action alternative potential undesirable plant species to be targeted

Common name	Scientific name	Category
Absinth wormwood	*Artemisia absinthium*	noxious, invasive
Amur honeysuckle	*Lonicera maackii*	invasive
Autumn olive	*Elaeagnus umbellata*	invasive
Black henbane	*Hyoscyamus niger*	noxious, invasive
Black knapweed	*Centaurea moncktonii*	invasive
Bohemian knotweed	*Polygonum x bohemicum*	noxious
Brazilian elodea	*Egeria densa*	invasive
Brittle naiad	*Najus minor*	invasive
Brownray knapweed	*Centaurea jacea*	invasive
Buffalobur	*Solanum rostratum*	weed
Bull thistle	*Cirsium vulgare*	noxious, invasive
Callery pear	*Pyrus calleryana*	invasive
Canda thistle	*Cirsium arvense*	noxious
Carolina horsenettle	*Solanum carolinense*	native
Caucasian bluestem	*Bothriochloa bladhii*	invasive
Common buckthorn	*Rhamnus cathartica*	invasive
Common burdock	*Arctium minus*	non-native
Common mullein	*Verbascum thapsus*	noxious, invasive
common St. Johnswort	*Hypericum perforatum*	noxious
Common tansy	*Tanacetum vulgare*	noxious
Common teasel	*Dipsacus fullonum*	invasive
Common watercress	*Nasturtium officinale*	invasive
Creeping foxtail	*Alopercurus arundinaceus*	invasive
Creeping water primrose	*Ludwigia peploides*	invasive
Crested wheatgrass	*Agropyron cristatum*	invasive
Crownvetch	*Securigera varia*	non-native
Curly-leaf pondweed	*Potamogeton crispus*	invasive
Cutleaf teasel	*Dipsacus laciniatus*	invasive
Dalmatian toadflax	*Linaria dalmatica*	noxious

Common name	Scientific name	Category
Diffuse knapweed	*Centaurea diffusa*	noxious
Downy brome	*Bromus tectorum*	invasive
Dyer's woad	*Isatis tinctoria*	non-native
Eastern redcedar	*Juniperus viriniana*	invasive
Eurasian watermilfoil	*Myriophyllum spicatum*	invasive
Field bindweed	*Convolvulus arvensis*	noxious, invasive
Field garlic	*Allium vineale*	invasive
Flowering rush	*Butomus umbellatus*	invasive
Garlic mustard	*Allaria petiolata*	invasive
Giant knotweed	*Polygonum sachalinense*	noxious
Giant reed	*Arundo donax*	invasive
Giant salvinia	*Salvinia molesta*	invasive
Goatsrue	*Galega officinalis*	invasive
Grecian foxglove	*Digitalis lanata*	non-native
Hairy vetch	*Vicia villosa*	invasive
Hoary alyssum	*Berteroa incana*	non-native
Hoary cress (whitetop)	*Cardaria draba*	noxious
Houndstongue (gypsyflower)	*Cynoglossum officinale*	noxious, invasive
Hydrilla	*Hydrilla verticillata*	invasive
Intermediate wheatgrass	*Thinopyrum intermedium*	invasive
Japanese brome	*Bromus japonicus*	invasive
Japanese honeysuckle	*Lonicera japonica*	invasive
Japanese hops	*Humulus japonicas*	invasive
Japanese knotweed	*Polygonum cuspidatum*	noxious
Johnsongrass	*Sorghum halepense*	non-native
Kentucky bluegrass	*Poa pratensis*	invasive
Kochia	*Bassia scoparia*	non-native
Kudzu	*Pueraria montana*	non-native
Larkspur	*Delphinium sp.*	native
Leafy spurge	*Euphorbia esula*	noxious
Meadow deathcamas	*Zigadenus venenosus*	native
Medusahead	*Taeniatherum caput-medusae*	invasive
Multiflora rose	*Rosa multiflora*	invasive
Morrow's honeysuckle	*Lonicera morrowii*	invasive
Musk thistle (nodding plumeless thistle)	*Carduus nutans*	noxious
Narrowleaf cattail	*Typha angustifolia*	invasive
Oriental bittersweet	*Celastrus orbiculatus*	invasive
Osage orange	*Maclura pomifera*	invasive
Oxeye daisy	*Leucanthemum vulgare*	noxious, invasive
Palmer amaranth	*Amaranthus palmeri*	noxious, invasive
Parrot feather watermilfoil	*Myriophyllum aquaticum*	invasive
Perennial pepperweed	*Lepidium latifolium*	invasive

Common name	Scientific name	Category
Perennial sowthistle	*Sonchus arvensis*	noxious
Phragmites (common reed)	*Phragmites australis*	noxious
Plains pricklypear	*Opuntia polyacantha*	native
Poison hemlock	*Conium maculatum*	noxious
Poison ivy	*Toxicodendron sp.*	weed
Puncturevine	*Tribulus terrestris*	noxious
Purple loosestrife	*Lythrum salicaria*	noxious
Quackgrass	*Elymus repens*	invasive
Queen Anne's lace	*Daucus carota*	invasive
Racemed poisonvetch (cream milkvetch)	*Astragalus racemosus*	native
Redtop	*Agrostis gigantean*	invasive
Ripgut brome	*Bromus diandrus*	invasive
Russian knapweed	*Acroptilon repens*	invasive
Russian olive	*Elaeagnus angustifolia*	invasive
Saltcedar	*Tamarix ramosissima*	noxious
Saltlover	*Halogeton glomeratus*	invasive
Sandbur	*Cenchrus longispinus*	weed
Scentless false mayweed	*Tripleurospermum perforatum*	non-native
Scotch thistle	*Ononpordum acanthium*	noxious
Sericea lespedeza	*Lespedeza cuneata*	noxious
Showy fly honeysuckle	*Lonicera morrowii x tatarica*	invasive
Siberian elm	*Ulmus pumila*	invasive
Sickleweed	*Falcaria vulgaris*	non-native
Skeletonleaf bur ragweed	*Ambrosia tomentosa*	weed
Smooth brome	*Bromus inermis*	invasive
Spiny plumeless thistle	*Carduus acanthoides*	noxious
Spotted knapweed	*Centaurea stoebe ssp. micranthos*	noxious
Starry stonewort	*Nitellopsis obtuse*	invasive
Sulphur cinquefoil	*Potentilla recta*	noxious, invasive
Tall fescue	*Festuca arundinacea*	invasive
Tall wheatgrass	*Thinopyrum ponticum*	invasive
Tatarian honeysuckle	*Lonicera tatarica*	invasive
Tree-of-heaven	*Ailanthus altissima*	invasive
Ventenata	*Ventenata dubia*	invasive
Water hyacinth	*Eichhornia crassipes*	invasive
Water lettuce	*Pistia stratiotes*	invasive
White horehound	*Marrubium vulgare*	noxious
White mulberry	*Morus alba*	invasive
Wild mustard	*Sinapis arvensis ssp. arvensis*	non-native
Wild parsnip	*Pastinaca sativa*	invasive
Woolyleaf bursage	*Ambrosia grayi*	invasive
Yellow bluestem	*Bothriochloa ischaemum*	invasive

Common name	Scientific name	Category
Yellow flag iris	*Iris pseudacorus*	invasive
Yellow floating heart	*Nymphiodes peltata*	invasive
Yellow spring bedstraw	*Galium verum*	noxious
Yellow starthistle	*Centaurea solstitialis*	invasive
Yellow toadflax (butter and eggs)	*Linaria vulgaris*	noxious

Appendix D: Implementation Checklists

Undesirable Plant Management Project Implementation Checklist

This checklist broadly ensures that the responsible official and resource management team would select appropriate areas for undesirable plant treatment(s), apply project design features, and implement the activities consistent with the environmental analysis decision. The steps shown in this checklist take place prior to project implementation.

