Environmental Assessment

The Use of Genetically-Modified, Glyphosate-Tolerant Corn and Soybeans On Lands Within Wisconsin Wetland Management Districts

Lead Agency: US Fish and Wildlife Service
Wisconsin Wetland Management Districts Include:

Leopold Wetland Management District
and
St. Croix Wetland Management District

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U.S. Fish and Wildlife Service

National Wildlife Refuge System
Midwest Region
Wisconsin Wetland Management Districts

Environmental Assessment

Use of Row Crop Farming and Genetically modified, Glyphosate tolerant Corn and Soybeans on the Wisconsin Wetland Management Districts

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Summary

Managed by the U.S. Fish and Wildlife Service (Service), the National Wildlife Refuge System includes more than 150 million acres of public lands and waters dedicated to habitat and wildlife conservation. The Refuge System includes 560 national wildlife refuges and 38 wetland management districts throughout the United States. This mission of the National Wildlife Refuge System is:

> *…To administer a national network of land and waters for the conservation, management and where appropriate restoration of the fish, wildlife and plant resources and their habitats for the benefit of present and future generations of Americans.*

The Midwest Region of the Fish and Wildlife Service includes: Illinois, Iowa, Indiana, Michigan, Minnesota, Missouri, Ohio and Wisconsin. There are 54 national wildlife refuges and 12 wetland management districts in the Midwest Region.

The Wisconsin Wetland Management Districts (Wisconsin Districts) are responsible for the management of both fee title and easement Waterfowl Production Areas within 42 Counties in eastern, southern and western Wisconsin. These counties include: Adams, Barron, Brown, Burnett, Calumet, Columbia, Dane, Dodge, Door, Dunn, Florence, Fond du Lac, Forest, Green, Green Lake, Jefferson, Kenosha, Kewaunee, Langlade, Manitowoc, Marinette, Marquette, Menominee, Oconto, Outagamie, Ozaukee, Pepin, Pierce, Polk, Racine, Rock, Sauk, Shawano, Sheboygan, St. Croix, Walworth, Washburn, Washington, Waukesha, Waupaca, Waushara and Winnebago. At the time this document was drafted, there are 101 Waterfowl Production Areas (WPAs), no wetland easements, 61 Farmers Home Administration (FmHA) easements and no habitat easements within the Districts.

Although Service policy is to use the most natural means available to meet Refuge or District purposes and wildlife objectives, policy allows the use of cropland management in situations where objectives cannot be met through maintenance of more natural ecosystems (USFWS 1985). Service policy stipulates that only the minimum acreage required to meet objectives should be devoted to croplands. Currently, within the Districts, row crops on WPAs and Easements cover 104.8 acres, or .4% of Wisconsin Districts' land (acreages as of January 19, 2016).

In March of 2015, following an order from the United States District Court for the District of Columbia, the Service halted the use of GMGT crops at several Service locations until an Environmental Assessment (EA) was completed. The court finding was that the Service required EAs for the use of GMGT crops within station farming programs as a tool to achieve management goals. This EA will consider the environmental impacts of using GMGT crops on District lands in Wisconsin.

Chapter 1: Purpose and Need

1.1 Purpose

The U.S Fish and Wildlife Service is the primary federal agency responsible for the conservation of habitat and wildlife. The Midwest Region of the U.S. Fish and Wildlife Service includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio and Wisconsin. The Wisconsin Wetland Management Districts are comprised of Adams, Barron, Brown, Burnett, Calumet, Columbia, Dane, Dodge, Door, Dunn, Florence, Fond du Lac, Forest, Green, Green Lake, Jefferson, Kenosha, Kewaunee, Langlade, Manitowoc, Marinette, Marquette, Menominee, Oconto, Outagamie, Ozaukee, Pepin, Pierce, Polk, Racine, Rock, Sauk, Shawano, Sheboygan, St. Croix, Walworth, Washburn, Washington, Waukesha, Waupaca, Waushara and Winnebago Counties in eastern, southern and western Wisconsin. Wisconsin Wetland Management Districts are part of the National Wildlife Refuge System, which is the largest system of lands managed primarily for wildlife conservation in the world. The Refuge System mission is:

> *"…to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, an plant resources and their habitats within the United States for the benefit of present and future generations of Americans."*

The purpose of this Environmental Assessment (EA) is to review and evaluate current and alternative actions that use farming as a habitat management tool to support establishing purposes of Refuge System lands or the Refuge System's mission, including the use of genetically modified, glyphosate tolerant (GMGT) corn and soybeans on National Wildlife Refuge System lands in the Wisconsin Wetland Management Districts (Figure 1), and to then select an alternative. Each alternative is evaluated based on the environmental consequences, including biological and socioeconomic impacts, in accordance with the National Environmental Policy Act (NEPA). Alternatives are also evaluated based on how effectively they support the purposes for which Refuge System lands were established and the mission of the Refuge System.

