Draft Environmental Assessment

Use of Genetically Modified, Glyphosate-Tolerant Soybeans and Corn on National Wildlife Refuge Lands in the Mountain–Prairie Region (Region 6)

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Summary

Draft Environmental Assessment

Use of Genetically Modified, Glyphosate-Tolerant Soybeans and Corn on National Wildlife Refuge Lands in the Mountain–Prairie Region (Region 6)

Abstract. The Mountain–Prairie Region of the U.S. Fish and Wildlife Service currently uses row crop farming on lands within the National Wildlife Refuge System to achieve a variety of management objectives. Genetically modified, glyphosate-tolerant soybeans and corn are regularly used under this practice. The increased use of glyphosate-tolerant soybeans and corn and revised Service policies regarding the use of genetically modified organisms warrants an evaluation of their use. This environmental assessment evaluates the impacts of allowing and disallowing the use of glyphosate-tolerant soybeans and corn on System-managed lands in Region 6. The analysis is based on issues and concerns identified during the planning process; a proposed action is identified on the basis of this analysis.

Executive Summary. Managed by the U.S. Fish and Wildlife Service (Service), the National Wildlife Refuge System (System) administers a national network of lands and waters for the conservation, management, and-where appropriate-restoration of fish, wildlife, and plant resources. Although Service policy calls for using the most natural means available to meet management objectives, policy does allow for the use of row crop farming where objectives cannot be met through maintenance of more natural ecosystems (USFWS 1985). In Region 6-which encompasses Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming-10,756 acres of the Service's total 2,462,987 fee title acres were farmed in 2009. Of the acres farmed in 2009, approximately 6.175 acres were genetically modified (GM) varieties of soybeans and corn.

Genetically modified crops, specifically glyphosatetolerant soybeans and corn, have been used as part of farming programs on System lands in Region 6 to manage and restore habitats on previously farmed sites. The increased use of glyphosate-tolerant crops as well as revised Service policy on the use of GM organisms warrants an evaluation of their continued use on System lands in Region 6. This environmental assessment (EA) is the instrument of that evaluation.

Chapter 1 describes the purpose and need for this EA, provides background on the history and purpose of farming on System lands in Region 6, summarizes applicable laws and policies, describes public outreach efforts for this EA, and lists issues that were identified during the public scoping period. Chapter 2 describes the alternatives that are evaluated in this EA as well as alternatives that were considered but not evaluated. Chapter 3 describes the physical environment and socioeconomic character of the portions of Region 6 that could be affected by the alternatives. Chapter 4 presents the evaluation of the alternatives, using the issues identified during scoping as the framework for analysis, and identifies a proposed action. Chapter 5 lists Service staff who prepared this EA as well as agencies consulted in its development.

The proposed action is Alternative A: Continue using glyphosate-tolerant soybeans and corn for habitat restoration and management on System-managed lands in Region 6 (No Action). This action was selected based on its conformance to the establishing purposes of the System and the desire to have the least impact on the environment.

Abbreviations

Administration Act	National Wildlife Refuge System Administration Act of 1966,
	as amended
APHIS	U.S. Department of Agriculture Animal and Plant Health
	Inspection Service
Appropriate Uses Policy	Appropriate Refuge Uses Policy
EA	environmental assessment
FONSI	finding of no significant impact
GM	genetically modified
Improvement Act	National Wildlife Refuge System Improvement Act of 1997
IPM	integrated pest management
NEPA	National Environmental Policy Act
P.L.	Public Law
PUP	Pesticide Use Proposal
Region 6	U.S. Fish and Wildlife Service Mountain–Prairie Region
Service	U.S. Fish and Wildlife Service
System	National Wildlife Refuge System
U.S.	United States
U.S.C.	United States Code
USDA	U.S. Department of Agriculture

CHAPTER 1—Purpose, Need, and Background Information

1.1 Purpose

The U.S. Fish and Wildlife Service (Service) has prepared this Draft Environmental Assessment (EA) to review and evaluate current and alternative actions that use glyphosate-tolerant soybeans and corn on National Wildlife Refuge System (System) lands in the Mountain–Prairie Region (Region 6) and to identify a preferred alternative. Each alternative was evaluated based on its environmental consequences, including biological and socioeconomic impacts, in accordance with the National Environmental Policy Act (NEPA). Once finalized, this EA will form the basis for selecting a preferred alternative for implementation and for determining if the alternative requires an environmental impact statement.

1.2 Need for Action

The increased use of glyphosate-tolerant soybeans and corn, along with revised Service policies regarding the use of genetically modified organisms, warrants an evaluation of their use on System-managed lands in Region 6.

1.3 Decision Framework

Based on this EA, the Regional Director for Region 6 will make two decisions:

- Select an alternative regarding use of glyphosatetolerant soybeans and corn on System lands in Region 6.
- Determine if the selected alternative is a federal action significantly affecting the quality of the human environment, thus requiring preparation of an environmental impact statement.

The proposed action recommended to the Regional Director is Alternative A: Continue using glyphosatetolerant soybeans and corn for habitat restoration and management on System-managed lands in Region 6 (No Action).

1.4 Background

For more than a century the Service (and its predecessors) has been acquiring lands and entering into agreements to manage lands for the purposes of protecting, restoring, and maintaining fish and wildlife habitat. A number of habitat management techniques are currently employed throughout Region 6. Prescribed fire, prescribed grazing, and water level manipulations may be used alone or in combination to simulate historical ecological processes that shaped native plant communities. However, where native plant communities have been removed or significantly altered, the management tools of haying, herbicide application, and farming may also be needed to meet management objectives.

In Region 6, System lands have regularly included units where native plant communities were eliminated through years of tillage and farming. In many cases, some or all of the upland acres of newly acquired units are existing farmlands; other units have previously been planted to nonnative species and have since deteriorated. Current management plans call for renovation of habitat or restoration of native plant communities, reflecting a general trend on all System lands in Region 6 of converting farmland to natural habitats, as natural habitats have greater value for wildlife (Tilman et al. 2001). In particular, there has been an emphasis on providing high-quality nesting cover for grassland-dependent migratory bird populations. To this end, former cropland has been seeded to grassland nesting cover.

Despite this trend of converting farmlands to natural habitats, current budget levels make it unlikely that the Service could immediately address all System lands requiring renovation or restoration. Compared to the cost of restoring land, farming is an effective management tool for preparing sites for restoration and managing invasive species until restoration can begin.

Farming as a management tool is conducted in several ways. One method is to work with a neighboring farmer—referred to as a *cooperator*—to plant a crop using cooperator-provided seed, labor, equipment, and other supplies in exchange for a portion of the crop. Under another method, a cooperator rents the land and harvests the entire crop. A third method entails System staff preparing the ground and planting a crop with System-provided equipment, operator(s), and supplies. Most farming in Region 6 is undertaken through agreements with cooperators.

The number of units and acres cooperatively farmed on System lands in Region 6 in any one season varies. In 2009, 10,756 acres of System lands were farmed in Region 6, constituting 0.4 percent of its total 2,462,987 fee title acres (figure 1). However, only 6,175 acres were planted with glyphosate-tolerant soybeans and corn.

Within the last decade, genetically modified (GM) crops have become widely available to the System's cooperative farmers. GM crop plants contain a gene (or genes) that has been inserted artificially rather than acquired naturally by the plant through pollination. The majority of GM crops in use today are glyphosate-tolerant, where a transgene has been inserted that enables the crop to tolerate and survive an application of an herbicide containing glyphosate. When applied to nearly all other species of growing plants, glyphosate kills the plant. Other GM crops include varieties with insect-resistance traits. In 2008, GM crops were planted on 92 percent of U.S. soybean acres and 80 percent of corn acres. Of the corn acres, however, 63 percent were glyphosate-tolerant variety only (Brookes and Barfoot 2010).

This Draft EA specifically addresses the following Federal Action:

The use of glyphosate-tolerant soybeans and corn for habitat restoration and management purposes on lands owned and/or managed by the System within Region 6 of the U.S. Fish and Wildlife Service in the states of Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming.

1.5 Authority, Legal Compliance, and Compatibility

System lands are managed consistent with a number of federal statutes, regulations, policies, and other guidance. The National Wildlife Refuge System Administration Act of 1966, as amended (16 United States Code [U.S.C.] 668dd–668ee) (Administration Act) is the core statute guiding management of the System. The National Wildlife Refuge System Improvement Act of 1997 (Public Law [P.L.] 105-57) (Improvement Act) made important amendments to the Administration Act, one of which was the mandate that a comprehensive conservation plan be completed for every unit of the System. Among other things, comprehensive conservation planning has required field stations to assess their current farming program and establish objectives for the future.

A list of other laws, regulations, policies, and executive orders that influence the System can be found in appendix A.

1.6 Coordination with Other Regions and Agencies

Preparation of this Draft EA was coordinated with a similar effort undertaken by the Service's Midwest Region (Region 3). In addition, internal comments were solicited from the Office of Science and Technology Policy in Washington, D.C., U.S. Department of Agriculture's (USDA's) Animal and Plant Health Inspection Service (APHIS) Biotechnology Regulatory Services, U.S. Environmental Protection Agency Biopesticides and Pollution Prevention Division, and the U.S. Food and Drug Administration's Center for Food Safety and Applied Nutrition.

1.7 Public Outreach and Comment

An internal and external public scoping period was held beginning on April 22, 2010, and ending on July 9, 2010. This scoping period allowed for a thorough review of available research and reviews related to the use of glyphosate-tolerant soybeans and corn prior to the development of this Draft EA. Scoping was coordinated between Regions 3 and 6, because both regions are currently evaluating the use of GM crops on System lands. However, Region 3 in its EA is reviewing farming as a management tool in addition to reviewing the use of glyphosate-tolerant soybeans and corn.

A total of 1,290 news outlets across 16 states received news releases announcing the Service's intent to review the use of glyphosate-tolerant soybeans and corn on System lands. News releases were posted on bulletin boards of Refuge Headquarters Offices in Region 6 during this scoping period. In addition, an announcement with a link on how to comment was posted on Region 3 and Region 6 websites.

Public open houses were held in Fergus Falls, Minnesota (June 17, 2010); Aberdeen, South Dakota (June 22, 2010); and Hartford, Kansas (June 24, 2010). A total of 10 individuals attended, all in Hartford, Kansas.

More than 30 written comments and emails were received from participants in the System farming program, neighboring landowners, private citizens, agricultural organizations, nongovernmental organizations, nonprofit organizations, the biotechnology industry,



Figure 1. Fee-title lands within the National Wildlife Refuge System in Region 6.

and herbicide manufacturers. All comments were reviewed and considered before writing this Draft EA. Comments were summarized and grouped into one of three categories—wildlife issues, habitat issues, and socioeconomic issues—as listed below.

WILDLIFE ISSUES

- 1. Using glyphosate-tolerant soybeans and corn could provide an alternative for farming that poses less risk to wildlife.
- 2. Agricultural herbicides could be toxic to wildlife.

HABITAT ISSUES

- 3. Using glyphosate-tolerant soybeans and corn could make habitat restoration and management more efficient and economical; increased costs associated with discontinuing the use of these crops could impede the progress of restoration efforts.
- 4. Farming combined with using glyphosate-tolerant soybeans and corn could be an effective way to control invasive plants, especially smooth brome and other cool-season exotic grasses.
- 5. Conservation tillage practices could be used by the Service to minimize soil erosion on cultivated lands.
- 6. Using glyphosate-tolerant soybeans and corn could result in the development of herbicide-resistant weeds on System lands.