Ranger District:
Location (allotment, pasture, National Forest System road, etc.):
Coordinates (UTM; center point of treatment location):
Acres: **Map attached:** Yes / No
Target Species/Purpose/Objective:
NEPA Decision: (name, date decision signed)
Party Implementing Project: USDA Forest Service staff / Contractor / Other
Proposed Implementation (month/year):

Control Method(s) & Description

(Biological, Chemical, Mechanical, Prescribed Fire)

Method – Biological

Targeted livestock grazing: Yes / No

Host specific species: Yes / No
Species:

Timing: (month/date – month/date)

Method – Chemical

Application method(s): (spot, broadcast, aerial, wick, etc.)
If aerial application see attached checklist.

Herbicide(s):

Application rate(s):

Timing (month/date – month/date):

Method – Mechanical

Equipment type: (chainsaw, mower, haying, trimmer, etc.)

Timing (month/date – month/date):

Method – Prescribed Fire

Burn plan attached: Yes / No

Timing (month/date – month/date)

Will a combination of control methods be implemented for this project?
Yes / No

If yes, explain planning effort:

Is treatment within Wilderness, Recommended for Wilderness, Research Natural, or Special Interest Area?
Yes / No

If yes, explain planning effort, alignment with management objectives, list design feature(s):

Is treatment within an established recreational area?
Yes / No

If yes, explain planning effort, list design feature(s):

Is treatment area within 1/8 of a mile (200 meters) of lands of other ownership?
Yes / No

If yes, has coordination with landowner/manager been completed? Yes / No

Contact name, date, highlights of discussion:

Water Quality Best Management Practices

Watersheds within Project Area:
Risk Assessment Level: Low / Moderate / High
Ground Disturbance: Yes / No
Sedimentation Increase Expected: Yes / No
Best Management Practices Implemented (buffer, erosion control measures, avoidance):
Design Features Implemented (see attached):

Air Quality Best Management Practices

Are there Class I or Class II airsheds within or near Project Area: Yes / No
Name airsheds or locations identified:
If yes, has coordination with landowner/manager been completed? Yes / No Contact name, date, highlights of discussion:
Best management practices implemented (drift calculations, smoke management, avoidance):
Design features implemented (see attached):

Surveys Required

Heritage Resources: Yes / No Survey and/or review complete: Yes / No Finding, date, & reviewer: SHPO/THPO consultation complete: Yes / No Design features implemented (see attached):
Wildlife/Fisheries Resources: Yes / No Survey and/or review complete: Yes / No Finding, date, and reviewer: USDI Fish and Wildlife Service consultation complete: Yes / No Design features implemented (see attached):

Silviculture: (in forested areas or involving woody treatments) Yes / No Survey and/or review complete: Yes / No Prescription, date, and reviewer: Design features implemented (see attached):
Botany/Range: Yes / No Survey and/or review complete: Yes / No Finding, date, and reviewer: Design features implemented (see attached):

Prepared by:

_____ Date:_____
Name & Title

Reviewed by: (only those that apply)

_____ Date:_____
Archeologist

_____ Date:_____
Biologist

_____ Date:_____
Forester

_____ Date:_____
Recreation Specialist

_____ Date:_____
Botanist/Range Specialist

_____ Date:_____
Fire/Fuels Specialist

_____ Date:_____
Other

_____ Date:_____
Approved by:
(Approval by Line Officer only)

Attachments:
Undesirable Plant Management Design Features (Examples: Project Map, Burn Plan, Aerial Checklist)

Aerial Application of Herbicide Checklist

This checklist broadly ensures that the responsible official would select appropriate area(s) for aerial application of herbicides, apply the project design features, and implement the activities consistent with the environmental analysis decision. The steps shown in this implementation checklist would take place prior to the decision to use aerial application(s) in a project area.

Ranger District:
Location: (allotment, pasture, National Forest System road, etc.)
Coordinates: (UTM; center point of treatment location)
Acres: **Map Attached:** Yes / No
Target Species/Purpose/Objective:
NEPA Decision (name, date decision signed):
Party Implementing Project: USDA Forest Service Staff / Contractor / Other
Proposed Implementation (month/year):

Project Development

What agencies, groups, or individuals did you contact to inform of this management action? (attached, listed below)
Were other alternatives considered? Yes / No
Explain your reasoning:
Is treatment area adjacent to non-Forest Service lands? Yes / No If yes, has coordination with landowner/manager been completed? Yes / No Contact name, title, & date of contact:

Physical Environment Review

Are there potential adverse effects to soils within the project area? Yes / No *Consider soil types and chemical makeup of herbicide used. Follow label instructions to avoid long-term residual effects to soil resources.* Explain your reasoning and any required mitigation:
Are there potential adverse effects to aquatic or riparian resources within the project area? Yes / No *Consider water quality regulations when planning project. Consider weather and specific environment of application for management of drift. Identify and/or mark buffer zones of known aquatic or riparian areas.* Explain your reasoning and any required mitigation:

Are there potential adverse effects to air quality within the project area? Yes / No

Consider air quality regulations when planning project. Consider weather and specific environment of application for management of drift. Identify known areas of recreational use or residence within close proximity to project area.

Explain your reasoning and any required mitigation:

Are there potential adverse effects to non-target plant species within the project area? Yes / No

Consider types of vegetation, project location, type of herbicide applied, or rates of application.

Explain your reasoning and any required mitigation:

Are there potential adverse effects to terrestrial, avian, or aquatic species, to include their habitat, within the project area? Yes / No

Consider substantial habitat values and management objectives for project area. Consider use of the area by wildlife, birds, fish, and other aquatic species.

Explain your reasoning and any required mitigation:

Are there potential adverse effects to threatened, endangered, or sensitive species, to include their habitat, within the project area? Yes / No

Consider any federally listed threatened or endangered species and their habitat in the project area.

Explain your reasoning and any required mitigation:

Are there potential adverse effects to historical, archaeological, or paleontological sites within the project area? Yes / No

Determine if surveys have been completed and if avoidance areas for historical, archaeological, or paleontological resources are required.

Explain your reasoning and any required mitigation:

Are there potential adverse effects to scenic quality within the project area? Yes / No

Determine if the project is location in a highly visible area to the public or known scenic location. What levels of noise, light, or visual effects would be produced?