1.2 Need for Action

The increased use of GMGT corn and soybeans crops and revised Service and Regional policies regarding farming and genetically modified organisms warrant a reevaluation of farming as a tool for wildlife and habitat management and the use of GMGT corn and soybeans on Refuge System lands in the Districts.

1.3 Decision Framework

The Regional Director for the Midwest Region will make two decisions based on this EA:

- Select an alternative regarding farming on Refuge System lands within the Wisconsin Districts.
- Determine if the selected alternative is a major federal action significantly affecting the quality of the human environment, thus requiring preparation of an Environmental Impact Statement.

Figure 1: Wisconsin Wetland Management Districts

1.4 Background

Currently, one out of 101 total WPAs and no easements within the Wisconsin Districts use farming as a method of habitat restoration. In 2016, 104 acres of Wisconsin Districts' land will be farmed, which is 0.4% of the District's total of 25,290 acres of WPAs and easements. Wisconsin Districts farmland accounts for 0.00002% percent of the total [1]3,777,100 planted acreage of corn and soybeans in the 41 (counties that comprise the Wisconsin Districts ([2]USDA 2014). The majority of Wisconsin Districts' land was farmland when acquired by the Service or had a farming history. It is expected that this trend will continue into the future as some of the best potential prairie habitat is also some of the most productive agricultural land within this broad area. The farming of Wisconsin Districts' land is utilized only as part of the process of native habitat restoration. The practice on all Service lands within the Wisconsin Districts has been to convert farmland to native prairie vegetation because natural habitats have greater value for wildlife (Tilman et al. 2001).

[1]Corn acre totals were not available for Florence, Forest, Langlade and Menominee Counties and soybean acres were not available for Florence, Forest, Langlade, Menominee, Ozaukee and Pepin Counties; thus acre totals reported in this document are likely less than totals.

[2]USDA planted acreage numbers were not available for 2015 at the time this document was authored.

The use of genetically-engineered organisms in American agriculture has increased substantially over the past decade. Genetically –modified, herbicide-tolerant crops were planted on 92 percent of the United States soybean acres and 80 percent of the corn acres in 2008 (Brookes 2010). In 2015 genetically modified crops or "biotechnology varieties" (glyphosate and all others) comprised 93 percent and 92 percent of the soybeans and corn crops planted in Wisconsin; respectively (USDA 2015).

Agriculture will continue to play a major role in the restoration of Wisconsin Districts' land into the future. Existing plans call for all cropland on District lands to be restored to native prairie vegetation. The 104 acres of cropland on Wisconsin Districts' land in 2016 will be reduced to 0 acres (100% reduction) in 2017. All cropland on currently owned Wisconsin Districts' land will be restored back to native prairie habitats by the spring of 2018. However, as the Service continues to acquire land it is likely that much of it will be cropland and these numbers will vary from year to year. Annual budget allocations require the Service to prioritize workloads, including restoration work. Utilizing agricultural practices in partnership with local farmers to prepare sites for restoration and manage invasive or unwanted plant species is a cost effective method to restore these lands.

The purpose of farming on Wisconsin Districts' land is to prepare the seedbed for planting native prairie species thus restoring habitat for migratory birds. Farming may be used on newly acquired parcels with current agricultural fields and on existing lands where poor quality, non-native, previously farmed areas are broken and prepared to be planted to native species resulting in a more resilient and diverse plant cover. Farming on Service owned land within the Districts will not be used for food plots, provide food for wildlife or any other purpose than habitat restoration.

Farming within the Wisconsin Districts is conducted by working with local farmers, referred to as a "cooperator". Farmers are selected for farming on service lands by being the renter or owner of the property at the time of purchase or participating in a bid process. The bid process results in the highest bidder (per acre rental rate) receiving the opportunity to farm for a designated number of years, up to

three. Under this system selected farms pay the Service the agreed upon amount and in exchange plant and harvest the entire field in accordance with the Special Use Permit and associated documents. Currently, the Districts requires the cooperator to plant GMGT soybeans or corn (if above ground material is chopped or baled and removed off site) during the final year of farming in order to control unwanted plant species and provide a firm, smooth seedbed for planting native species.