SOCIOECONOMIC ISSUES

- 7. Conventional (not glyphosate-tolerant) soybean and corn seeds may be more difficult to obtain in local communities.
- 8. Not using glyphosate-tolerant soybeans and corn could make farming more costly for cooperators; local farming cooperators could lose income if farming is reduced or eliminated.
- 9. Using glyphosate-tolerant soybeans and corn could affect certified organic farmers.

1.8 Issues beyond the Scope of This Draft Environmental Assessment

This Draft EA is focused on the use of glyphosatetolerant soybeans and corn for habitat restoration and management on System-owned or -managed lands in Region 6. It does not evaluate GM organisms other than glyphosate-tolerant soybeans and corn.

Other issues regarding glyphosate-tolerant soybeans and corn were previously evaluated by the USDA's APHIS through NEPA review prior to general release of these organisms for use. These EAs did not find significant impacts regarding inadvertent crop-toweed gene flow, significant impacts on human health and safety, impacts on non-target species, impacts on agricultural practices, potential impacts on organic farmers, potential weediness of genetically modified crops, or impacts on soil microorganisms. Two recent, relevant documents from APHIS can be found at the following web addresses:

- www.aphis.usda.gov/brs/aphisdocs2/06_17801p_ com.pdf
- www.aphis.usda.gov/brs/aphisdocs2/00_01101p_ com.pdf

Of the two relevant documents listed above, the first is an EA and finding of no significant impact (FONSI) for the Glycine Max soybean line completed in 2007. The second document, completed in 2000, is an EA, FONSI, and Federal Register notice for an extension on glyphosate-tolerant corn (NK603 corn line).

CHAPTER 2—Alternatives

2.1 Introduction

This chapter describes how alternatives were formulated, describes those alternatives carried through for further analysis, describes elements common to all alternatives, and describes those alternatives eliminated from further study.

Specifically, this chapter describes the two alternatives identified for analysis:

- Alternative A, the no-action alternative and proposed action, to continue using glyphosate-tolerant soybeans and corn for habitat restoration and management of System-managed lands in Region 6
- Alternative B, to disallow the use of glyphosatetolerant soybeans and corn on System-managed lands in Region 6

This chapter also includes two alternatives considered but eliminated from further study.

- Go-Back Alternative
- Organic Only Farming Alternative

2.2 Formulation of Alternatives

The Service reviewed the authorities, policies, and existing research and information on the topic of using glyphosate-tolerant soybeans and corn on System lands in Region 6. Discussions were held with refuge managers concerning current management activities, as well as regional and national office staff. In addition, comments received during the public scoping period were reviewed and discussed. Factors considered in the development of alternatives were as follows:

- the Improvement Act
- refuge or wetland management district establishing purposes
- 15-year comprehensive conservation plans
- the availability and effectiveness of alternative management tools
- benefits and impacts on wildlife and the habitat needed to support wildlife

Four alternatives were preliminarily identified, but through this process only two were selected for further development.

2.3 Description of Developed Alternatives

ALTERNATIVE A: CONTINUE USING GLYPHOSATE-TOLERANT SOYBEANS AND CORN FOR HABITAT RESTORATION AND MANAGEMENT ON SYSTEM-MANAGED LANDS IN REGION 6 (NO ACTION)

Under this alternative, the System in Region 6 would continue to follow existing policy on Biological Integrity, Diversity, and Environmental Health (601 FW 3 of the Service Manual, 2001; Amendment 1, 2006); the use of glyphosate-tolerant soybeans and corn, when essential, would continue to be one tool the Service could use to achieve habitat restoration and management objectives. The Service would continue to have the option to use conventional soybeans and corn along with other conventional crops in a crop rotation, provided adequate cooperators using these methods are available who can meet habitat restoration and management goals.

If glyphosate-tolerant corn or soybeans are used, refuge managers would be required to complete and submit to the Regional Chief the Genetically Modified Crop Eligibility Questionnaire for approval. In addition, appropriate use and compatibility determinations would be prepared to address the use of glyphosate-tolerant soybeans and corn. Pesticides used, including (but not limited to) glyphosate, would need to be approved through the Service's Pesticide Use Proposal (PUP) process and applied following all label specifications.

Habitat restoration under this alternative may take a variety of forms, including restoring croplands or lands previously tilled and infested with invasive species to grasslands, wetlands, brushlands, or timbered habitats. A typical scenario would involve newly acquired lands with long farming histories. These acres would be farmed under a cash rent or sharecrop agreement. This farming rotation normally takes 2–5 years, but it can take up to 7 years depending on crop history, past pesticide use, invasive species present, and overall seedbed condition. The crop rotation may include soybeans, corn, wheat, or other crops and end with glyphosate-tolerant soybeans or another crop with light crop residue. These soybeans may be treated with glyphosate twice during the final cropping season, with a final application early the following growing season to eradicate any newly germinated invasive species. These croplands are then seeded to the desired native species by the Service or cooperator. These fields may be clipped or mowed 2–3 times per year for 1–2 years after seeding. Prescribed fire, prescribed grazing, haying, or herbicide application may be used alone or in combination to suppress any invasive species and stimulate the desired species.

Another common scenario in Region 6 would involve historic croplands within dry reservoir bottoms or areas subject to flooding where the normal hydrology has been altered. In such areas, the tillage and altered hydrology enabled invasive species such as Johnson grass (Sorghum halepense), salt cedar (Tamarix spp.), Canada thistle (Cirsium arvense), Russian olive (*Elaeagnus angustifolia*), Phragmites (*Phragmites australis*), cattail (*typha* spp.), and others to dominate the site. Native plant communities that thrive in temporarily or seasonally flooded wetlands have been eliminated. Historically, these bottomlands flooded seasonally, providing resting and feeding sites for a variety of wetland-dependent wildlife. Many were farmed during dry periods but are still subject to unpredictable flooding events. Left unmanaged, these fields would behave similarly to the go-back sites described in Section 2.5. However, under Alternative A, these tracts would be cultivated and planted in a crop rotation that includes glyphosate-tolerant soybeans and corn as well as conventional soybeans, corn, sorghum, wheat, alfalfa, or another suitable crop. The goal of this habitat restoration would be to control invasive species, provide food for wildlife, and maintain the open aspect of the habitat until it refloods, providing wetland habitat. Although unpredictable, these sites may reflood every 3-7 years.

ALTERNATIVE B: DISALLOW THE USE OF GLYPHOSATE-TOLERANT SOYBEANS AND CORN FOR HABITAT RESTORATION AND MANAGEMENT ON SYSTEM-MANAGED LANDS IN REGION 6

This option would be the same as Alternative A, except that glyphosate-tolerant soybeans and corn would not be allowed as part of the farming operations related to habitat restoration and management. Under this alternative, if soybeans and corn are part of a farming operation, these crops would be conventional. Under this scenario it is possible—and likely—that a wide array of other pre-plant and post emergence herbicides, including glyphosate, would be applied as appropriate to control invasive species. As under Alternative A, appropriate use findings and compatibility determinations would need to be prepared. Pesticides used would need to be approved through the official Service PUP process and applied following all label specifications.

As in Alternative A, a typical scenario would involve newly acquired lands with long farming histories. These croplands would be rotationally farmed under a cash rent or sharecrop agreement as site preparation for habitat restoration. This rotation normally takes 2–5 years but can take up to 7 years depending upon crop history, pesticide use, invasive species present, availability of desired seeds for restoration, and seedbed condition. Herbicides used would include pre-plant chemicals prior to seeding or in the first 4 weeks followed by 1–3 applications of post-emergent chemicals to target a variety of invasive species. Growing conventional soybeans and corn may require higher levels of tillage for weed control purposes (Brookes and Barfoot 2010). The crop rotation would normally end with soybeans or other crop with light crop residue. Subsequently, the croplands would be seeded to the desired native species by the Service or cooperator. These fields may be clipped or mowed 2–3 times per year for 1–2 years after seeding. Prescribed fire, prescribed grazing, having, or herbicide application may be used alone or in combination to suppress any invasive species and stimulate the desired species.

2.4 Elements Common to All Alternatives

ADHERENCE TO THE NATIONAL WILDLIFE REFUGE SYSTEM ADMINISTRATION ACT, AS AMENDED BY THE NATIONAL WILDLIFE REFUGE SYSTEM IMPROVEMENT ACT OF 1997

All alternatives evaluated in this EA are consistent with the main points of the Improvement Act, as summarized below:

- Wildlife conservation comes first on refuges.
- The Service will adhere to biological integrity, diversity, and environmental health of the System.
- Compatibility determinations will guide uses of System lands.
- Six wildlife-dependent recreational uses are legitimate and appropriate public uses of the System: hunting, fishing, wildlife observation, wildlife photography, environmental education, and environmental interpretation.
- A comprehensive conservation plan will be prepared for every refuge and wetland management district.

ADHERENCE TO SERVICE'S APPROPRIATE USES AND COMPATIBILITY POLICIES

All alternatives evaluated in this Draft EA would adhere to two policies set forth in the Service Manual that guide decisions on activities allowed on lands managed by the System: the Appropriate Refuge Uses Policy (603 FW 1 of the Service Manual) (Appropriate Uses Policy) and the Compatibility Policy (603 FW 2 of the Service Manual).

The Appropriate Uses Policy describes the initial decision process a refuge or wetland management district manager follows when considering whether or not to allow a proposed use. The manager must find a use appropriate before undertaking a compatibility review of the use. An appropriate use, as defined by the Appropriate Uses Policy, is a proposed or existing use on a refuge or wetland management district that meets at least one of the following four conditions: (1) the use is a wildlife-dependent recreational use as identified in the Improvement Act; (2) the use contributes to the fulfilling of the refuge purpose(s). the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law; (3) the use involves the take of fish and wildlife under state regulations; or (4) the use has been found to be appropriate as specified in section 1.11 (603 FW 1 of the Service Manual). Lands within refuges are different from other multiple use public lands in that they are closed to all public uses unless specifically and legally opened. Unlike refuges, the waterfowl production areas that make up wetland management districts are considered open to hunting unless posted as closed. The Improvement Act states "... the Secretary [of the Interior] shall not initiate or permit a new use of a refuge or expand, renew, or extend an existing use of a refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety." The Improvement Act also states that "... compatible wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, or environmental education and interpretation) are the priority general public uses of the System and shall receive priority consideration in refuge planning and management."

In accordance with the Improvement Act, the Service has adopted the Compatibility Policy, which includes guidelines for determining if a use proposed on a refuge or wetland management district is compatible with the purposes for which the refuge or wetland management district was established. A *compatible use* is defined in the policy as a proposed or existing wildlife-dependent recreational use or any other use of System lands that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the System mission or the purposes of the refuge. The policy also includes procedures for documentation and periodic review of existing refuge uses. A compatibility determination is a document that evaluates a proposed use and states whether it has been determined to be compatible or not compatible. The public has an opportunity to review and comment on draft compatibility determinations, often during the comprehensive conservation planning process. The draft compatibility determination for this EA is in appendix B.