Explain your reasoning and any required mitigation:

Are there other environmental documents pertinent to the project area? Yes / No

List other studies, plans, or projects currently implemented within the project area. Determine if any cumulative effects are likely to occur.

Explain your reasoning and any required mitigation:

Human Environment

Are there health and safety concerns that need to be considered prior to project implementation? Yes / No

Ensure Risk Assessment(s) have been completed and distributed.

Explain your reasoning and any required mitigation:

Do commercial or agricultural activities or production exist in or near the project area?
Yes / No

Identify how the treatment could affect these activities within the project area or adjacent properties.

If yes, list properties and ownership. Describe avoidance measures:

Are established recreational areas or access routes to these location in or near the project area?
Yes / No

Identify recreation areas, common activities, or access routes that occur in or near the project area. Determine any affects the project may have on recreational use.

Explain your reasoning and any required mitigation:

Determination

Is there a need for additional environmental analysis prior to implementation? Yes / No

If yes, level of analysis required (circle one):
Categorical Exclusion, or
Environmental Assessment (Supplemental or Complete), or
Environmental Impact Statement

Explain your reasoning:

Prepared by:

_____
Name (Print)

_____ Date:_____
Signature

Reviewed by:

_____
Name (Print)

_____ Date:_____
Signature

Approved by:

_____
Name (Print)

_____ Date:_____
Signature

Attachments: Project Implementation Checklist (Examples: Project Map, Contract Agreement, Certifications)

Appendix E: Project Design Features

Design features are sideboards for subsequent projects and activities to help achieve the desired outcome. This may include such things as legal and regulatory direction, treatment and clear need criteria, standards and guidelines, or monitoring and evaluation procedures.

The following includes two tables. Table 29 identifies design features representing the no-action alternative and the second table (table 30) the modified proposed action alternative.

No-Action Alternative Design Features

The no-action alternative's decisions do not specifically call out guidance as design features in their analysis, but the below direction found in individual ranger districts environmental assessments or decision documents meet the definition of a design feature. This direction was filtered from the each of the current decisions for ease of comparison of alternatives. Consistency between each ranger district's decision is lacking. Similar "design features" between ranger districts are listed to show this inconsistency. The following table lists each design feature, the applicable law, regulation, policy or forest plan standard that is complied with by applying the design feature, where the design feature is applicable (ranger district) and under which control method the design feature could be necessary.

Table 29. No-action design features by resource area

Design feature	Ensures compliance with	Ranger district	Control method
Cultural Resources			
1. A pre-treatment cultural resource survey will be conducted on all sites identified for control through tillage.	Section 106 of the National Historic Preservation Act of 1966	Fort Pierre Ranger District Fall River Ranger District	Mechanical
Fire/Fuels			
1) No applicable design features			
Forestry			
1) No applicable design features			
Implementation			
1) Do not spray when wind velocity is more than 10 miles per hour.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District Fall River Ranger District	Chemical
2) No spraying will occur when air temperatures exceed a temperature where the herbicide being applied begins to volatilize.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fall River Ranger District	Chemical
3) Use drift reduction techniques - course, low pressure spray (less than 30 psi); and keep spray nozzles close to the ground.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District	Chemical
4) Workers will read and heed label precautions for all herbicides.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District	Chemical

Design feature	Ensures compliance with	Ranger district	Control method
5) To avoid accidental exposures to workers, all workers will follow all label precautions for all herbicides.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fall River Ranger District	Chemical
6) Workers will wear the following clothing at all times when handling herbicides: a. Long-sleeved shirt b. Long pants c. Boots (Rubber or wear rubber boot cover d. Hard hat e. Gloves - (Rubber, plastic, or neoprene) f. Cover-all's.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District	Chemical
7) Pants, shirt, and cover-all's are to be changed if they become noticeable wet, and after each day's use. They will be washed separate from other clothes in a strong liquid detergent.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District	Chemical
8) Goggles or eye shields will be worn whenever measuring and/or mixing concentrated herbicides.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District	Chemical
9) Workers must wear protective clothing at all times when handling herbicides. Label instructions list required protective clothing.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fall River Ranger District	Chemical
10) Eyewash facilities will be available on site.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District	Chemical
11) Hands or clothing with pesticides on them will be kept away from eyes. If solution or dust enters the eyes, flush them immediately with clean water for several minutes. Contact a doctor immediately.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District	Chemical

Design feature	Ensures compliance with	Ranger district	Control method
12) Hands and face will be washed thoroughly with soap and warm water immediately after work or at earliest opportunity if pesticides contact bare skin.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District	Chemical
13) Hands and face will be washed thoroughly with soap and warm water before eating.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District	Chemical
14) Use a course spray and low pressure (less than 30 psi) to minimize drift.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fall River Ranger District	Chemical
15) All spray equipment will be cleaned in the field and not at the Forest Service Work Center.	Best Management Practices	Fall River Ranger District	Chemical
16) At a minimum, all herbicide applicators will have a current South Dakota Commercial Pesticide Applicators License.	South Dakota Codified Law	Fall River Ranger District	Chemical
17) At a minimum all label health and safety instructions will be followed.	Environmental Protection Agency chemical label instructions.	Fall River Ranger District	Chemical
18) Guidelines provided in Forest Service Manual 2080 and mitigation/stipulation measures described on Forest Service pesticide use proposals and safety hazard analysis documents would be implemented annually.	Forest Service Manual 2080	Fall River Ranger District	Chemical
19) An on-site field survey will be conducted by Forest Service district personnel to determine the presence and proximity of resources that may be at risk from treatments, including human habitations, aquatic resources, special status species, and cultural resources.	Best Management Practices	Fall River Ranger District	Biological, Chemical, Mechanical
20) Forest Service policies and guidance would be followed in implementing all treatment methods.	Best Management Practices	Fall River Ranger District	Chemical

Design feature	Ensures compliance with	Ranger district	Control method
21) Maximum safe application amounts for workers using herbicides will be determined prior to project implementation	Environmental Protection Agency chemical label instructions.	Fall River Ranger District	Chemical
22) An emergency spill contingency plan for herbicides will be developed. Personnel responsible for application of herbicides would have the necessary equipment and/or knowledge regarding implementation of the plan.	Best Management Practices	Fall River Ranger District	Chemical
23) Monitoring of herbicide use would be completed on an annual and daily basis.	Best Management Practices South Dakota Codified Law	Fall River Ranger District	Chemical
24) All areas treated will be monitored for effectiveness of control, level of infestation of targeted species, and control type used.	Best Management Practices Nebraska Forest Plan	Fall River Ranger District	Biological, Chemical, Mechanical
Recreation/Public Outreach			
1) When using physical control through soil disturbance within wilderness areas, only non-mechanical methods such as pulling, cutting and grubbing will be utilized.	The Wilderness act	Fort Pierre Ranger District	Mechanical
2) Post areas sprayed until all foliage is completely dry. Signs will include information on the target species sprayed and the herbicide used. When possible, spray applications will be accomplished when human use is likely to be low.	Best Management Practices	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District	Chemical
3) To inform the public of herbicide control activities within a particular area, the area will be posted until the foliage is completely dry. Signs will conform to Environmental Protection Agency publication “The Worker Protection Standard for Agricultural Pesticides”	Best Management Practices	Fall River Ranger District	Chemical