The Districts utilize a diverse mix of local ecotype native species in the restoration efforts. This seed is obtained by either harvesting from native prairies within the District or by purchasing seed from local vendors. Local ecotype seed is better adapted to the local climate and site conditions. Having a diverse mix also allows the restoration to provide structural diversity for a variety of wildlife as well as making the restoration more resilient in the face of changing environmental factors.
It is desirable for restoration work to take place at one time on Wisconsin District lands, but actual restoration of native vegetation may be accomplished by dividing larger fields into smaller parcels for seeding, typically 40-60 acres depending on seed availability. This means that a 160 acre field may take 1-3 years to seed completely to native vegetation. This approach has several advantages including reducing the risk of a large scale seed failure, decreasing local public concerns regarding invasive species and potentially increasing the diversity across seedings by utilizing different harvest years in order to complete the seedings.

Decreasing the public's concerns regarding invasive species, typically Canada thistle is a large part of the restoration effort. The Districts use various techniques including mowing in year one and two to control weeds and using a prescribed burn three to five years after seeding. In some cases restoration sites are not mowed, depending on weed control needs.

1.5 Authority, Legal Compliance, and Compatibility

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

The CCPs for the Wisconsin Districts were completed in 2008. These CCPs lay out the goals and objectives for the Wisconsin Districts for the following 15 years. In conjunction with the CCP a compatibility determination (CD) was signed allowing the use of limited (3 years or less) cooperative farming for habitat restoration. However, neither the CCP nor CD included specific language regarding GMGT crops. With the increase in use of GMGT corn and soybeans in the latter half of the decade it was necessary to update the CD to include these crops. In 2011 the Midwest Region completed an EA titled *"Use of Row Crop Farming and Genetically-modified, Glyphosate-tolerant Corn and Soybeans on National Wildlife Refuges and Wetland Management Districts."* This document identifies the specific conditions in which GMGT corn and soybeans can be used on Wisconsin Districts' land. Based on the 2011 Regional EA, a new CD was written and approved that allowed the use of farming to enhance and restore grasslands on Service lands in Region 3. This CD specifically identified the use of GMGT crops as well as limiting farming agreements to five years.

In 2014, due to variability amongst Farming Programs in Region 3, a Regional Farming Team was developed to standardize farming practices on Service lands throughout the region. Utilizing guidance from the team, the Wisconsin Districts developed individual Farming Program Implementation Plans describe how farming programs will be implemented on Service lands. The farming plans, among other things, identified the use of GMGT crops to achieve management goals, elimination of neonicotinoid treated seeds by 2016 and the process for selecting farmers for farming Service lands. Wisconsin Districts stopped the use of neonicotinoid treated seed in 2013.

In March of 2015, following an order from the United States District Court for the District of Columbia (Court), several field stations in Region 3 were directed to halt the use of GMGT crops until an Environmental Assessment was completed. As a result of the Court findings, all field stations in Region 3 of the U.S. Fish and Wildlife Service that utilize row crop farming programs in tandem with GMGT crops for habitat restoration purposes were directed to develop an Environmental Assessment (EA). This EA has been developed to ensure Wisconsin Districts are compliant with the 2015 Court findings. The EA will consider the environmental impacts of using GMGT crops on Wisconsin Districts' land for restoration purposes.

1.6 Issues Beyond the Scope of This EA

This EA is focused on the use of row crop farming as a management tool, and the use of GMGT corn and soybeans on Waterfowl Production Areas and Habitat Easements within Wisconsin Wetland Management Districts for habitat restoration purposes only. This EA does not evaluate other issues, including:

- Farming on wetland easements
- Genetically modified organisms other than GMGT corn and soybeans

Chapter 2: Description of the Alternatives

2.1 Formulation of Alternatives

Alternatives were developed based on a review of authorities, policies and regulations as well as management needs of the District. This chapter describes two alternatives:

1. Alternative A: Farming for Habitat Restoration Purposes Only, GMGT Corn and Soybeans Allowed

2. Alternative B: Farming for Habitat Restoration Purposes Only, No GMGT Corn and Soybeans

Development of the alternatives considered:

- The National Wildlife Refuge System Improvement Act of 1997
- The Midwest Region's 2011 Environmental Assessment "Use of Row Crop Farming and Genetically-modified, Glyphosate-tolerant Corn and Soybeans on National Wildlife Refuge and Wetland Management Districts"
- The Midwest Region's 2014 Farm Program Guidance
- Establishing purpose of the Wisconsin Wetland Management Districts
- Reasons for farming on Wisconsin Districts' land
- The availability and effectiveness of alternative management tools
- Benefits and impacts to wildlife
- Current goals and objectives identified in the completed Comprehensive Conservation Plan
- Current goals and objectives identified in the DRAFT Habitat Management Plan

2.2 Alternatives Considered But Not Developed

2.2.1 Unmanaged Succession

Unmanaged succession occurs when land is allowed to grow back with no human land management. This approach to restoration takes more time when compared to active management methods and typically results in a stand of vegetation dominated by undesirable, invasive and non-native plants. This is particularly true for lands that have been farmed for many years; the longer a tract is farmed, the less likely it is for native plant species to remain. This strategy for restoration is less efficient and effective than active restoration because native plant species are competing with invasive plants. Not only can unmanaged succession be unpopular with neighboring private land owners, it can result in violations of local and state laws pertaining to control of noxious weeds.