ADHERENCE TO THE SERVICE'S PROCEDURES AND LIMITS ON HERBICIDE USE

Under all of the alternatives evaluated in this Draft EA, protective measures would be taken to ensure the proper use of herbicides on Service lands. Such measures would be identified in a PUP, as Service policy requires a land manager to complete a PUP before applying herbicide on Service land. Each PUP must be approved by environmental contaminant staff or System staff at the field, regional, or national levels, depending on the pesticide proposed. Requiring PUPs helps ensure that product label instructions are followed, that pesticides are used effectively and safely, that the lowest risk products are selected, and that buffers are maintained.

ADHERENCE TO THE SERVICE'S GUIDANCE ON INTEGRATED PEST MANAGEMENT

All alternatives considered would adhere to the Service's policy on integrated pest management (IPM) (569 FW 1 of Service Manual). IPM coordinates the use of pest biology, environmental information, and available technology in a sustainable approach to prevent unacceptable levels of pest damage by the most economical means, while posing the least possible risk to people, property, resources, and the environment.

ADHERENCE TO THE SERVICE'S GENETICALLY MODIFIED ORGANISM AND FARMING POLICY

All alternatives evaluated in this Draft EA would adhere to national and Region 6 policy concerning GM organisms and farming on System lands. Nationally, the Service policy on Biological Integrity, Diversity, and Environmental Health (601 FW 3 of the Service Manual, 2001; Amendment 1, 2006) states:

We do not allow Refuge System uses or management practices that result in the maintenance of non-native plant communities unless we determine there is no feasible alternative for accomplishing refuge purposes(s). For example, where we do not require farming to accomplish refuge purpose(s), we cease farming and strive to restore natural habitat. Where feasible and consistent with refuge purpose(s), we restore degraded or modified habitats in the pursuit of biological integrity, diversity, and environmental health. We use native seed sources in ecological restoration. We do not use genetically modified organisms in refuge management unless we determine their use is essential to accomplishing refuge purpose(s) and the Regional Chief, National Wildlife Refuge System, approves the use.

2.5 Alternatives Considered but Not Developed

Two alternatives were considered but not developed. The two alternatives and the rationale for not developing them are listed below.

GO-BACK ALTERNATIVE

The first alternative eliminated was to restore habitat without additional cropping by allowing the field to return—or *go-back*—to whatever species exist in the soil seedbank that may germinate and grow to maturity. Under this alternative, lands could be grazed, hayed, mowed, or burned in an attempt to enhance the possibility of restoring habitat and reaching objectives.

This alternative was eliminated because the number and diversity of native species necessary to restore habitats are not found in the soil seedbank after years of farming. Refuge managers' experience and research confirms that repeated tillage and farming eliminates most perennial native plant species from the seedbank (Apfelbaum and Haney 2010, Zylka et al. 2010). In addition, a variety of invasive annual and perennial species often remains in the seedbank and will out-compete any remaining native species, resulting in unsuccessful habitat restorations. Past experience with this go-back method has shown that these fields require long-term invasive species control and that few native species become established. The end result has been that habitat objectives are not achieved. For these reasons, this alternative was not considered for further analysis.

ORGANIC FARMING ONLY ALTERNATIVE

The second alternative eliminated was to use only organic farming methods where conventional crops would be planted; no synthetic pesticides, fertilizers, or plant growth regulators would be applied.

This alternative was eliminated because an inadequate number of organic farmers are operating in reasonable proximity to System lands in Region 6 to complete the necessary habitat restoration. A review of USDA data for Minnesota, Indiana, Missouri, Kansas, South Dakota, and Wyoming shows the cumulative acreage totals for organic soybeans and organic corn in these states are 0.13 percent and 0.18 percent, respectively. In addition, organic farming regulations require land to be certified chemical-free for a period of 3 years prior to crop production, and this increases the timeframe required for habitat restorations. Furthermore, organic farming methods often tolerate invasive species; this practice can limit the success of habitat restoration efforts in subsequent years. For these reasons, it was determined that requiring organic-only farming would not meet habitat restorations goals and objectives and thus was not considered for additional analysis.

CHAPTER 3—Affected Environment

3.1 Introduction

This Draft EA addresses the lands owned or administered by the System in Region 6. The nature of this programmatic Draft EA is to address a use across similar habitats, in similar climates, for similar purposes.

The affected environment describes those portions of the natural and human environment that could be affected by implementing each alternative. A complete description of Region 6 refuge and wetland management district resources may be found in their individual comprehensive conservation plans at www.fws.gov/ mountain-prairie/planning/ccp.htm.

3.2 Regional Setting

Region 6 encompasses the states of Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. The current landcover in this region is shown in figure 2.

The climate varies from north to south and east to west. In general, maximum summer temperatures increase to the south and east; minimum winter temperatures decrease to the north. The mean January temperature in North Dakota is 8 °F, while in Kansas the January mean is 29 °F. The mean summer temperature in North Dakota is 69 °F, while in Kansas the mean is 78° F. Precipitation varies widely; however, in general it increases from west to east. The average annual precipitation in Montana is 11 inches, and in Nebraska the average annual precipitation is 30 inches. Precipitation averages within states follow the same pattern. For example, in Nebraska the average annual precipitation is 14 inches in the west and 32 inches in the southeast. All refuge lands experience dramatic climatic changes through the year and have spring, summer, fall, and winter seasons.

Soils vary from refuge to refuge and even within refuges. They reflect the local climate, parent material, and erosional processes that shaped the formation of these soils. Soils included in this review are suitable for conventional farming and in a typical year would support adequate growth of soybeans and corn.

Tallgrass and mixed-grass prairie were the dominant plant communities found on the farmable acres suitable for growing soybeans and corn throughout the eight states of Region 6. Only very small remnants of tallgrass prairie escaped the plow before acquisition by the System. More acres of mixed-grass prairie remain; however, significant acres of mixed-grass prairie were plowed and/or sprayed and replanted to exotic grasses or farmed prior to acquisition. Some locations along rivers and tributaries may have contained bottomland forests subject to seasonal flooding.

Water resources vary widely. Many miles of rivers and acres of lakes and wetlands exist within the boundaries of these refuge and wetland management district lands. Groundwater irrigation is commonly used for farming on adjacent private lands where adequate groundwater resources can be tapped and economics of development are profitable. Where possible, additional wetlands were created or restored after acquisition. These wetlands are currently managed through a variety of methods, including prescribed burning, prescribed grazing, and manipulation of water levels. In some locations, aggressive trees and shrubs may become established in wetland units that have previously been farmed. The practice of farming these wetlands when they are drawn down helps keep habitat available to migratory bird species such as shorebirds and waterfowl. Concentrations of temporary and seasonal wetlands are embedded in cropped sites in the Prairie Pothole Region of Montana, North Dakota, and South Dakota and in the Rainwater Basin of Nebraska. Prior to acquisition, many of these wetlands were farmed when dry.

3.3 Wildlife Resources

A wide array of wildlife occurs on System lands and waters in Region 6. Listings of documented bird species for many refuges and wetland management districts can be downloaded at www.npwrc.usgs.gov/resource/ birds/chekbird/. Other plant and wildlife species lists can be obtained by contacting individual refuges and wetland management districts or by searching online at www.fws.gov/mountain-prairie/refuges/.

Typically, areas suitable for farming historically contained tallgrass prairie, mixed-grass prairie, wet prairie, and wet meadow habitats. On System lands in Region 6, there has been an emphasis in restoring farmlands to grasslands and wetland habitats for migratory birds.

3.4 Invasive Species

Invasive species are defined by Presidential Executive Order 13112 (February 3, 1999), Invasive Species, as "an alien species whose introduction does, or is likely to cause economic or environmental harm or harm to human health." Invasive species are a growing issue on System lands. They spread quickly, displace native species, and create significant change in the natural environments. Some invasive species can affect the severity and frequency of wildfire. Some interfere with water flow, and others can alter nutrient availability and water quality (National Invasive Species Council 2008).

System lands may contain units dominated by nonnative, and often invasive, plant species. In most cases, were significantly altered. In addition, many areas that were tillable were farmed prior to acquisition or after the System acquired them. The practice of converting native plant communities to agricultural uses was halted in the 1970s. Exotic and invasive species such as smooth brome (Bromus inermis), Kentucky bluegrass (Poa pratensis), crested wheatgrass (Agropyron cristatum), and reed canary grass (Phalaris arundinacea) were planted and may have spread through long periods of non-management. In addition, numerous species of noxious and invasive forbs have found their way onto the landscape. Some of the worst include Canada thistle and leafy spurge (Euphorbia esula). Newly establishing invasive species appear on the landscape regularly. These simple plant communities are not as resilient as diverse native plant communities and are more easily invaded by noxious



Figure 2. National landcover map for Region 6.

3.5 Threatened and Endangered Species

Threatened and endangered species, as well as candidate species, known to occur on System lands in Region 6 are listed in appendix C. In general, the majority of these species are found in more natural habitats rather than on farmed lands. Occasionally, some species may visit agricultural fields for incidental feeding during migratory periods.

3.6 Cultural Resources

Both prehistoric and historic cultural resources are distributed throughout Region 6. Formal consultation with regional archeologists is required for any activities that may affect these resources or whenever the effect is unknown. Units considered in this review have been previously farmed, reducing the likelihood that impacts on cultural resources will occur.

CHAPTER 4—Environmental Consequences

4.1 Effects Common to Developed Alternatives

THREATENED AND ENDANGERED SPECIES

All of the threatened and endangered species listed in appendix C, with the exception of whooping crane (*Grus americana*), piping plover (*Charadrius melodus*), interior least tern (*Sterna antillarum*), and Sprague's pipit (*Anthus spragueii*), do not occur in farmed sites. These four bird species may visit corn and soybean fields during migratory periods but normally would not be present during normal farming operations. A review was conducted of any known impacts of the glyphosate-tolerant soybean and corn seed, pollen, and/ or other growing or residue plant parts for impacts on threatened and endangered species and their habitats listed in appendix C. None was found.

APHIS completed EAs of the use of glyphosatetolerant soybeans and corn (USDA 2000, 2007) prior to general release and found the following:

- 1. There are no significant differences between the chemical compositions of glyphosate-tolerant soybeans and corn and conventional (glyphosate-intolerant) soybeans and corn. Contact with or ingestion of glyphosate-tolerant soybeans and corn is very unlikely to have any effect on any plant and animal.
- 2. Feeding experiments with chickens failed to detect any differences between glyphosate-tolerant soybeans and corn and conventional (glyphosateintolerant) soybeans and corn regarding mortality rates, weight gain, and reproductive rates.
- 3. Corn and soybeans are not sexually compatible with any listed threatened or endangered plant species in Region 6; accordingly, there is no likelihood that there can be an unintended transfer of genes to a threatened or endangered species.
- 4. Glyphosate-tolerant corn and soybeans are very unlikely to escape into natural habitats because corn and soybeans can only persist with intensive human management; accordingly, there is no chance they will escape into native habitats occupied by threatened or endangered species.
- 5. In its final EAs for both crops, APHIS included an evaluation of the effects of glyphosate-tolerant

corn and soybeans on threatened and endangered species. The final EAs concluded that no effect is expected on federally listed threatened and endangered species, species proposed for listing, or their proposed or designated critical habitats from exposure to glyphosate-tolerant soybeans and corn or from exposure to label rates of glyphosate expected to be used in conjunction with glyphosatetolerant soybeans and corn.