Design feature	Ensures compliance with	Ranger district	Control method
4) When possible, spray applications will be accomplished when human use is likely to be low.	Best Management Practices	Fall River Ranger District	Chemical
5) When practical, Concentrated Human Use areas will be treated when they are closed to human use. Areas such as trailheads, where it is not practical to close to human use, will be posted for 72 hours following spraying. Signs will include information on target plant species and herbicide used.	Best Management Practices	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District Fall River Ranger District	Chemical
Soils, Riparian, and Aquatic			
1) Riparian and Wetland areas will not be tilled.	Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook	Fort Pierre Ranger District Fall River Ranger District	Mechanical Control
2) Manual and mechanical control techniques requiring ground disturbance, other than through manual hand control methods, would not be done in riparian or wetland areas.	Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook	Fall River Ranger District	Mechanical Control
3) All spraying within 100 feet of a water body will be with a hand-held wand rather than a boom-type sprayer	Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook Federal Water Pollution Control Act (1956, as amended); Clean Water Act (1972, as amended); Safe Drinking Water Act (1974, as amended); and State Water Quality Requirements	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District	Chemical
4) All spraying within riparian and wetland areas will be with a hand-held wand rather than a boom-type sprayer.	Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook Federal Water Pollution Control Act (1956, as amended); Clean Water Act (1972, as amended); Safe Drinking Water Act (1974, as amended); and State Water Quality Requirements	Fall River Ranger District	Chemical
5) Only herbicides registered for aquatic use will be used in riparian and wetland areas.	Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District	Chemical

Design feature	Ensures compliance with	Ranger district	Control method
6) Only herbicides registered for aquatic use may be used in riparian and wetland areas and along water courses.	Environmental Protection Agency chemical label instructions.	Fall River Ranger District	Chemical
7) Pesticides containers will be emptied thoroughly and rinsed three times before disposal. Rinsate will be put in spray containers.	Federal Water Pollution Control Act (1956, as amended); Clean Water Act (1972, as amended); Safe Drinking Water Act (1974, as amended); and State Water Quality Requirements	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District Fall River Ranger District	Chemical
8) If herbicide granules are applied on hard, packed soils, especially in windy areas, they will be incorporated into the soil.	Best Management Practices	Fall River Ranger District	Chemical
9) Rinsate will be put in spray equipment and used for spraying. Rinsed pesticide containers will be disposed of in conformance with label instructions. When possible, the South Dakota container recycling program will be utilized.	Best Management Practices Federal Water Pollution Control Act (1956, as amended); Clean Water Act (1972, as amended); Safe Drinking Water Act (1974, as amended); and State Water Quality Requirements	Fall River Ranger District	Chemical
10) Soil disturbance may result in severe erosion due to drainages, flood plains, high water tables, and general topography of the area, therefore areas with high water tables and steep topography will be avoided.	Best Management Practices	Fall River Ranger District	Mechanical Control
Vegetation			
1) Insure that domestic animals used to control a noxious weed are not moved to an un-infested area during the period of seed production.	Best Management Practices	Fort Pierre Ranger District	Biological
2) Domestic animals used to control an undesirable plant species would not be grazed in an infested area during the period of plant seed production and then moved to another vegetative community. This is intended to limit the spread of plant species through animal fecal material.	Best Management Practices	Fall River Ranger District	Biological

Design feature	Ensures compliance with	Ranger district	Control method
3) Closely monitor grazing animals to insure that the animals are on the site long enough to consume the undesirable plant, but not long enough to damage the other plants.	Best Management Practices	Fort Pierre Ranger District	Biological
4) Monitoring vegetation to insure that grazing does not damage the other plants and/or resources.	Best Management Practices	Fall River Ranger District	Biological
5) Pre-treatment surveys will be required anytime control activities are planned in a listed threatened and endangered (threatened and endangered) and/or candidate plant's known or suspected habitat. If any listed or candidate species are identified during these surveys, control options will be limited to those which will not adversely affect those plants.	Best Management Practices	Fort Pierre Ranger District Fall River Ranger District	Biological, Chemical, Mechanical, Prescribed Fire
6) On large sites, adjacent to waterways, lakes and ponds where tilling is used, sediment control strategies would be implemented. Control strategies would include, but not be limited to immediate revegetation with desirable species, sediment fences, hay bales, mulching, or other appropriate measures.	Best Management Practices	Fort Pierre Ranger District Fall River Ranger District	Chemical (Aerial)
7) In order to avoid damaging and/or killing non-target plant species, use spot treatment to the extent possible and practical.	Best Management Practices	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District	Biological, Prescribed Fire
8) Use a spot treatment strategy to the extent possible and practical.	Best Management Practices	Fall River Ranger District	Biological, Chemical, Mechanical, Prescribed Fire
9) Use the lowest application rate recommended for effective control of a given undesirable plant species.	Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District Fall River Ranger District	Chemical

Design feature	Ensures compliance with	Ranger district	Control method
10) Avoid areas where trees are present and herbicides may leach down to the root zones.	Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District Fall River Ranger District	Chemical
11) Only selective herbicides that will not damage trees and shrubs and other non-target species; and application techniques (wick applicators, directed sprays) will be used in areas where non-target trees and shrubs are present.	Best Management Practices Environmental Protection Agency chemical label instructions.	Fall River Ranger District	Chemical
12) When required by the herbicide label, livestock will be held off treated areas for the specified time following application.	Environmental Protection Agency chemical label instructions.	Fort Pierre Ranger District Pine Ridge Ranger District Wall Ranger District Fall River Ranger District	Chemical
13) In selecting a competitive plant species or insect agent criteria will be based upon specific site restrictions such as slope, soil type, and existing species composition.	Animal Health and Plant Inspection Service guidance	Fall River Ranger District	Biological
14) All areas treated will be monitored to determine effectiveness of control, biological control agent used, and level of infestation of target species.	Animal Health and Plant Inspection Service guidance	Fall River Ranger District	Biological
15) Only native indigenous ORB and pathogenic fungi would be allowed to be used under this alternative.	Animal Health and Plant Inspection Service guidance	Fall River Ranger District	Biological
16) Undesirable plant surveys would be kept showing locations of undesirable plants and where treatment activities have occurred.	Best Management Practices Nebraska Forest Plan	Fall River Ranger District	Biological, Chemical, Mechanical
17) Seed from native plants will be used to revegetate disturbed ground.	Best Management Practices Nebraska Forest Plan	Fall River Ranger District	Biological, Chemical, Mechanical
Wildlife			
1) No applicable design features			

Modified Proposed Action Alternative Design Features

Design features were developed for the modified proposed action to provide resource protection and consistency with applicable laws, regulations, and policies during implementation of the Undesirable Plant Management Project. The following table lists each design feature, the applicable law, regulation, or policy or forest plan standard that is complied with by applying the design feature, where the design feature is applicable (by unit, management area, habitat/resource condition, etc.), and under which control method the design feature could be necessary.