Unmanaged succession was not carried forward for evaluation because its results are not acceptable or adequate to fulfill the establishing purposes of Wisconsin Districts.

2.2.2 No Farming

No farming or fallowing means that once a parcel is acquired, farming would cease by the end of the calendar year. Depending on the size of the tract, native grassland restoration could be completed during that first complete year of ownership or over several years. The majority of land the USFWS acquires within the Wisconsin Districts is cropland. A significant concern is the unknown history of herbicide use on newly acquired tracts. Many herbicides have significant carryover and would likely have a detrimental impact on the establishment of native habitats.

Fallowing will not reduce the use of glyphosate by the Districts. If the field is left idle for one growing season, two applications of glyphosate would be applied to prevent unwanted plants from becoming established. The alternative to herbicide application would be hiring a contractor to disc a field to reduce weed competition. Discing a field one or two times per year would likely increase soil erosion on the site. Both of these options are not as efficient or cost effective as utilizing GMGT crops for seedbed preparation. In 2015, the cost to disc the 455 acres of cropland on District lands twice throughout the growing season is estimated at $13,331.50 (IA State University Extension 2015). The Wisconsin Districts spends approximately $15,000.00 per year to harvest and purchase local ecotype native seed. Spending any additional amount on seedbed preparation would decrease the amount available to acquire seed thereby reducing the number of acres Wisconsin Districts are able to restore by over 80 percent annually.

The combination of unknown herbicide history and/or carryover, potential increased use of glyphosate or mechanical fallowing and an increase in restoration cost/time results in fewer acres of high quality habitat annually. Therefore, not farming does not meet habitat restoration goals of the Wisconsin Districts and was not carried forward for further consideration.

2.3 Elements Common to All Alternatives

Several elements are common to both alternatives evaluated in this EA. These elements are listed here and are discussed in more detail in the following paragraphs.

- Issues Receiving Extensive Analysis During Comprehensive Assessments by the U.S. Department of Agriculture
- Adherence to the National Wildlife Refuge System Administration Act, as Amended by the National Wildlife Refuge System Improvement Act of 1997
- Adherence to FWS appropriate Use and Compatibility Policies
- Agricultural Lands Will Decrease on Wisconsin Districts' land
- Procedures and Limits on Herbicide Use
- Adherence to FWS Integrated Pest Management and pesticide use policies and guidance
- Adherence to Midwest Region Farming Policy and Guidance

2.3.1 Issues Receiving Extensive Analysis During Comprehensive Assessments by the U.S. Department of Agriculture

Since 1986 the U.S. Department of Agriculture (USDA), the Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA) have been the federal agencies responsible for assessing the safety of products of modern biotechnology. Assessments are based on the biological characteristics of

each new organism. The USDA's Animal and Plant Health Inspection Service (APHIS) has completed comprehensive assessments of GMGT corn and soybeans through NEPA review. This review did not find significant impacts regarding:

- Weediness

Corn and soybeans have been grown throughout the world without any report that they are serious weeds. They are not generally persistent in undisturbed environments without human intervention. In the year following cultivation, they may grow as a volunteer only under specific conditions and can be easily controlled by herbicides or mechanical means. They do not compete effectively with cultivated plants or primary colonizers.

- Human health and safety

The engineered proteins in GMGT corn and soybeans are not known to have any toxic properties and have minimal potential to be food allergens.

- Non-target species

The engineered proteins in GMGT corn and soybeans are not known to have any toxic properties and have minimal potential to be food allergens.

- Inadvertent crop-to-weed gene flow

There are no known species of weeds that are sexually compatible with corn or soybeans.

There are many EAs written by APHIS that assess GMGT corn and soybeans. Two of them may be found at the following web addresses:

http://www.aphis.usda.gov/brs/aphisdocs2/06_17801p_com.pdf
http://www.aphis.usda.gov/brs/aphisdocs2/00_01101p_com.pdf

2.3.2 Adherence to the National Wildlife Refuge System Administration Act, as amended by the National Wildlife Refuge System Improvement Act of 1997

The National Wildlife Refuge System Improvement Act of 1997 amended the National Wildlife Refuge System Act of 1966 and created comprehensive legislation spelling out how the Refuge System would be managed and how it could be used by the public. All of the alternatives evaluated in this EA are consistent with the main points of the Improvement Act:

- Wildlife conservation comes first on National Wildlife Refuges (Includes Wetland Management Districts).
- The Service will adhere to biological integrity, diversity and environmental health of the Refuge System.
- Compatibility determinations will guide uses of Refuge System lands.