Based on past reviews as well as a current Section 7 evaluation for species occurring in Region 6, it was determined that there would be no effect on threatened and endangered species and their habitats listed in appendix C.

CULTURAL RESOURCES

The consequences of the planned management on cultural resources are the same for both alternatives. Agricultural activities associated with farming and planting glyphosate-tolerant soybeans and corn have resulted in ongoing ground disturbance. Any additional effects on cultural or historic resources will be minor or non-existent. Any management actions with the potential to affect cultural resources require refuge or district manager review, as well as review by the Service's regional archeologist in consultation with the State Historic Preservation Office as mandated by Section 106 of the National Historic Preservation Act. Areas considered in this review have been previously farmed or disturbed, reducing the likelihood that impacts on cultural resources will occur.

4.2 Effects of Developed Alternatives

This analysis of effects compares how the two developed alternatives adhere to Service policy and how they affect the wildlife, habitat, and socioeconomic issues developed during public outreach, as listed below:

- 1. Using glyphosate-tolerant soybeans and corn could provide an alternative for farming that poses less risk to wildlife.
- 2. Agricultural herbicides could be toxic to wildlife.
- 3. Use of glyphosate-tolerant soybeans and corn could make habitat restoration and management

more efficient and economical; increased costs associated with discontinuing the use of these crops could impede the progress of restoration efforts.

- 4. Farming combined with using of glyphosate-tolerant soybeans and corn is an effective way to control invasive plants, especially smooth brome and other cool season exotic grasses.
- 5. Conservation tillage practices could be used by the Service to minimize soil erosion on cultivated lands.
- 6. Using glyphosate-tolerant soybeans and corn could result in the development of herbicide-resistant weeds on System lands.
- 7. Conventional (not glyphosate-tolerant) soybean and corn seeds may be more difficult to obtain in local communities.
- 8. Not using glyphosate-tolerant soybeans and corn could make farming more costly for cooperators; local farming cooperators could lose income if farming is reduced or eliminated.
- 9. Using glyphosate-tolerant soybeans and corn could affect certified organic farmers.

ALTERNATIVE A: CONTINUE USING GLYPHOSATE-TOLERANT SOYBEANS AND CORN FOR HABITAT RESTORATION AND MANAGEMENT ON SYSTEM-MANAGED LANDS IN REGION 6 (NO ACTION)

Summary of Alternative A Effects

Alternative A allows for the use of conventional crops as well as glyphosate-tolerant soybeans and corn in a cropping sequence. Alternative A allows for repeated use of glyphosate to control invasive species before, during, and after the cropping season, thereby eliminating or greatly reducing invasive species during all their growth stages. This treatment regime is particularly effective for elimination of smooth brome, which is the single greatest cause of native prairie seeding failures in Region 6. Farming, combined with the use of a wide-spectrum herbicide such as glyphosate, has been demonstrated to be very effective in controlling these nonnative and invasive plant species (Apfelbaum and Haney 2010, Helzer 2010, Smith et al. 2010). Experience has also shown this alternative to be the most successful in preparing a seedbed for prairie habitat restoration (Apfelbaum and Haney 2010, Smith et al. 2010).

Alternative A would result in timely and cost-effective restoration of habitat, as the associated seed and herbicides are readily available (Brookes and Barfoot 2010, Helzer 2010) and cooperative farmers can be readily located. Under this alternative, herbicide use would primarily be glyphosate, which has a relatively low toxicity (Brookes and Barfoot 2010, Cerdeira and Duke 2006, COBFLES 2010, Ferry and Anghaard 2008). When applied according to label specifications, glyphosate is rain fast in a matter of hours, adheres closely to soil particles, and breaks down to inert substances in a matter of days, significantly reducing the potential to leach into groundwater or move into surface waters.

Under Alternative A, using glyphosate-tolerant corn or soybeans would have no effect on non-target or federally listed endangered or threatened species.

Additionally, impacts on the local economy and cooperative farmers would not change because the majority of farming operations currently use glyphosate-tolerant soybeans and corn (COBFLES 2010); glyphosate-tolerant soybeans and corn were planted on 92 percent of U.S. soybean acres and 63 percent of U.S. corn acres in 2008 (Brookes and Barfoot 2010).

Wildlife Issues

Issue 1. Using Glyphosate-Tolerant Soybeans and Corn Could Provide an Alternative for Farming That Poses Less Risk to Wildlife. Growing glyphosate-tolerant soybeans and corn has some conservation advantages over growing non-GM varieties. The use of glyphosate-tolerant crops increases the chances that conservation tillage (no-till) can be successfully used (Towery and Werblow 2010). Conservation tillage results in reduced soil disturbance and increased crop residue, which both decrease soil erosion, which in turn results in more productive land and cleaner water. Glyphosate is also fairly environmentally benign, especially when compared to most other herbicides (Apfelbaum and Haney 2010, Duke and Powles 2008). Field and laboratory studies show it does not leach appreciably, has low potential for runoff (Shipitalo et al. 2006), is nontoxic to honeybees, is practically nontoxic to fish, may be slightly toxic to aquatic invertebrates, is slightly toxic to wild birds, and has no significant potential to accumulate in animal tissue (Oregon State University 1996).

Commercial formulations of glyphosate may contain additional chemicals (surfactants) to increase effectiveness. Some research indicates that there are commercial formulations of glyphosate that can negatively affect amphibians (Dinehart et al. 2010) and aquatic communities in general (Relyea 2005, Vera et al. 2010), and it is likely that these additional chemicals cause the toxicity (Mann et al. 2009). These impacts can be minimized by applying glyphosate following label restrictions, including those directing that the chemical should not be applied directly to water or to areas where surface water is present. Because there is a wide range of toxicity exhibited by different formulations of glyphosate (Langeland 2006), these impacts can also be managed by using less toxic formulations.

Issue 2. Agricultural Herbicides Could Be Toxic to Wildlife. Herbicides vary greatly in toxicity, and some have been banned by the U.S. Environmental Protection Agency (Buffington and McDonald 2006). Through its PUP program, the Service requires approval of a pesticide before it is applied on Systemmanaged land (USFWS 1982, 2005). In Region 6, refuge managers are annually provided a limited list of herbicides that they may review and approve for use on the System lands they manage. If the refuge manager wishes to use an herbicide not on the list, the pesticide must first be approved at the regional or national level.

Using herbicides will not affect wildlife if the following actions are taken:

- 1. Herbicides are applied following label restrictions. These restrictions include information regarding the use of a particular herbicide around water, near sensitive habitats, and near threatened and endangered species. (For a list of restrictions, see www.cdms.net/LabelsMsds/LMDefault .aspx?pd=6935&t=1,2,3,4.)
- 2. Conditions outlined in the Service's cooperative farming agreement are followed. Many of these conditions relate to best management practices to protect soil and water and to manage pests and nutrients. (For a list of agricultural best management practices followed by the Service, see www .epa.gov/owow/watershed/wacademy/acad2000/ agmodule/.)
- 3. PUPs are completed. PUPs are required before the application of pesticides on System lands. Impacts on threatened or endangered species are considered during this annual review (USFWS 1982, 2005).
- 4. IPM plans and comprehensive conservation plans that analyze the potential environmental impacts of herbicide use are completed for each System unit (USFWS 2010).

Habitat Issues

Issue 3. Using Glyphosate-Tolerant Soybeans and Corn Could Make Habitat Restoration and Management More Efficient and Economical; Increased Costs Associated with Discontinuing the Use of These Crops Could Impede *the Progress of Restoration Efforts.* The effects under this alternative are the same as the effects under Alternative B, except that ultimately, more acres will be restored to natural habitat under this alternative. Restoration of natural habitats is a Service priority. As stated in the Improvement Act, "[w]here feasible and consistent with refuge purpose(s), we restore degraded or modified habitats in the pursuit of biological integrity, diversity, and environmental health." In Region 6, this means converting farmland or sites dominated by invasive species to tall and mixed-grass native prairie. As mentioned in Section 2.5 above, farmland left to grow unmanaged would result in vegetation that does not meet habitat objectives on System lands. The typical restoration technique includes the continuation of farming and herbicide use until just before restoration planting occurs. Continued farming and herbicide use minimizes the number of residual weeds and weed seeds that will compete with the native vegetation to be planted. The use of glyphosatetolerant soybeans and corn results in timely and costeffective restoration of habitat as the associated seed and herbicides are readily available (Apfelbaum and Haney 2010, Brookes and Barfoot 2010, Helzer 2010). Certain herbicides that have commonly been used for weed control in corn, such as atrazine, remain active for up to 5 years in the soil and prevent many native grass and forb species from establishing (Smith et al. 2010). By contrast, glyphosate breaks down quickly to inert substances and does not prevent establishment of native grass and forb species (Duke and Powles 2008). Excess residual vegetation can also make it difficult or impossible to operate the equipment used to plant native vegetation. Lastly, using farming to maintain sites in good condition makes restoration more economically feasible, resulting in more acres of restored prairie over the long term.

Issue 4. Farming Combined with Using Glyphosate-Tolerant Soybeans and Corn Could Be an Effective Way to Control Invasive Plants, Especially Smooth Brome and Other Cool Season Exotic Grasses. Invasive species of plants and animals is a growing problem on a global, national, and regional scale (Pimentel et al. 2005). Invasive species are a threat to agricultural and native habitats (USFWS 2009). To discourage invasive plants, the Service often continues farming land until just before restoration. It will be most cost-effective to prevent invasive plants from becoming established in areas that will be restored to native habitat by using glyphosate-tolerant soybeans and corn.

Issue 5. Conservation Tillage Practices Could Be Used by the Service to Minimize Soil Erosion on Cultivated Lands. Conservation tillage results in reduced soil disturbance and increased crop residue, which together decrease soil erosion and maintain soil structure and diversity, which in turn results in more productive land and cleaner water. The use of glyphosate-tolerant soybeans and corn increases the chances that conservation tillage can be successfully used (Towery and Werblow 2010).

Issue 6. Using Glyphosate-Tolerant Soybeans and Corn Could Result in the Development of Herbicide-Resistant Weeds on System Lands. There are almost 200 species of herbicide-resistant plants worldwide (Heap 2010). Herbicide resistance is a predictable and growing problem. For example, glyphosate tolerance in horseweed (Conyza canadensis) was first identified in Maryland in 2001 (VanGessel 2001) and has been documented in Nebraska, Kansas, as well as a number of states adjacent to Region 6 (Heap 2010). Almost 90 percent of all herbicide-tolerant crops are glyphosate-tolerant. The use of glyphosate is being threatened by the evolution of glyphosate-tolerance in weeds (Duke and Powles 2008). Currently, more than 90 percent of the soybeans and over 60 percent of the corn planted in the U.S. is glyphosate-tolerant (Brookes and Barfoot 2010). Regular, widespread use of the same herbicide increases the risk of developing herbicide tolerance. IPM techniques minimize the likelihood of herbicide resistance by regularly changing the active ingredient in the herbicide as well as the mode of action. In addition, IPM techniques used by the Service incorporate rotating the type of herbicide used, rotating the crop planted, and using mechanical and biological control methods to achieve control. Using glyphosatetolerant soybeans and corn would help manage herbicide resistance of weeds on System lands because it would be an additional technique to use in weed management. On private lands where IPM may not be used, glyphosate-tolerant soybeans and corn are so widely and regularly used that their use encourages herbicide resistance (Duke and Powles 2008). Effective use of IPM will help manage herbicide resistance (USFWS 2004).