The design features are expected to provide adequate resource protection under most treatment scenarios associated with project implementation. However, there may be instances where additional or more stringent design features are needed to address locally unique conditions. In these cases, the additional, or more stringent, project design features would be developed by Nebraska resource specialists and approved by the responsible official prior to treatment implementation.

Table 30. Modified Proposed Action design features by resource area

Design feature	Ensures compliance with	Applicable area/activity	Control method
Cultural Resources			
1) A request for specialist review will be submitted prior to any undertaking.	Section 106 of the National Historic Preservation Act of 1966	All National Forest System lands under the management of the Nebraska.	Biological, Chemical, Mechanical, Prescribed Fire
2) Identify and review known permitted or traditional cultural plant gathering areas prior to implementation.	Section 106 of the National Historic Preservation Act of 1966	All National Forest System lands under the management of the Nebraska.	Biological, Chemical, Mechanical, Prescribed Fire
Fire/Fuels			
1) Any prescribed fire activity will require an approved prescribed burn plan.	Forest Service Manual 5100 – Fire Management	All National Forest System lands under the management of the Nebraska.	Prescribed Fire
Forestry			
1) Consult with Forester before entering forested cover types to identify planned reforestation, natural regeneration stocking levels, potential mortality limits, and to discuss timing of activities.	National Forests Management Act (Reforestation Requirements)	All desired pine/hardwood cover types.	Biological, Chemical, Mechanical, Prescribed Fire
2) In forested areas where tree planting has been completed within 20 years, no treatments will occur that can affect woody plant species without approval from the unit Forester.	National Forests Management Act (Reforestation Requirements)	Pine/Hardwood Regeneration Areas – Planting Completed within 20 years.	Chemical (Aerial & Ground), Mechanical, Prescribed Fire

Design feature	Ensures compliance with	Applicable area/activity	Control method
3) All treatments focusing on woody plant species require consultation with the Forester to determine if signed silvicultural prescriptions are needed.	Nebraska Forest Plan management area objectives, National Forests Management Act.	All areas.	Biological, Chemical, Mechanical, Prescribed Fire
4) Do not begin undesirable plant management implementation in areas under active forestry contracts.	Contracting practices	All areas.	Biological, Chemical, Mechanical, Prescribed Fire
Implementation			
1) Annual implementation meetings for all undesirable plant management actions would occur to determine which proposed projects require use of implementation checklist(s).	All applicable design features.	All National Forest System lands under the management of the Nebraska.	Biological, Chemical, Mechanical, Prescribed Fire
2) Individual treatments would not be implemented until necessary project implementation checklist(s) have been completed and a responsible official has authorized the treatment.	All applicable design features.	All National Forest System lands under the management of the Nebraska.	Biological, Chemical, Mechanical, Prescribed Fire
3) Ensure that previous relevant environmental analysis decisions are reviewed prior to implementation.	Previously completed environmental analysis decisions.	All National Forest System lands under the management of the Nebraska.	Biological, Chemical, Mechanical, Prescribed Fire
Recreation/Public Outreach			
1) Implement the most effective, least impactive treatment method to achieve desired conditions within designated Wilderness Area(s) following the Minimum Requirement Decision Guide.	The Wilderness act	Designated Wilderness Area(s)	Biological, Chemical, Mechanical, Prescribed Fire
2) When treatments occur along property boundaries, coordination with adjacent private landowners or public land managers will occur.	Best Management Practices	All National Forest System lands under the management of the Nebraska adjacent to other property boundaries.	Biological, Chemical, Mechanical, Prescribed Fire

Design feature	Ensures compliance with	Applicable area/activity	Control method
Soils, Riparian, and Aquatic			
1) Apply herbicides using selective treatments and methods that minimize risk of entry to surface and ground water.	Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook Federal Water Pollution Control Act (1956, as amended); Clean Water Act (1972, as amended); Safe Drinking Water Act (1974, as amended); and State Water Quality Requirements Nebraska Land and Resource Management Plan, chapter 1, Water 10, Standard Nebraska Land and Resource Management Plan, chapter 1, Water 11, Standard Nebraska Land and Resource Management Plan, chapter 1, Water 12, Standard	All National Forest System lands under the management of the Nebraska.	Chemical Control
2) During use periods, inspect herbicide transportation, storage, or application equipment for leaks. If leaks occur, report and clean them up. Contaminated soils and other material shall be removed from NFS lands and disposed of according to label directions.	Forest Service Handbook 6709.11 – Health and Safety Code Handbook Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook Federal Water Pollution Control Act (1956, as amended); Clean Water Act (1972, as amended); Safe Drinking Water Act (1974, as amended); and State Water Quality Requirements Nebraska Land and Resource Management Plan, chapter 1, Water 10, Standard Nebraska Land and Resource Management Plan, chapter 1, Water 12, Standard	All National Forest System lands under the management of the Nebraska.	Chemical Control

Design feature	Ensures compliance with	Applicable area/activity	Control method
3) Locate vehicle service and fuel areas, chemical storage, mix, load, clean and use areas 100 feet away from water sources.	Forest Service Handbook 2509.25 – Watershed Conservation Practices Handbook Federal Water Pollution Control Act (1956, as amended); Clean Water Act (1972, as amended); Safe Drinking Water Act (1974, as amended); and State Water Quality Requirements Nebraska Land and Resource Management Plan, chapter 1, Water 10, Standard Nebraska Land and Resource Management Plan, chapter 1, Water 11, Standard Nebraska Land and Resource Management Plan, chapter 1, Water 14, Standard	All National Forest System lands under the management of the Nebraska.	Chemical and Mechanical Control
4) Ground herbicide applications will maintain a 100-foot buffer of all water sources unless the formulations are approved for aquatic application.	Federal Water Pollution Control Act (1956, as amended); Clean Water Act (1972, as amended); Safe Drinking Water Act (1974, as amended); and State Water Quality Requirements Nebraska Land and Resource Management Plan, chapter 1, Water 10, Standard Nebraska Land and Resource Management Plan, chapter 1, Water 11, Standard Nebraska Land and Resource Management Plan, chapter 1, Water 12, Standard	All water sources within Forest System lands under the management of the Nebraska.	Chemical
5) Consult aerial application checklist prior to implementation to ensure proper consideration of soils, riparian, and aquatic resources.			Chemical (aerial)
Vegetation			
1) Baseline information will be collected on the existing condition of known threatened, endangered, and sensitive plant species in the proposed treatment area.	The Endangered Species Act of 1973	Threatened, endangered, proposed, sensitive species or species of local concern.	Biological, Chemical, Mechanical, Prescribed Fire
2) Only biological control agents that have been approved by USDA Animal and Plant Health Inspection Service will be released.	Animal and Plant Health Inspection Service Biological Control Program	All National Forest System lands under the management of the Nebraska.	Biological