- Six wildlife-dependent recreational uses are priority public uses of the Refuge System: hunting, fishing, wildlife observation and photography, environmental education and interpretation.
- A comprehensive conservation plan will be prepared for every refuge and wetland management district.

2.3.3 Adherence to FWS Appropriate Use and Compatibility Policies

All of the alternatives evaluated in this environmental assessment would adhere to two policies guiding decisions on activities allowed on lands managed by the National Wildlife Refuge System: Appropriate Use and Compatibility.

The Appropriate Refuge Uses policy describes the initial decision process a refuge or district manager follows when first considering whether or not to allow a proposed use on a National Wildlife Refuge or Wetland Management District. The manager must first find a use appropriate before undertaking a compatibility review of the use. An appropriate use, as defined by the Appropriate Use Policy (603 FW1), is a proposed or existing use on a refuge that meets at least one of the following four conditions:

- The use is a wildlife-dependent recreational use as identified in the Improvement Act.
- 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.
- The use involves the take of fish and wildlife under State regulations.
- The use has been found to be appropriate as specified in section 1.11 (603 FW 1 of the Service Manual).

Waterfowl Production Areas (WPAs) that make up Wetland Management Districts are considered open to hunting and fishing unless posted as "closed". Other public uses on WPAs are prohibited unless specifically and legally opened. The Improvement Act states "…the Secretary 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 a Compatibility Policy (603 FW 2) that includes guidelines for determining if a use proposed on a National Wildlife Refuge or Wetland Management District is compatible with the purposes for which the refuge or 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 National Wildlife Refuge System lands that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the NWRS mission or the purposes of the Refuge* (Part 2.6 Section B, 603 FW2 of the Service Manual). The policy also includes procedures for documentation and periodic review of existing refuge uses.

The Wisconsin Districts completed compatibility determinations for "Farming for Cover Enhancement" in conjunction with its Comprehensive Conservation Plan in April, 2003. A new appropriate use and compatibility determination was completed for "Cooperative farming as a habitat management tool to enhance and restore refuge grasslands" in May, 2011. This new CD specifically identified GMO crops

(specifically Glyphosate-tolerant corn and soybeans) as being authorized on District lands when used for habitat restoration. The compatibility determinations for Wisconsin Districts will be updated again in 2016. This most recent CD lays out the specific circumstances under which farming and the use of GMGT corn and soybeans may be used. In addition, it described the phasing out of neonicotinoid treated seeds from the farming program by 2016. No neonicotinoid treated seeds have been used on District lands since 2013.

2.3.4 Agricultural Lands Will Decrease within the Wisconsin Wetland Management Districts

Under all alternatives evaluated, the amount of Wisconsin Districts' land planted in row crops will diminish as land is restored to native habitat. How quickly the farming program decreases varies with each alternative and availability of local ecotype seed.

The Service's Biological Integrity, Diversity and Environmental Health policy (601 FW3) provides direction on the use of farming (including row crops) and directs land managers to restore land to native habitats. Farming on Wisconsin Districts has been reviewed under their Comprehensive Conservation Plan (CCP) completed in 2008. Prairie restoration objective within the CCPs state that Wisconsin Districts are to "Restore an average of 200 acres of uplands on WPAs to native seeded grassland species each year. Begin the process on all new acquisitions within 3 years of purchase…." In addition, the DRAFT Wisconsin Districts Habitat Management Plan (HMP) goal for habitat restoration states "Restore biologically diverse grasslands using local ecotype seed to mimic native plant communities and manage them using natural processes to provide quality habitat for upland-nesting waterfowl and other grassland-dependent wildlife." Currently (2016), 0.4 percent of Wisconsin Districts' land is farmed. Under the current seeding plan, all cropland on currently owned District lands will be restored back to native prairie habitats by the spring of 2017. However, as the Service continues to acquire land it is likely that much of it will be cropland and these numbers will vary from year to year.

2.3.5 Procedures and Limits on Herbicide Use

Under all of the alternatives evaluated, protective measures will be followed to ensure the proper use of herbicides on Wisconsin Districts' land. Service policy requires managers to complete a Pesticide Use Proposal, or PUP, each year before applying pest control chemicals (herbicides, insecticides, fungicides, etc.) on Service lands. Each PUP is completed by Service staff and approved at either field, regional or national levels, depending on the pesticide being proposed. Requiring PUPs helps ensure that product label instructions are followed, pesticides are used effectively and safely, the lowest risk products are selected, and appropriate buffers are maintained.