Concern for glyphosate-tolerant weeds becoming established in System lands planned for habitat restoration is also minimized by the fact that once the native species are planted, glyphosate will likely never be sprayed on the field in the future. Not only would managers kill the targeted weeds, but they would also kill the very expensive native grasses and forbs that had recently been planted with an application of the wide spectrum herbicide glyphosate. In addition, the documented glyphosate tolerance in the U.S. is for annual agricultural weeds. These annual weeds will fade and disappear within 3–5 years from the prairie seeding, as perennial native grasses and forbs become established and out-compete the annual weeds. More selective herbicides, other than glyphosate, would be used to control any invasive weeds in new prairie seedings.

Socioeconomic Issues

Issue 7. Conventional (Not Glyphosate-Tolerant) Soybean and Corn Seeds May Be More Difficult to Obtain in Local

Communities. Glyphosate-tolerant soybeans and corn were planted on 92 percent of the U.S. soybean acres and 63 percent of U.S. corn acres in 2008 (Brookes and Barfoot 2010). Under Alternative A, both glyphosatetolerant soybeans and corn as well as non-GM seeds could still be used in System farming operations. The availability of traditional seed and the cost for traditional seed can vary widely among locations (Mike Brown; USFWS; personal communications; 2010).

Issue 8. Not Using Glyphosate-Tolerant Soybeans and Corn Could Make Farming More Costly for Cooperators; Local Farming Cooperators Could Lose Income if Farming Is Reduced or Eliminated. According to Brookes and Barfoot (2010), the overall cost of planting glyphosate-tolerant soybeans results in a cost savings of between \$30 and \$85 per hectare. This savings is attributable to reduced fuel costs (less tilling required) and reduced herbicide costs. Overall costs for glyphosate are cheaper than other herbicides used in conventional soybean fields. For glyphosate-tolerant corn, the savings are approximately \$17 per hectare (Brookes and Barfoot 2010). Therefore overall, farm income is increased through the use of glyphosate-tolerant varieties compared with conventional varieties.

In general, farming practices would continue unchanged under Alternative A. As existing farmland on System lands is seeded back to native prairie, fewer acres of farmland on System lands will exist. However, such decreases in currently farmed acres will be offset through additional farming in preparation for prairie restoration of deteriorated fields of exotic grasses or areas that were managed through the goback method. Newly acquired fee title lands will also likely contain existing farmland that requires prairie restoration. In most situations, the acres of System lands farmed by an individual cooperator make up a small percentage of the cooperator's entire farming operation, limiting the economic impact on individuals if farming operations are scaled back. Cooperative farming agreements and special use permits used to authorize farming on System lands in Region 6 are limited to a maximum of 5 years, with many covering only 3 or 4. There are no guarantees for future farming given or implied beyond these specified timeframes. Such limits allow cooperators to plan accordingly and reduce any potential economic impact.

Issue 9. Using Glyphosate-Tolerant Soybeans and Corn **Could Affect Certified Organic Farmers.** A review of potential impacts of glyphosate-tolerant soybeans and corn on organic farmers was completed by APHIS prior to its general release (USDA 2000, 2007). The conclusion of these reviews was that for soybeans, there should be no apparent potential for significant impact on organic farming through deregulation and general release. Soybeans are highly self-pollinated with large, heavy seeds that are not easily dispersed. Consequently, minimal buffer zones are needed to prevent cross-pollination to other soybeans or contamination of adjacent agricultural land (USDA 2007). The conclusion made for corn was that all corn, whether genetically modified or not, can transmit pollen to nearby corn fields. A small influx of pollen originating from a given corn variety does not appreciably change the characteristics of corn in adjacent fields. The frequency of occurrence decreases with increasing distance from the pollen source such that it is negligible by 660 feet, the isolation distance considered safe for certified corn seeds (USDA 2000). Typically, organic farmers provide their own buffers to ensure that they

ALTERNATIVE B: DISALLOW THE USE OF GLYPHOSATE-TOLERANT SOYBEANS AND CORN FOR HABITAT RESTORATION AND MANAGEMENT ON SYSTEM-MANAGED LANDS IN REGION 6

Summary of Alternative B Effects

Alternative B would disallow the use of glyphosatetolerant corn and soybeans as part of a restoration program on System lands in Region 6. Conventional crops would still be allowed. Alternative B would result in reduced control of invasive plants. Control measures in conventional fields would typically include applying an array of pre-emergent and post-emergent herbicides that are more toxic than glyphosate (Cerdeira and Duke 2006, COBFLES 2010). The control of cool season exotic grasses-especially smooth bromewould be limited because glyphosate would not be applied during the growing season. In addition, some herbicides applied under this alternative may persist in the soil for up to 5 years, which would inhibit the germination and growth of native grasses and forbs (Smith et al. 2010). Under Alternative B, herbicide use would include an array of pesticides, including glyphosate. Available pesticides that are typically used with conventional soybeans and corn generally have more potential to move offsite, leach into groundwater, and take much longer to break down to inert substances (Brookes and Barfoot 2010, Cerdeira and Duke 2006, COBFLES 2010, Ferry and Anghaard 2008).

Alternatives A and B are both viable options in current farming operations. However, glyphosate-tolerant crops are widespread within the U.S., accounting for 92 percent of the U.S. soybean acres and 63 percent of U.S. corn acres in 2008 (Brookes and Barfoot 2010). Under Alternative B, it may be more difficult to find cooperators willing to farm conventional crops only.

Under Alternative B, using conventional corn, soybeans, and other crops on currently farmed or previously tilled System lands would have no effect on federally listed endangered or threatened species. All of the threatened and endangered species listed in appendix C, with the exception of whooping crane, piping plover, interior least tern, and Sprague's pipit, do not occur in cropped sites. These four bird species may visit corn, soybean, and other crop fields during migratory periods but would not be present during normal farming operations.

Under Alternative B, impacts on non-target native plant species may occur, particularly from carryover of certain herbicides; this could affect native plant species seeded during habitat restoration (Smith et al. 2010). Under Alternative B, farm income would be reduced due to higher production costs (Brookes and Barfoot 2010).

Wildlife Issues

Issue 1. Using Glyphosate-Tolerant Soybeans and Corn **Could Provide an Alternative for Farming That Poses Less** Risk to Wildlife. Growing glyphosate-tolerant soybeans and corn has some conservation advantages over growing non-GM varieties. The use of glyphosate-tolerant crops increases the chances that conservation tillage can be successfully used (Towery and Werblow 2010). Conservation tillage results in reduced soil disturbance and increased crop residue, which both decrease soil erosion, which in turn results in more productive land and cleaner water. Under Alternative B, traditional farming practices such as complete tillage at the end of the growing season, and partial tillage during the growing season (in corn fields), would increase the disturbance of the soil and decrease the amount of crop residue. Both of these have the potential to increase soil erosion.

Glyphosate is also fairly environmentally benign, especially when compared to most other herbicides used in conventional farming (Duke and Powles 2008). Field and laboratory studies show it does not leach appreciably, has low potential for runoff (Shipitalo et al. 2006), is nontoxic to honeybees, is practically nontoxic to fish, may be slightly toxic to aquatic invertebrates, is only slightly toxic to wild birds, and has no significant potential to accumulate in animal tissue (Oregon State University 1996).

Alternative B would include applying an array of pre-emergent and post-emergent herbicides that are more toxic to wildlife, fish, and other aquatic organisms; may move in surface waters more readily; and take longer to break down to inert substances than glyphosate (Cerdeira and Duke 2006, COBFLES 2010).

Issue 2. Agricultural Herbicides Could Be Toxic to Wildlife. Herbicides vary greatly in toxicity, and some have been banned by the U.S. Environmental Protection Agency (Buffington and McDonald 2006). In general, most herbicides used in conventional farming practices to control weeds are more toxic to wildlife (Cerdeira and Duke 2006, COBFLES 2010).

Through its PUP program, the Service requires approval of a pesticide before it is applied on Systemmanaged land (USFWS 1982, 2005). In Region 6, refuge managers are annually provided a limited list of herbicides that they may review and approve for use on the System lands they manage. If the refuge manager wishes to use an herbicide not on the list, the pesticide must first be approved at the regional or national level.

Using herbicides will not affect wildlife if the following actions are taken:

- 1. Herbicides are applied following label restrictions. These restrictions include information regarding the use of a particular herbicide around water, near sensitive habitats, and near threatened and endangered species. (For a list of restrictions, see www.cdms.net/LabelsMsds/LMDefault .aspx?pd=6935&t=1,2,3,4.)
- 2. Conditions outlined in the Service's cooperative farming agreement are followed. Many of these conditions relate to best management practices to protect soil and water and to manage pest and nutrients. (For a list of agricultural best management practices followed by the Service, see www .epa.gov/owow/watershed/wacademy/acad2000/ agmodule/.)
- 3. PUPs are completed. PUPs are required before the application of pesticides on System lands. Impacts on threatened or endangered species are considered during this annual review (USFWS 1982, 2005).
- 4. IPM plans and comprehensive conservation plans that analyze the potential environmental impacts of herbicide use are completed for each System unit (USFWS 2010).

Habitat Issues

Issue 3. Using Glyphosate-Tolerant Soybeans and Corn Could Make Habitat Restoration and Management More Efficient and Economical; Increased Costs Associated with Discontinuing the Use of These Crops Could Impede the Progress of Restoration Efforts. Restoration of natural habitats is a Service priority. As stated in the Improvement Act, "[w]here feasible and consistent with refuge purpose(s), we restore degraded or modified habitats in the pursuit of biological integrity, diversity, and environmental health." In Region 6, this usually means converting farmland to tall and mixedgrass prairie on fields capable of growing corn or soybeans. As mentioned in Section 2.5 above, farmland left to grow unmanaged would result in vegetation that does not meet the purposes of System lands. The typical restoration technique includes the continuation of farming and herbicide use until just before restoration planting occurs. Continued farming and herbicide use minimizes the number of residual weeds and weed seeds that will compete with the native vegetation to be planted. The control of cool season exotic grasses-especially smooth brome-would be limited because glyphosate would not be applied during the growing season. In addition, some herbicides applied under this alternative may persist in the soil for up to 5 years, which would inhibit the germination and growth of native grasses and forbs (Smith et al. 2010). By contrast, glyphosate breaks down quickly to inert substances and does not prevent establishment of native grass and forb species (Duke and Powles 2008).

The use of glyphosate-tolerant soybeans and corn results in timely and cost-effective restoration of habitat because the associated seed and herbicides are readily available (Brookes and Barfoot 2010, Helzer 2010). Because glyphosate-tolerant varieties of soybeans and corn are now dominant in Region 6, it would be less cost-effective to prepare farmland for conversion to native habitats without the use of glyphosate-tolerant soybeans and corn.

Issue 4. Farming Combined with Using Glyphosate-Tolerant Soybeans and Corn Could Be an Effective Way to Control Invasive Plants, Especially Smooth Brome and Other Cool Season Exotic Grasses. Invasive species of plants and animals are a growing problem on a global, national, and regional scale (Pimentel et al. 2005). Invasive species are a threat to agricultural and native habitats (USFWS 2009). To discourage invasive plants, the Service often continues farming land until just before restoration. Under Alternative B, the control of cool season exotic grasses-especially smooth brome—would be limited because glyphosate would not be applied during the growing season. In addition, some herbicides applied under this alternative may persist in the soil for up to 5 years, which would inhibit the germination and growth of native grasses and forbs (Smith et al. 2010).