Design feature	Ensures compliance with	Applicable area/activity	Control method
3) Where biocontrol agents have become successfully established, protect those sites from other forms of weed control to promote spread of the biocontrol agents and provide collection locations for release at other sites	Animal and Plant Health Inspection Service Biological Control Program	Biocontrol areas	Biological, Chemical, Mechanical, Prescribed Fire
4) Herbicides will be rotated, when and where possible, to prevent the development of herbicide resistant plants.	Best Management Practices	All National Forest System lands under the management of the Nebraska.	Chemical
5) Use lowest chemical application rate recommended for effective control of targeted species.	U.S. Environmental Protection Agency chemical label instructions.	All National Forest System lands under the management of the Nebraska.	Chemical
6) Aerial spray units would be field validated, flagged, and marked using global positioning system (GPS) prior to spraying to ensure only appropriate portions of the unit are aerially treated. To ensure that aerial treatments stay within intended treatment areas, units will be marked using GPS before and during the flight.	Best Management Practices	All Forest System lands, outside wilderness and special management areas, under the management of the Nebraska.	Chemical (Aerial)
7) Following prescribed burning, defer livestock grazing or rest pastures to allow for resource recovery as determined by management purpose.	Nebraska Forest Plan Grassland-wide Objective	All National Forest System lands under the management of the Nebraska.	Biological, Prescribed Fire
8) Site(s) where restoration and rehabilitation treatments have been applied may need to be protected from grazing by using temporary fencing or other livestock exclusion methods appropriate for the site(s).	Forest Service Manual 2000 – chapter 2070 Vegetation Ecology	All National Forest System lands under the management of the Nebraska.	Biological, Chemical, Mechanical, Prescribed Fire

Design feature	Ensures compliance with	Applicable area/activity	Control method
Wildlife			
1) Where species of concern or their habitat are known to exist conduct pre-implementation surveys when appropriate.	The Endangered Species Act of 1973 Nebraska Forest Plan Chemical Label	All National Forest System lands under the management of the Nebraska.	Biological, Chemical, Mechanical, Prescribed Fire
2) If a Federally listed species, sensitive species, species of local concern, or a critical/important habitat component of those species is found prior to or during project implementation, all project activities will immediately cease, and the local biologists/botanists will be notified. If protection measures are required, they will be implemented prior to the resumption of project activities.	The Endangered Species Act of 1973 Nebraska Forest Plan Chemical Label	All National Forest System lands under the management of the Nebraska.	Biological, Chemical, Mechanical, Prescribed Fire
3) The use of Aerial Chemical Applications is prohibited in all 3.63 Management Areas (Black-footed Ferret Reintroduction Habitat).	The Endangered Species Act of 1973 Nebraska Forest Plan	Management Area 3.63	Chemical Application

Appendix F: Response to Public Comments (Standalone document)

Appendix G: U.S. Fish and Wildlife Service Consultation

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Dakota Ecological Services Field Office
420 South Garfield Avenue, Suite 400
Pierre, SD 57501-5408
Phone: (605) 224-8693 Fax: (605) 224-1416

In Reply Refer To: February 25, 2023
Project Code: 2023-0049327
Project Name: Nebraska National Forests and Grasslands Undesirable Plant Management EIS

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/media/endangered-species-consultation-handbook

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/law/bald-and-golden-eagle-protection-act, https://www.fws.gov/media/endangered-species-act-1, and/or https://www.fws.gov/law/migratory-bird-treaty-act-1918.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/law/migratory-birds

Please be aware that bald and golden eagles are protected under the Migratory Bird Treaty Act (16 U.S.C. §§ 703-712, as amended), as well as the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). Projects affecting these species may benefit from the development of an Eagle Conservation Plan (ECP), see guidance at this website (https://www.fws.gov/node/266177). An ECP can assist developers in achieving compliance with regulatory requirements, help avoid “take” of eagles at project sites, and provide biological support for eagle permit applications. Additionally, we recommend wind energy

developments adhere to our Land-based Wind Energy Guidelines for minimizing impacts to migratory birds and bats.
We have recently updated our guidelines for minimizing impacts to migratory birds at projects that have communication towers (including meteorological, cellular, digital television, radio, and emergency broadcast towers). These guidelines can be found at:

https://www.fws.gov/story/incidental-take-beneficial-practices-communication-towers
http://www.towerkill.com

According to National Wetlands Inventory maps, (available online at https://www.fws.gov/library/collections/national-wetland-inventory) wetlands exist adjacent to the proposed construction corridor. If a project may impact wetlands or other important fish and wildlife habitats, the U.S. Fish and Wildlife Service (Service), in accordance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321-4347) and other environmental laws and rules, recommends complete avoidance of these areas, if possible. If this is not possible, attempts should be made to minimize adverse impacts. Finally if adverse impacts are unavoidable, measures should be undertaken to replace the impacted areas. Alternatives should be examined and the least damaging practical alternative selected. If wetland impacts are unavoidable, a mitigation plan addressing the number and types of wetland acres to be impacted, and the methods of replacement should be prepared and submitted to the resource agencies for review.

Please check with your local wetland management district to determine whether Service interest lands exist at the proposed project site, the exact locations of these properties, and any additional restrictions that may apply regarding these sites. The Offices are listed below. If you are not sure which office to contact, we can help you make that decision.

U.S. Fish and Wildlife Service, Huron Wetland Management District, Federal Building, Room 309, 200 4th Street SW, Huron, SD 57350; telephone (605) 352-5894. Counties in the Huron WMD: Beadle, Buffalo, Hand, Hughes, Hyde, Jerauld, Sanborn, Sully.

U.S. Fish and Wildlife Service, Lake Andes Wetland Management District, P O Box 18, Pickstown, South Dakota, 57367; telephone (605) 487-7603. Counties in the Lake Andes WMD: Aurora, Brule, Charles Mix, Davison, Douglas.

U.S. Fish and Wildlife Service, Madison Wetland Management District, P.O. Box 48, Madison, South Dakota, 57042, telephone (605) 256-2974. Counties in the Madison WMD: Bon Homme, Brookings, Clay, Deuel, Hamlin, Hanson, Hutchinson, Kingsbury, Lake, Lincoln, McCook, Miner, Minnehaha, Moody, Turner, Union, Yankton.

U.S. Fish and Wildlife Service, Sand Lake Wetland Management District, 39650 Sand Lake Drive, Columbia, South Dakota, 57433; telephone (605) 885-6320. Counties in the Sand Lake WMD: Brown, Campbell, Edmunds, Faulk, McPherson, Potter, Spink, Walworth.

U.S. Fish and Wildlife Service, Waubay Wetland Management District, 44401 134A Street, Waubay, South Dakota, 57273; telephone (605) 947-4521. Counties in the Waubay WMD: Clark, Codington, Day,

Grant, Marshall, Roberts.