Typically, Roundup Original Max (glyphosate) is the preferred herbicide to use in restoration efforts because there is no residual carryover that might impact reseeding of native vegetation the following winter/spring. A brief description of Roundup Original Max follows:

- Roundup Original Max (Monsanto) – Roundup Original Max is a postemergence, non-selective herbicide with no residual soil activity. The active ingredient in Glyphosate, N(phosphonomethyl)glycine. There is no residual soil activity after application. This herbicide cannot be applied directly to water.

2.3.6 Integrated Pest Management

While Wisconsin Districts do not have a specific Integrated Pest Management (IPM) plans, all alternatives considered would adhere to the Service's IPM policy (569 FW 1).

IPM is "a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health and environmental risks" (7 USC 136r-1). IPM coordinates the use of pest biology environmental information and available technology 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.

More information on IPM is available in Service policy issued on preparing and implementing integrated pest management.

2.3.7 Adherence to Midwest Region Refuge System Farming Policy

All alternatives developed in this EA would adhere to national and regional policy related to farming on National Wildlife Refuge System lands.

Nationally, the Fish and Wildlife Service policy on Biological Integrity, Diversity and Environmental Health (601 FW 3, 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 purpose(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."

The Midwest Region incorporated national policy into the Region's policy on farming in 2010:

> "Where feasible and consistent with Refuge purpose(s), Region 3 staff (we) restore and manage degraded or modified habitats in the pursuit of biological integrity, diversity and environmental health. We do not allow Refuge uses or management practices that result in the maintenance of non-native plant communities unless we determine there is no feasible alternative for accomplishing the Refuge purpose(s). Where farming is not required for Refuge purpose(s) we cease farming and strive to restore natural habitats. We do not use genetically modified organisms in Refuge management unless we determine their use is essential to accomplish Refuge purpose(s) and the Chief of Refuges for Region 3 approves the use. The use of genetically modified organisms is limited to herbicide-resistant crops only (September 24, 2010, Notice from Midwest Regional Chief). More specifically the use of GMGT corn and soybeans can only be used for habitat restoration purposes." (USFWS 2011, pp. 91)

2.4 Alternatives Considered

2.4.1 Alternative A: Farming for Habitat Restoration Purposes Only, GMGT Corn and Soybeans Allowed (Preferred Alternative)

Under Alternative A, the use of GMGT corn and soybeans on Wisconsin Districts' land would continue but only as a habitat restoration tool. Currently, as part of restoration planning the amount of cropland on WPAs will decrease an average of 66 percent per year through 2017. All currently existing agricultural lands would be reseeded with native prairie vegetation by the spring of 2017. However, row crop farming is likely to continue, but only on newly acquired tracts where habitat restoration has not occurred.

This alternative retains the option to use GMGT corn and soybeans to prepare former agricultural fields for habitat restoration. Wisconsin Districts completed the GMGT eligibility questionnaire and received approval from the Regional Refuge Chief, to use GMGT corn and soybeans for habitat restoration purposes in 2011.The questionnaire identified why the use of GMGT crops was essential in meeting habitat restoration objectives.

Wisconsin Districts work with local cooperators to plant corn and soybeans through a Special Use Permit (SUP). The SUP establishes the terms and conditions the cooperator must follow such as, how long tracts may be farmed, the herbicides that may be used and any other special conditions they are required to follow. Typical farming practices used throughout the Districts include mechanically tilling the ground with disks and harrows, using drills and planters to seed the crop and using a combine to harvest. In addition, two pesticide treatments are applied to control invasive species during the growing season.

Conditions outlined in the Service's Special Use Permit would be followed. Many of these conditions relate to the Environmental Protection Agency's CORE 4 conservation practices:

- Conservation tillage
- Crop nutrient management
- Pest management
- Conservation buffers

2.4.2 Alternative B: Farming for Habitat Restoration Purposes Only, GMGT Corn and Soybeans Not Allowed.

Under Alternative B, the use of GMGT corn and soybeans on Wisconsin Districts' land would no longer be allowed. As in Alternative A, farming would be allowed for habitat restoration purposes only. Cooperator selection, farming practices and special conditions would all be the same as Alternative A, with the exception of GMGT crops being prohibited.