Issue 5. Conservation Tillage Practices Could Be Used by the Service to Minimize Soil Erosion on Cultivated Lands. Conservation tillage results in reduced soil disturbance and increased crop residue, which decrease the potential for soil erosion. Reduced soil erosion results in more productive land and cleaner water. Under Alternative B, the likelihood that conservation tillage could be used successfully would be decreased because glyphosate would not be applied during the growing season (Towery and Werblow 2010).

Issue 6. Using Glyphosate-Tolerant Soybeans and Corn Could Result in the Development of Herbicide-Resistant Weeds on System Lands. Under Alternative B, the use of glyphosate-tolerant soybeans and corn for habitat restoration and management would no longer be allowed. However, the herbicide glyphosate may still be used. A typical scenario would be to use glyphosate to kill all growing plants in fields dominated by exotic grasses and invasive species prior to farming. The field would then be farmed using traditional soybeans, corn, or other crops. In the final year of farming, glyphosate may be applied after harvest and again the following spring, prior to seeding native species.

There are almost 200 species of herbicide-resistant plants worldwide (Heap 2010). Herbicide resistance is a predictable and growing problem. For example, glyphosate tolerance in horseweed was first identified in Maryland in 2001 (VanGessel 2001) and has now been documented in Nebraska, Kansas, as well as a number of states adjacent to Region 6 (Heap 2010). Almost 90 percent of all herbicide-tolerant crops are glyphosate-tolerant. The use of glyphosate is being threatened by the evolution of glyphosate tolerance in weeds (Duke and Powles 2008). Currently, more than 90 percent of the soybeans and 63 percent of the corn planted in the U.S. is glyphosate-tolerant (Brookes and Barfoot 2010). Regular, widespread use of the same herbicide increases the risk of developing herbicide tolerance. IPM techniques minimize the likelihood of herbicide resistance by regularly changing the active ingredient in the herbicide as well as the mode of action. In addition, IPM calls for rotating herbicides, rotating crops, and using mechanical and biological control methods to achieve pest control. Using glyphosate-tolerant soybeans and corn would help manage herbicide resistance of weeds on System lands because it would be an additional weed management technique. On private lands where IPM may not be used, glyphosate-tolerant soybeans and corn are so widely and regularly used that their use actually encourages herbicide resistance (Duke and Powles 2008). Effective use of IPM will help manage herbicide resistance (USFWS 2004).

Socioeconomic Issues

Issue 7. Conventional (Not Glyphosate-Tolerant) Soybean and Corn Seeds May Be More Difficult to Obtain in Local Communities. Glyphosate-tolerant soybeans and corn

were planted on 92 percent of the U.S. soybeans and corn and 63 percent of the corn acres in 2008 (Brookes and Barfoot 2010). Under Alternative B, only conventional soybeans and corn seeds would be used in System farming operations in Region 6. Conventional seeds are still available commercially; however, advanced planning by cooperators would be needed as distribution of conventional seed can be limited.

Issue 8. Not Using Glyphosate-Tolerant Soybeans and Corn Could Make Farming More Costly for Cooperators; Local Farming Cooperators Could Lose Income if Farming Is Reduced or Eliminated. Under Alternative B, production costs associated with planting conventional soybeans and corn are higher due to increased costs for fuel (more tilling required) and due to more costly herbicides used to control weeds (Brookes and Barfoot 2010). This would result in decreased farm revenue for System cooperative farmers. This coupled with the difficulty in finding conventional seed varieties may result in fewer farmers willing to participate in refuge farming programs. As a result, fewer acres of current or former cropland would be available for native prairie restoration as the Service does not have the equipment nor the financial resources to implement an active prairie restoration program within existing budget limitations.

As in Alternative A, as existing farmland on System lands is seeded back to native prairie, fewer acres of farmland on System lands will exist. However, such decreases will be offset through additional farming (although reduced) in preparation for prairie restoration of deteriorated fields of exotic grasses or areas that were managed through the go-back method. Newly acquired fee title lands will also likely contain existing farmland that requires prairie restoration. In most situations, the acres of System lands farmed by an individual cooperator make up a small percentage of the cooperator's entire farming operation, limiting the economic impact on individuals. Cooperative farming agreements and special use permits used to authorize farming on System lands in Region 6 are limited to a maximum of 5 years, with many covering only 3 or 4. There are no guarantees for future farming given or implied beyond these specified timeframes. Such limits allow cooperators to plan accordingly and reduce any potential economic impact.

Issue 9. Using Glyphosate-Tolerant Soybeans and Corn Could Affect Certified Organic Farmers. Under Alternative B, glyphosate-tolerant soybeans and corn would not be used on System lands for habitat restoration and management purposes. Consequently, there would be no potential impacts on adjacent organic farmers.

4.3 Comparison of Alternatives

A comparison of Alternatives A and B is shown in table 1.

4.4 Environmental Justice

Presidential Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was signed by President Clinton on February 11, 1994. Its purpose was to focus the attention of federal agencies on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low income populations. The order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and lowincome communities with access to public information

Table 1. Comparison of Alternatives	A and B.	
Issue	Alternative A: Continue using glyphosate-tolerant soybeans and corn for habitat restoration and management on System-managed lands in Region 6 (No Action)	Alternative B: Disallow the use of glyphosate-tolerant soybeans and corn for habitat restoration and management on System-managed lands in Region 6
	Wildlife Issues	
1. Using glyphosate-tolerant soybeans and corn could provide an alternative for farming that poses less risk to wildlife.	Increased use of conservation tillage and reduced overall toxicity to wildlife species would be expected.	Decreased use of conservation tillage would be expected, and an increased use of herbicides that, in general, are more toxic to wildlife than glyphosate.
2. Agricultural herbicides could be toxic to wildlife.	Glyphosate is less toxic to fish and wild- life than other commonly used agricul- tural herbicides.	Varies; however, most other commonly used herbicides are more toxic to fish and wildlife.
	Habitat Issues	
3. Use of glyphosate-tolerant soybeans and corn could make habitat restora- tion and management more efficient and economical; the increased costs as- sociated with discontinuing the use of these crops could impede the progress of restoration efforts.	Restoration of prairie is more effective and less costly.	Restoration of prairie is less effective and more costly.
4. Farming combined with using glypho- sate-tolerant soybeans and corn could be an effective way to control invasive plants, especially smooth brome and other cool season exotic grasses.	More effective control of invasive plants due to more timely application of glypho- sate during the growing season.	Less effective control of invasive plants.
5. Conservation tillage practices could be used by the Service to minimize soil erosion on cultivated lands.	Increased use of conservation tillage would be expected.	Decreased use of conservation tillage would be expected.
6. Using glyphosate-tolerant soybeans and corn could result in the develop- ment of herbicide-resistant weeds on System lands.	Lower risk of developing glyphosate- resistant weeds due to IPM practices, as well as the fact that glyphosate would not be used once a field as been restored to prevent damage to native vegetation.	Less risk of developing glyphosate-resis- tant weeds due to the reduced amount of glyphosate used in conventional fields.
7. Conventional (not glyphosate-tolerant) soybean and corn seeds may be more difficult to obtain in local communities.	Readily available seed.	Limited availability in some local com- munities; may be more costly due to limited supplies.
8. Not using glyphosate-tolerant soy- beans and corn could make farming more costly for cooperators; local farming co- operators could lose income if farming is reduced or eliminated.	No change from current costs because cooperators have the choice of crop vari- eties to be used in restoration program.	Reduced profitability based on higher costs associated with growing conven- tional soybeans and corn.
9. Using glyphosate-tolerant soybeans and corn could affect certified organic farmers.	No effect on organic soybeans; no effect on organic corn with buffer.	No effect on organic soybeans or or- ganic corn.

and participation in matters relating to human health or the environment. Neither management alternative described in this EA would disproportionately place any adverse environmental, economic, social, or health impact on minority and low-income populations.

4.5 Cumulative Impacts

Cumulative impacts are effects on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Potential cumulative impacts for the alternatives are described in this section. The discussion considers the interaction of activities on System lands in Region 6 with other actions occurring over a larger spatial and temporal frame of reference.

As set forth in the Service Manual, Service policy states: "[w]e do not allow refuge uses or management practices that result in the maintenance of nonnative plant communities unless we determine there is no feasible alternative for accomplishing refuge purpose(s)" (601 FW 3 of the Service Manual).

This policy and trends in land management practices indicate that future actions will result in more restoration of cropland to natural habitats on System lands. Conversion of farmland to natural habitats is likely to have little impact on the System on a regional scale, as farmland currently makes up only 0.4 percent of the total fee title acres in Region 6. Restoration to natural habitats could play a larger role in the future as new land is added to the system. An estimated 25 percent of the land that could be purchased in Region 6 is currently farmed. In addition, existing fee title acres that are composed of exotic grasses and other invasive species and that have been previously farmed may be converted to native grass and forb species. The effective restoration of additional mixed-grass and tallgrass prairie habitats using glyphosate-tolerant soybeans and corn will improve the available habitat on individual refuges and waterfowl production areas for grassland-dependent migratory birds, grasslanddependent insects, and grassland-dependent resident wildlife species.

The effective restoration of degraded and weed-infested habitats on System lands to native mixed-grass and tallgrass prairie that can be managed through prescribed fire and prescribed grazing would cumulatively reduce needed expenditures of labor and funds for weed control efforts on System lands in Region 6.

4.6 Proposed Action

Based on the analysis above, the proposed action is Alternative A: Continue using glyphosate-tolerant soybeans and corn for habitat restoration and management on System-managed lands in Region 6 (No Action).

CHAPTER 5—Consultation and Coordination

5.1 Planning Team and Contributors

The Planning Team was made up of representatives from both Regions 3 and 6 and included Kevin Brennan and Doug Wells from Fergus Falls Wetland Management District, Sandra Siekaniec from Region 3 regional office, Mike Brown from Cypress Creek National Wildlife Refuge, Mike Artmann from Region 6 regional office, and Tom Koerner from Sand Lake National Wildlife Refuge Complex.

All members of the Planning Team contributed to the development of this Draft EA. Activities included public scoping, reviewing comments, researching and reading literature, interviewing refuge managers, producing maps, and writing and editing the Draft EA.

5.2 Agencies Consulted

The following agencies were consulted during the development of this Draft EA:

- APHIS Biotechnology Regulatory Services
- U.S. Environmental Protection Agency, Biopesticides and Pollution Prevention Division
- U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition
- Executive Office of the President, Office of Science and Technology Policy

5.3 How to Comment on This Draft Environmental Assessment

This Draft EA is being released for a 30-day public review and comment period, which will end on March 4,2011. Individuals and organizations wishing to comment on the Draft EA or to provide new or additional information may submit by 5 p.m., Mountain Standard Time, on March 4, 2011.

You may submit comments electronically to Tom Koerner at r6gmcomments@fws.gov. Please note in the subject line that your comment is regarding the Draft EA for use of glyphosate-tolerant soybeans and corn. You may also mail comments or information to:

Tom Koerner

Sand Lake National Wildlife Refuge

39650 Sand Lake Drive

Columbia, SD 57433

After completion of the 30-day comment period, all new information and comments will be reviewed before writing and adopting a final signed EA.