You are welcome to visit our website (https//www.fws.gov/office/southdakota-ecological-services) or to contact our office/staff at the address or phone number above for more information.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Note: IPaC has provided all available attachments because this project is in multiple field office jurisdictions.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

South Dakota Ecological Services Field Office
420 South Garfield Avenue, Suite 400
Pierre, SD 57501-5408
(605) 224-8693

This project's location is within the jurisdiction of multiple offices. However, only one species list document will be provided for all offices. The species and critical habitats in this document reflect the aggregation of those that fall in each of the affiliated office's jurisdiction. Other offices affiliated with the project:

Nebraska Ecological Services Field Office
9325 B South Alda Rd., Ste B
Wood River, NE 68883-9565
(308) 382-6468

Wyoming Ecological Services Field Office
334 Parsley Boulevard
Cheyenne, WY 82007-4178
(307) 772-2374

PROJECT SUMMARY

Project Code: 2023-0049327

Project Name: Nebraska National Forests and Grasslands Undesirable Plant Management EIS

Project Type: Invasive Plant Control

Project Description: The Nebraska National Forests and Grasslands propose to develop a comprehensive undesirable plant management plan to update direction used within the Nebraska National Forests and Grasslands boundaries. This plan would update existing Nebraska National Forests and Grasslands policy for the management of noxious weeds, invasive plant species, and/or undesirables plant species to incorporate modern, supported methodology. Management development would encompass a process designed to support early detection and rapid response, control methods and preventative measures, rehabilitation and restoration, and implementation and effectiveness monitoring.

To provide for early detection and rapid response this plan would allow for the prompt treatment of undesirable plant infestations. These infestations may include existing and future sites. The intent of early detection and rapid response is to allow timely control so that infestations can be treated when they are small, which prevents establishment and spread while reducing treatment costs and adverse consequences.

Proposed control methods would be based on the most current methods known to be effective for each target species. These methods include, but are not limited to, (1) biological control, such as the release of host-specific natural enemies or targeted grazing; (2) chemical control using agency approved herbicides that target undesirable plant species; (3) mechanical techniques, such as mowing, cutting or pulling; and (4) prescribed fire conducted in accordance with Nebraska National Forests and Grasslands suppression and prescribed burn management policy. Control methods would be employed alone or in combination to achieve the most effective control. The use of preventative measures to reduce the introduction and spread of undesirable species would continue to be implemented Forest-wide. Treatment methods would be based on the extent, location, type, and character of an infestation and would be implemented using design criteria developed to ensure ecosystem health. Forest-wide combined treatments of up to one hundred thousand acres annual over a fifteen-year period can be expected. Treated acre totals could be those that are treated a single time or multiple times annually using a combination of methods.

Rehabilitation and restoration actions would be designed and implemented based on the conditions found in and around infested areas. Passive vegetation (allowing plants on site to fill in treated areas) and active revegetation would be considered. Rehabilitation techniques would be assessed and implemented to promote native plant communities that

are resistant to infestation by undesirable plants.
The Nebraska National Forests and Grasslands would like to implement the proposed action in 2024. Management priority would be based on risk factors such as the number and size of known infestations; vectors for spread; proximity to susceptible habitat; threat to important resources (e.g., wilderness, endangered species habitat); and ability to out-compete desirable plant species. The priority of species to be treated would vary based on these factors and could change over time. These priorities would be used to guide selection of specific management activities for each infestation.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@43.75060735,-102.1984212758693,14z



Counties: Nebraska, South Dakota, and Wyoming

ENDANGERED SPECIES ACT SPECIES

There is a total of 14 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Black-footed Ferret *Mustela nigripes* Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6953	Endangered
Black-footed Ferret *Mustela nigripes* Population: U.S.A. (WY and specified portions of AZ, CO, MT, SD, and UT, see 17.84(g)(9)) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6953	Experimental Population, Non-Essential
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

BIRDS

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

FISHES

NAME	STATUS
Pallid Sturgeon *Scaphirhynchus albus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7162	Endangered
Topeka Shiner *Notropis topeka (=tristis)* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4122	Endangered

INSECTS

NAME	STATUS
American Burying Beetle *Nicrophorus americanus* Population: Wherever found, except where listed as an experimental population No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/66	Threatened
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Blowout Penstemon *Penstemon haydenii*	Endangered
No critical habitat has been designated for this species.	
Species profile: https://ecos.fws.gov/ecp/species/6172	
Ute Ladies'-tresses *Spiranthes diluvialis*	Threatened
No critical habitat has been designated for this species.	
Species profile: https://ecos.fws.gov/ecp/species/2159	
Western Prairie Fringed Orchid *Platanthera praeclara*	Threatened
No critical habitat has been designated for this species.	
Species profile: https://ecos.fws.gov/ecp/species/1669	

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

The following FWS National Wildlife Refuge Lands and Fish Hatcheries lie fully or partially within your project area:

FACILITY NAME	ACRES
FARM SERVICE AGENCY INTEREST OF SD https://www.fws.gov/refuges/profiles/index.cfm?id=64540	565.474

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Golden-plover *Pluvialis dominica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Baird's Sparrow *Ammodramus bairdii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5113	Breeds May 20 to Aug 15

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Oct 15 to Aug 31
Black Tern *Chlidonias niger* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
California Gull *Larus californicus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 1 to Jul 31
Chestnut-collared Longspur *Calcarius ornatus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 10
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Clark's Grebe *Aechmophorus clarkii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 1 to Aug 31
Ferruginous Hawk *Buteo regalis* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/6038	Breeds Mar 15 to Aug 15
Franklin's Gull *Leucophaeus pipixcan* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Golden Eagle *Aquila chrysaetos* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds Jan 1 to Aug 31

NAME	BREEDING SEASON
Hudsonian Godwit *Limosa haemastica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds elsewhere
Lark Bunting *Calamospiza melanocorys* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Aug 15
Lesser Yellowlegs *Tringa flavipes* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Lewis's Woodpecker *Melanerpes lewis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Long-billed Curlew *Numenius americanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/5511	Breeds Apr 1 to Jul 31
Long-eared Owl *asio otus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3631	Breeds Mar 1 to Jul 15
Marbled Godwit *Limosa fedoa* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds May 1 to Jul 31
Mccown's Longspur *Calcarius mccownii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9292	Breeds May 1 to Aug 15
Mountain Plover *Charadrius montanus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3638	Breeds Apr 15 to Aug 15
Pinyon Jay *Gymnorhinus cyanocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9420	Breeds Feb 15 to Jul 15

NAME	BREEDING SEASON
Prairie Falcon *Falco mexicanus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/4736	Breeds Mar 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Sprague's Pipit *Anthus spragueii* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8964	Breeds May 10 to Aug 31
Western Grebe *aechmophorus occidentalis* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Willet *Tringa semipalmata* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 5