Chapter 3: Physical and Social Environment

3.1 Introduction

The Wisconsin Wetland Management Districts includes 101 Waterfowl Production Areas and 61 Farmers Home Administration Easements within 42 counties in eastern, southern and western Wisconsin. These counties are:

- Adams
- Barron
- Brown
- Burnett
- Calumet
- Columbia
- Dane
- Dodge
- Door
- Dunn
- Florence
- Fond du Lac
- Forest
- Green
- Winnebago
- Green Lake
- Jefferson
- Kenosha
- Kewaunee
- Langlade
- Manitowoc
- Marinette
- Marquette
- Menominee
- Oconto
- Outagamie
- Ozaukee
- Pepin
- Pierce
- Polk
- Racine
- Rock
- Sauk
- Shawano
- Sheboygan
- St. Croix
- Walworth
- Washington
- Waukesha
- Waupaca
- Waushara

The nature and distribution of vegetation types in Wisconsin are described by Curtis, in his 1959 book Vegetation of Wisconsin. The southern forests covered the southern half and western third of the state. Dominant species were primarily oak on the drier sites; sugar maple, basswood, slippery elm, red oak and ironwood on the mesic sites; and silver maple and American elm dominating the lowland sites. In pre-settlement times these forests covered approximately 5.2 million acres with another 7.3 million acres of what is considered oak savanna also falling in this category (Figure#). In this region, the closed woodlands and oak savannas provided no distinct boundaries but blended together. Forests dominated the northern half of Wisconsin. These forests supported jack, red, and white pine with red maples and red oak on the dry sites. The more mesic stands of northern forests were dominated by sugar maple but hemlock and/or beech may have been co-dominant. Finally, the northern lowland (swamp) forests of Wisconsin are split into the tamarack-black spruce bog forests, the white cedar-balsam fir conifer swamps, and the black ash-yellow birch-hemlock hardwood swamps. Scattered throughout the southern forest type were areas of true tall grass prairie. These prairies covered just over 2 million acres and were most dominant in the southwest corner of the state, becoming smaller and more scattered as one moved northeast. Prairie and oak savanna covered about 9.5 million acres of Wisconsin combined (Figure#). These areas were dominated by many species, including big bluestem, little bluestem, needlegrass and many other grass and forb species. Burr, black, Hill's and white oaks were the dominant species in the oak savannas during pre-settlement time. Of the approximately 9.5 million acres of prairie and oak savanna that Wisconsin hosted just 150 short years ago only one-half of one percent (less than 10,000 acres) of the prairies and less than one-tenth of 1 percent (less than 1,000 acres) of the savanna remains. Farming, urban sprawl, fire suppression, and other developments continue to threaten the few acres of prairie and savanna that remain of what we have lost in the last 150 years. (St. Croix WMD, 2011 pp.9)

3.2 Habitat

One can only begin to imagine what the landscape looked like prior to European settlement in Wisconsin. Located along Wisconsin's Tension Zone, the landscape found within the Wisconsin Districts is some of the most diverse in Wisconsin. For example, in two separate 5 mile stretches of land in St. Croix and Polk County, one can progress south from deciduous and coniferous forest into open wet prairie, through oak openings and barrens into rolling grasslands and pastures. Many of the pre-settlement vegetation/habitat types as documented and then mapped by Finley (1976) can be found within the District (Figure 2).

The landscape within the Wisconsin Districts has changed dramatically since the pre-settlement era. As settlers arrived in the tension zone (Figure 2) of Wisconsin, they discovered a precious resource in the prairie—its soils. This discovery ultimately led to the conversion of prairie to cropland in the heart of the Wisconsin Districts from eastern Minnesota to the shore of Lake Michigan. Massive conversion of drained wetlands and prairie to agricultural fields has dramatically altered the landscape, hydrology, and the region's carrying capacity for waterfowl and other prairie- and wetland-dependent plants and wildlife. Within the Wisconsin Districts, the only areas with native remnant plant communities remaining are located on hillsides too steep to till, on very poor soil or within some form of protected ownership (WI DNR 2006). Wisconsin has less than 0.1% of its original prairie habitat (Samson and Knopf 1994) and has lost roughly 5 of the estimated 10 million acres of wetlands present when Wisconsin achieved statehood in 1848 (Hagen 2008).