Appendix A Authority

This appendix contains a list of additional laws, regulations, policies, and executive orders that influence the National Wildlife Refuge System (System) beyond those discussed in Section 1.5 of the Draft Environmental Assessment: Use of Genetically Modified, Glyphosate-Tolerant Soybeans and Corn on National Refuges in the Mountain–Prairie Region, as completed by the U.S. Fish and Wildlife Service (Service).

The National Wildlife Refuge System Improvement Act of 1997 (Public Law [P.L.] 105-57) indicates in Section 4, Mission of the System, that "the mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate restoration of the fish, wildlife, and plant resources and their habitats with the United States for the benefit of present and future generations of Americans." Section 5, Administration of the System, states that "in administering the System, the Secretary shall— (A) provide for the conservation of fish, wildlife, and plants, and their habitats within the System; (B) ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans." This direction was clarified in 601 FW 3 of the Service Manual, as discussed below.

The Service's Biological Integrity, Diversity, and Environmental Health Policy (601 FW 3 of the Service Manual) directs refuges to "prevent the introduction of invasive species, detect and control populations of invasive species, and provide for restoration of native species and habitat conditions in invaded ecosystems." This policy further directs refuge managers to "develop integrated pest management strategies that incorporate the most effective combination of mechanical, chemical, biological, and cultural controls while considering the effects on environmental health." Presidential Executive Order 12996 (March 25, 1996), Management and General Public Use of the National Wildlife Refuge System, provides guidance to the Service relative to management of the System. Section 2(b) states "[f]ish and wildlife will not prosper without high-quality habitat, and without fish and wildlife, traditional uses of refuges cannot be sustained. The Refuge System will continue to conserve and enhance the quality and diversity of fish and wildlife habitat within refuges."

The Fish and Wildlife Act of 1956 (16 United States Code [U.S.C.] 742a–742j), as amended, provides general guidance which can be interpreted to include habitat management and restoration that requires the Secretary of the Interior to take steps "required for the development, management, advancement, conservation, and protection of fish and wildlife resources" (742f.a.4).

Presidential Executive Order 13112 (February 3, 1999), Invasive Species, provides general guidance to federal agencies relative to invasive species. Section 2(a)(2), states: "Each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law, subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them."

Appendix B

Draft Compatibility Determination

B.1 Use

Use of glyphosate-tolerant soybeans and corn for habitat restoration and management on National Wildlife Refuge System (System) owned or managed lands in Region 6.

B.2 Refuge Name

- Arrowwood Complex
- Audubon Complex
- Devils Lake Complex
- Flint Hills National Wildlife Refuge
- Huron Wetland Management District
- Kirwin National Wildlife Refuge
- Kulm Wetland Management District
- Lake Andes Complex
- Long Lake Complex
- Madison Wetland Management District
- Marais des Cygnes National Wildlife Refuge
- Quivira National Wildlife Refuge
- Rainwater Basin Wetland Management District
- Souris River Basin Complex
- Sand Lake Complex
- Tewaukon Complex
- Waubay Complex

B.3 County

All counties within National Wildlife Refuges and Wetland Management Districts listed above in Region 6.

B.4 Establishing and Acquisition Authority(ies)

System lands are managed consistent with a number of federal statutes, regulations, policies, and other

guidance. The National Wildlife Refuge System Administration Act of 1966, as amended (16 United States Code [U.S.C.] 668dd–668ee) (Administration Act) is the core statute guiding management of the System.

The National Wildlife Refuge System Improvement Act of 1997 (Public Law [P.L.] 105-57) made important amendments to the Administration Act, one of which was the mandate that a comprehensive conservation plan be completed for every unit of the System. Among other things, comprehensive conservation planning has required field stations to assess their current farming program and establish objectives for the future.

The Migratory Bird Hunting Stamp Act of March 16, 1934, as amended by section 3 of the Act of August 1, 1958 (72 Stat. 486, 16 U.S.C. sec. 716 d[c]), authorized the Secretary of Interior to acquire small wetland or pothole areas suitable as Waterfowl Production Areas.

Additional Authorities include the following: Consolidated Farm and Rural Development Act, Migratory Bird Conservation Act, North American Wetlands Conservation Act, and the Emergency Wetlands Resources Act.

B.5 Refuge Purpose(s)

- As "a refuge and breeding ground for migratory birds and other wildlife, for use as an inviolate sanctuary, or for any other management purpose for migratory birds." *Migratory Bird Conservation Act*
- As "Waterfowl Production Areas" subject to "[...] all of the provisions of such Act [Migratory Bird Conservation Act] [...] except the inviolate sanctuary provisions." 16 U.S.C. 718(c) Migratory Bird Hunting and Conservation Stamp
- For "any other management purpose, for migratory birds." 16 U.S.C. sec. 715d Migratory Bird Conservation Act
- For "conservation purposes [...]" 7 U.S.C. sec. 2002 Consolidated Farm and Rural Development Act

Establishing Authorities and Refuge Purposes for individual Units may be obtained online at www .fws.gov/refuges/policiesandbudget/purposes/ Purposes_Search.cfm.

B.6 National Wildlife Refuge System Mission

The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

B.7 Description of Use

What is the use? Is the use a wildlife-dependent public use? The use is as follows: use of glyphosate-tolerant corn and soybeans for habitat restoration and management purposes on lands owned in fee title or managed through agreement by the National Wildlife Refuge System in Region 6. The primary use will be to prepare a seedbed on previously or currently cropped sites for prairie reconstruction purposes. An additional use would include incorporation into a station's integrated pest management program for the control of invasive and noxious plant species. An example would be use on System-managed lands behind flood control dams where prairie restoration would not be warranted due to the likelihood of future flooding.

The use is not a wildlife-dependent public use.

Where would the use be conducted? The use would be conducted on lands owned in fee title or managed through agreement by the System in Region 6, in Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming, that are currently farmed or have previously been farmed and contain soils and receive average precipitation to support growth of agricultural soybeans and corn.

When would the use be conducted? Use would be ongoing. The use of glyphosate-tolerant soybeans and corn would be allowed as part of an integrated pest management program used to prepare a seedbed for habitat restoration and management and/or to control noxious and invasive vegetation.

How would the use be conducted? Use would be conducted by cooperative farmers through a cooperative farming agreement or by special use permit.

Why is this use being proposed? Refuge managers' experience combined with published literature indicates that use of glyphosate-tolerant soybeans and corn—which allows for the application of an herbicide containing the active ingredient glyphosate during the growing season—is very effective at killing invasive

cool season grasses and other noxious and invasive species. This results in a weed-free seedbed used for habitat restoration purposes, which increases the possibility of successful habitat reconstruction efforts on System-managed and -owned lands.

B.8 Availability of Resources

Resources involved in the administration and management of the use:

- No additional management or administrative costs will be associated with this activity.
- Special equipment, facilities, or improvements necessary to support the use: none
- Maintenance costs: none
- Monitoring costs: none
- Offsetting revenues: none

B.9 Anticipated Impacts of the Use

SHORT-TERM IMPACTS

The use of glyphosate-tolerant soybeans and corn will increase the likelihood that conservation tillage can be successfully conducted, reducing soil erosion.

LONG-TERM IMPACTS

The effective reconstruction of degraded and weedinfested habitats on System lands to native mixed-grass and tallgrass prairie which can be managed through the historical ecological processes of prescribed fire and prescribed grazing, will cumulatively reduce needed expenditures of labor and funds for weed control efforts on System lands in Region 6 over the long term.

B.10 Stipulations Necessary to Ensure Compatibility

- 1. Refuge managers will comply with all existing and current policies regarding the use of genetically modified crops (glyphosate-tolerant soybeans and corn).
- 2. Activity will occur only on currently farmed or previously farmed System-owned or -managed lands.

B.11 Public Review and Comment

The period of public review and comment will begin February 2, 2011, and will end at 5 p.m., Mountain Time, on March 4, 2011.

Why was this level of public review and comment selected? It is appropriate to provide opportunity to comment on this compatibility determination at the same time as the draft environmental assessment. The proposed activity has a national as well as local level of interest, and it was felt that a full month with wide distribution should be given to review.

B.12 How to Comment on This Draft Compatibility Determination

People wishing to provide comments can do so by March 4, 2011, by submitting them to r6gmcomments@fws. gov. For more information, contact Tom Koerner at (605) 885-6320, extension 12.

Appendix C

Threatened, Endangered, Proposed, and Candidate Species' That Occur in Region 6

					Stat	e			
Common name	Latin name	CO	KS	MT	NE	ND	SD	UT	WY
American burying beetle	Nicrophorus americanus		Е		Е		Е		
Arctic grayling	Thymallus arcticus			С					С
Arkansas darter	$E the ostoma\ cragini$	С	С						
Arkansas River shiner	Notropis girardi		Т						
Autumn buttercup	Ranunculus aestivalis							Е	
Barneby reed-mustard	Schoenocrambe barnebyi							Е	
Barneby ridge-cress	Lepidium barnebyanum							Е	
Black-footed ferret	Mustela nigripes	Е		Е		Е	Е	Е	Е
Blowout penstemon	Penstemon haydenii				Е				Е
Bonytail chub	Gila elegans	Е						Е	
Bull trout	Salvelinus confluentus			Т					
Canada lynx	Lynx canadensis	Т		Т				Т	Т
Clay reed-mustard	Schoenocrambe argillacea							Т	
Clay-loving wild buckwheat	Eriogonum pelinophilum	Е							
Colorado Basin hookless cactus	Sclerocactus glaucus	Т							
Colorado butterfly plant	Gaura neomexicana spp. coloradensis	Т							Т
Colorado pikeminnow	Ptychocheilus lucius	Е						Е	
Coral pink sand dunes tiger beetle	Cicindela albissima							С	
Dakota skipper	Hesperia dacotae					С	С		
DeBeque phacelia	Phacelia submutica	\mathbf{PT}							
Deseret milkvetch	Astragalus desereticus							Т	
Desert tortoise	Gopherus agassizii							Т	
Desert yellowhead	Yermo xanthocephalus								Т
Dudley Bluffs bladderpod	Lesquerella congesta	Т							
Dudley Bluffs twinpod	Physaria obcordata	Т							
Dwarf bear-poppy	Arctomecon humilis							Е	
Gierisch mallow	Sphaeralcea gierischii							С	
Goose Creek milkvetch	Astragalus anserinus							С	
Gray bat	Myotis grisescens		Е						
Gray wolf	Canis lupus	Е					Е	Е	
Gray wolf, lower 48 states	Canis lupus					Е			
Greater sage-grouse	Centrocercus minimus	С		С	С	С	С	С	
Greenback cutthroat trout	Oncorhynchus clarki stomias	Т							
Grizzly bear	Ursus arctos horribilis			Е					Т
Gunnison's prairie dog	Cynomys gunnisoni	С						С	
Gunnison sage-grouse	Centrocercus minimus		С						
Heliotrope milkvetch	Astragalus montii							Т	