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum

probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

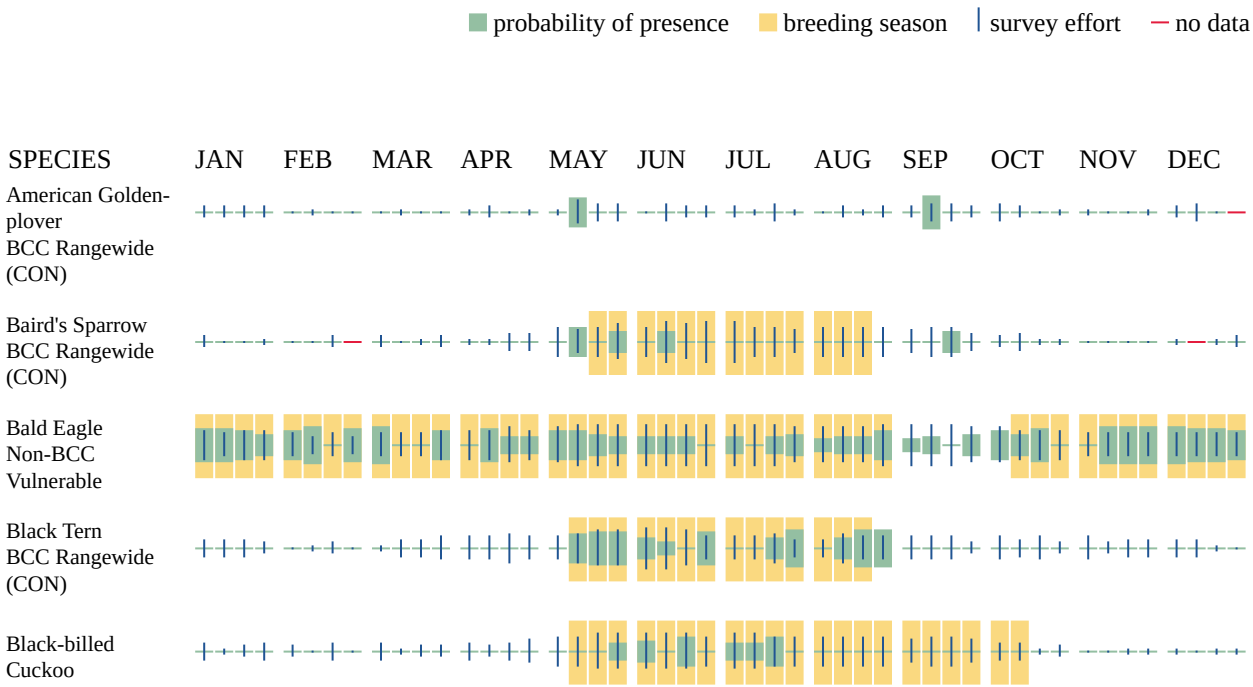
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

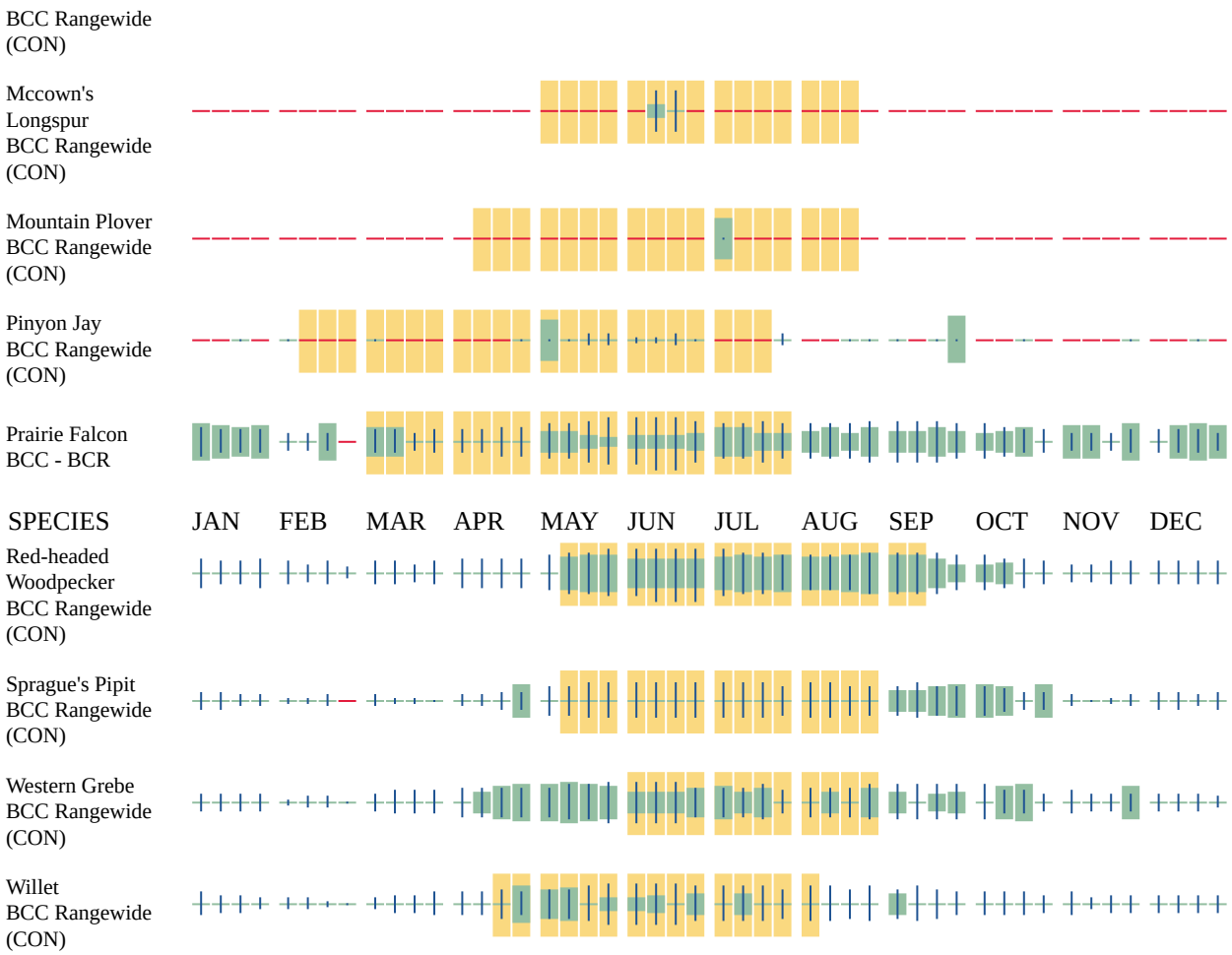
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.




BCC Rangewide (CON)
Bobolink BCC Rangewide (CON)
California Gull BCC Rangewide (CON)
Chestnut-collared Longspur BCC Rangewide (CON)
Chimney Swift BCC Rangewide (CON)
Clark's Grebe BCC Rangewide (CON)
Ferruginous Hawk BCC - BCR
Franklin's Gull BCC Rangewide (CON)
SPECIES
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
Golden Eagle Non-BCC Vulnerable
Hudsonian Godwit BCC Rangewide (CON)
Lark Bunting BCC - BCR
Lesser Yellowlegs BCC Rangewide (CON)
Lewis's Woodpecker BCC Rangewide (CON)
Long-billed Curlew BCC - BCR
Long-eared Owl BCC Rangewide (CON)
Marbled Godwit



Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits

may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);

2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities,

should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPAC USER CONTACT INFORMATION

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City: Chadron
State: NE
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Appendix H: References and Data Sources

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