			State						
Common name	Latin name	CO	KS	MT	NE	ND	SD	UT	WY
Holmgren milkvetch	Astragalus holmgreniorum							Е	
Humpback chub	Gila cypha	Е						Е	
Interior least tern	Sterna antillarum	Е	Е	Е	Е		Е		
Jones cycladenia	Cycladenia humilis var. jonesii							Т	
June sucker	Chasmistes liorus							Е	
Kenab ambersnail	Oxyloma haydeni kanabensis							Е	
Kendall Warm Springs dace	Rhinichthys osculus thermalis								Е
Knowlton cactus	Pediocactus knowltonii	Е							
Kodachrome bladderpod	Lesquerella tumulosa							Е	
Lahontan cutthroat trout	Onocorhynchus clarki henshawi							Т	
Last Chance townsendia	Townsendia aprica							Т	
Least chub	Iotichthys phlegethontis							С	
Least tern, interior population	Sterna antillarum					Е			
Lesser prairie-chicken	Tympanuchus pallidicinctus	С	С						
Maguire daisy	Erigeron maguirei							Т	
Mancos milk-vetch	Astragalus humillimus	Е							
Mead's milkweed	Asclepias meadii		Т						
Mesa Verde cactus	Sclerocactus mesaeverdae	Т							
Mexican spotted owl	Strix occidentalis lucida	Т						Т	
Milk-vetch (unnamed)	Astragalus microcymbus	С							
Navajo sedge	Carex specuicola							Т	
Neosho madtom	Noturus placidus		Т						
Neosho mucket	Lampsilis rafinesqueana		С						
North American wolverine	Gulo gulo luscus	С		С		С		С	С
North Park phacelia	Phacelia formosula	Е							
Osterhout milk-vetch	Astragalus osterhoutii	Е							
Pagosa skyrocket	Ipomopsis polyantha	PE							
Pallid sturgeon	Scaphirhynchus albus		Е	Е	Е	Е	Е		
Parachute beardtongue	Penstemon debilis	РТ							
Pariette cactus	Sclerocactus brevispinus							Т	
Pawnee montane skipper	Hesperia leonardus montana	Т							
Penland alpine fen mustard	Eutrema penlandii	Т							
Penland beardtongue	Penstemon penlandii	Е							
Piping plover	Charadrius melodus	Т	Т	Т	Т	Т	Т		
Preble's meadow jumping mouse	Zapus hudsonius preblei	Т							Т
Razorback sucker	Xyrauchen texanus	Е						Е	Е
Relict leopard frog	Lithobates onca							С	
Rio Grande cutthroat trout	Oncorhynchus claki virginalis	С							
Salt Creek tiger beetle	Cicindela nevadica lincolniana				Е				
San Rafael cactus	Pediocactus despainii							Е	
Scaleshell mussel	Leptodea leptodon						Е		
Schmoll milk-vetch	Astragalus schmolliae	С							
Sheepnose mussel	Plethobascus cyphyus		PE						
Shivwits milkvetch	Astragalus ampullarioides							Е	
Shrubby reed-mustard	Schoenocrambe suffrutescens							Е	

			State						
Common name	Latin name	CO	KS	MT	NE	ND	SD	UT	WY
Siler pincushion cactus	Pediocactus sileri							Т	
Sleeping Ute milk-vetch	Astragalus tortipes	С							
Snuffbox mussel	Epioblasma triquetra		PE						
Southwestern willow flycatcher	Empidonax traillii extimus	Е						Е	
Spalding's campion (or "catchfly")	Silene spaldingii			Т					
Spectaclecase (mussel)	Cumberlandia monodonta		PE		PE				
Sprague's pipit	Anthus spragueii	С	С	С	С	С	С		
Topeka shiner	Notropis Topeka (=tristis)		Е		Е		Е		
Uinta Basin hookless cactus	Sclerocactus wetlandicus							Т	
Uncompangre fritillary	Boloria acrocnema	Е							
Utah prairie dog	Cynomys parvidens							Т	
Ute ladies'-tresses	Spiranthes diluvialis	Т		Т				Т	Т
Virgin River chub	Gila seminuda (=robusta)							Е	
Water howellia	Howellia aquatilis			Т					
Welsh's milkweed	Asclepias welshii							Т	
Western prairie fringed orchid	Platanthera praeclara	Т	Т		Т	Т	Т		
White River beardtongue	Penstemon scariosus albifluvis	С						С	
White sturgeon	Acipenser transmontanus			Е					
Whooping crane	Grus americana	Е	Е	Е	Е	Е	Е		
Winkler cactus	Pediocactus winkleri							Т	
Woundfin	Plagopterus argentissimus							Е	
Wright fishhook cactus	Sclerocactus wrightiae							Е	
Wyoming toad	Bufo baxteri (=hemiophrys)								Е
Yellow-billed cuckoo	Coccyzus americanus	С		С				С	С

¹ E=endangered T= threatened PT = proposed threatened PE = proposed endangered C= candidate

References

- Apfelbaum, S.I.; Haney, A.W. 2010. Restoring ecological health to your land. Washington, D.C.: Island Press, Society for Ecological Restoration International. 264 p.
- Brookes, G.; Barfoot, P. 2010. GM crops: global socioeconomic and environmental impacts 1996–2008. Dorchester, UK: PG Economics Ltd. 165 p.
- Buffington, E.J.; McDonald, S.K. 2006. [Banned and Severely Restricted Pesticides]. http://wsprod.colostate.edu/cwis79/Factsheets/Sheets/141BannedPesticides.pdf> accessed January 18, 2011.
- Cerdeira, A.L; Duke, S.O. 2006. The current status and environmental impacts of glyphosate-resistant crops: a review. Journal of Environmental Quality 35:1633–1658.
- [COBFLES] Committee on the Impact of Biotechnology on Farm-Level Economics and Sustainability: National Research Council. 2010. Impact of genetically engineered crops on farm sustainability in the United States. Washington, D.C.: National Academies Press. 250 p.
- Dinehart, S.K.; Smith, L.M.; McMurry, S.T.; Smith, P.N.; Anderson, T.A.; Haukos, D.A. 2010. Acute and chronic toxicity of Roundup Weathermax® and Ignite® 280SL to larval *Spea multiplicata* and *S. bombifrons* from the southern high plains USA. Journal of Environmental Pollution 158:2610–2617.
- Duke, S.O.; Powles, S.B. 2008. Glyphosate: a oncein-a-century herbicide. Pest Management Science 64:319–325.
- Ferry, N.; Anghaard, M.R. 2008. Environmental impact of genetically modified crops gatehouse. Pondicherry, India: MPG Books Group. 424 p.
- Heap, I. 2010. [The International Survey of Herbicide Resistant Weeds]. <www.weedscience.com> accessed January 19, 2011.
- Helzer, C. 2010. The ecology and management of prairies in the central United States. Iowa City, IA: University of Iowa Press. 208 p.
- Langeland, K.A. 2006. Safe use of glyphosate-containing products in aquatic and upland natural areas. Florida Cooperative Extension Service: SS-ARG-104. 4 p.
- Mann, R.M.; Hyne, R.V.; Choung, C.B.; Wilson, S.P. 2009. Amphibians and agricultural chemicals: review of the risks in a complex environment. Journal of Environmental Pollution 157:2903–2927.

- Oregon State University. 1996. [EXTOXNET: Extension Toxicology Network, Pesticide Information Profiles]. http://extoxnet.orst.edu/pips/glyphosa .htm> accessed January 18, 2011.
- National Invasive Species Council. 2008. 2008–2012 National invasive species management plan. <www .invasivespecies.gov/home_documents/2008-2012%20 National%20Invasive%20Species%20Management %20Plan.pdf> accessed January 27, 2011.
- Pimentel, D.; Zuniga, R.; Morrison, D. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics 52(2005):273–288.
- Relyea, R.A. 2005. The impact of insecticides and herbicides on the biodiversity and productivity of aquatic communities. Ecological Society of America 15(2):618–627.
- Shipitalo, M.J.; Malone, R.W.; Owens, L.B. 2008. Impact of glyphosate-tolerant soybean and glufosinate-tolerant corn production on herbicide losses in surface runoff. Journal of Environmental Quality 37(2):401–408.
- Smith, D.; Williams, D.; Houseal, G.; Henderson, K. 2010. The tallgrass prairie center guide to prairie restoration in the upper midwest. Iowa City, IA: University of Iowa Press. 138 p.
- Tilman, D.; Fargione, J.; Wolff, B.; D'Antonio, C.; Dobson, A.; Howarth, R.: Schindler, D.; Schlesinger, W.H.; Simberloff, D.; Swackhamer, D. 2001. Forecasting agriculturally driven global environmental change. Science 292(5515):281–284.
- Towery, D.; Werblow, S. 2010. Facilitating conservation farming practices and enhancing environmental sustainability with agricultural biotechnology. West Lafayette, IN: The Conservation Technology Information Center. 25 p. <www2.ctic.purdue.edu/ biotech/pdfs/Biotechnology_Final.pdf> accessed January 19, 2011.
- [USDA] U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2000. Environmental Assessment and FONSI in response to petition 00-011-01p corn line NK603. <www.aphis. usda.gov/brs/aphisdocs2/00_01101p_com.pdf> accessed January 20, 2011.
- [USDA] U.S. Department of Agriculture, Animal and Plant Health Inspection Service. 2007. Finding of No Significant Impact: Petition for Nonregulated Status for Soybean Line MON 89788.

APHIS Contract No. 06-178-01p. Riverdale: USDA, APHIS, BRS. 45 p.

- [USFWS] U.S. Fish and Wildlife Service. 1982. [Refuge Manual]. <www.fws.gov/contaminants/ Documents/7RM14.pdf> accessed January 18, 2011.
- [USFWS] U.S. Fish and Wildlife Service. 1985. Refuge Manual. Part 6 Section 4 Cropland Management (6 RM 4). Arlington, VA. 15 p.
- [USFWS] U.S. Fish and Wildlife Service. 2004. [Integrated Pest Management: Reducing Risks from Pests and Pest Management Activities]. <www .fws.gov/contaminants/Documents/IPMfinal.pdf> accessed January 19, 2011.
- [USFWS] U.S. Fish and Wildlife Service. 2005. [Pesticide Use Proposals: One Step Towards Protecting Trust Resources]. <www.fws.gov/contaminants/pdf/PUP.pdf> accessed January 18, 2011.
- [USFWS] U.S. Fish and Wildlife Service. 2009. [What are Invasive Species?]. <www.fws.gov/invasives/> accessed January 18, 2011.
- [USFWS] U.S. Fish and Wildlife Service. 2010. [Environmental Contaminates Program]. <www

.fws.gov/contaminants/Issues/IPM.cfm> accessed January 18, 2011.

- VanGessel, M.J. 2001. Glyphosate-resistant horseweed from Delaware. Weed Science 49:703–705.
- Vera, M.S.; Lagomarsino, L.; Sylverster, M.; Perez, G.L.; Rodriguez, P.; Mugni, H.; Sinistro, R.; Ferraro, M.; Bonetto, C.; Zagarese, H.; Pizarro, H. 2010. New evidences of Roundup® (glyphosate formulation) impact on the periphyton community and the water quality of freshwater ecosystems. Ecotoxicology 19(4):710–721.
- Zylka, J.; Molano Flores, B.; Whelan, C. 2010. Grassland seed bank composition and restoration potential across a land management spectrum. In: Proceedings, 22nd North American Prairie Conference; Aug. 2–4, 2010; Cedar Falls, IA. Ceder Falls, IA: University of Northern Iowa.