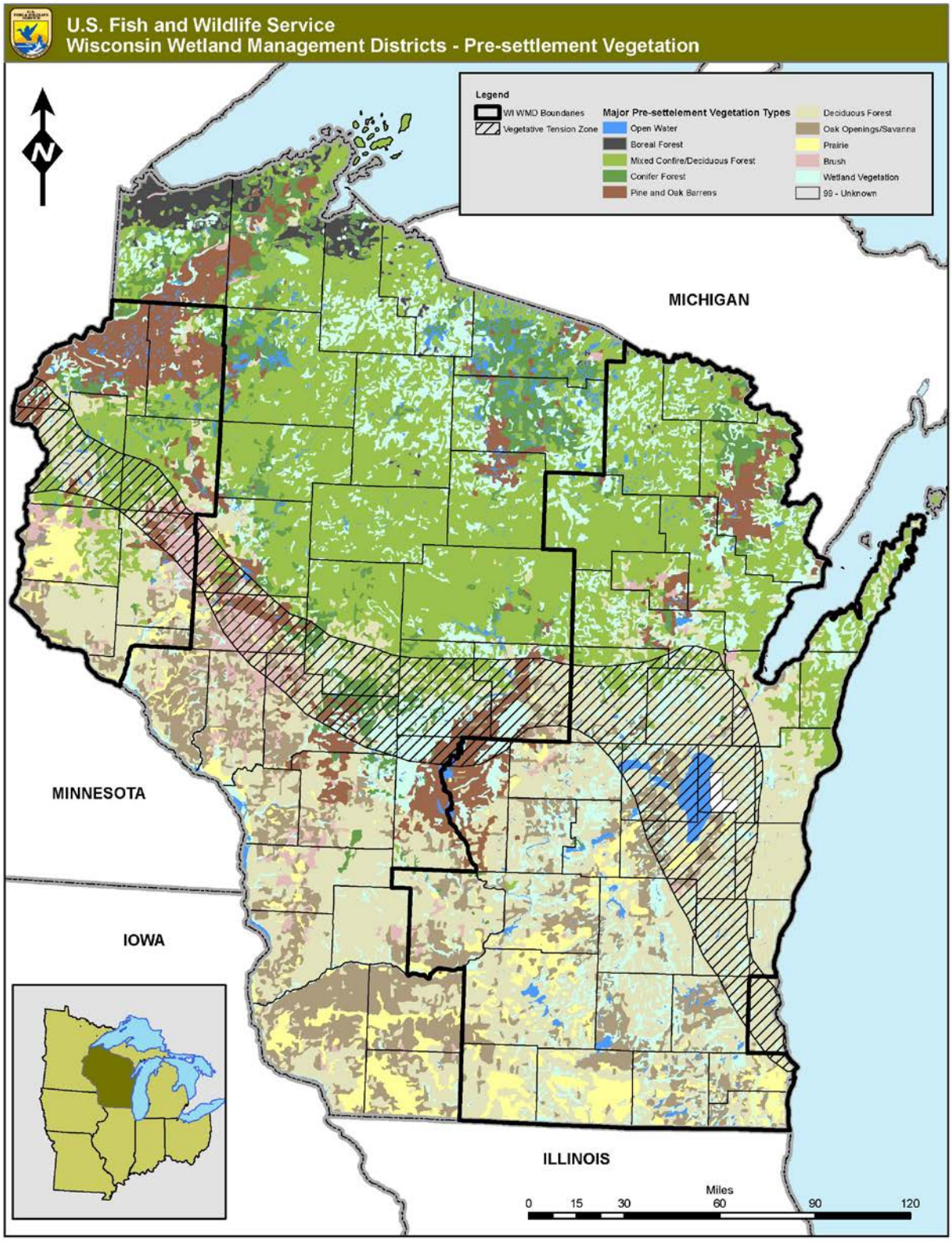

Figure 2: Pre-settlement Vegetation of the Wisconsin Wetland Management Districts

3.3 Existing Management of Wisconsin Districts' land

The Service uses a variety of techniques to manage lands, depending on the habitat, the presence of endangered species and other factors. Habitat management techniques include but are not limited to, prescribed burning, haying, grazing, mechanical treatment of invasive trees and chemical and biological control of invasive and undesirable species.

Row crop farming has been used to accomplish habitat restoration objectives on Wisconsin Districts' land. Farming activities on WPAs are almost always a small part of the local farming economy. The Districts have slowly reduced the amount of cropland through the years and will continue to do so. In 2015, 455 acres were farmed compared to 590 acres in 2011. However, since 2011 the Districts have restored 1,094 acres of cropland on WPAs but due to continual acquisition of new parcels that are cropland the number of acres is only slightly reduced. See table 1 below for an overview of crop acres and restored acres.

Table 1: Crop Acres and Restoration Acres by Year- Wisconsin Wetland Management Districts

Year	2016	2015	2014	2013	2013
Total Acres Farmed	104.8	310	307.8	111	129

3.4 Wildlife

Migratory birds are the focus of district land acquisition and management, in particular waterfowl. Primary nesting waterfowl include mallard, blue-winged teal and wood duck. Shallow lakes and some larger wetlands also support over-water nesting species such as lesser scaup and canvasback. In addition to waterfowl, other migratory birds common on Wisconsin Districts' land include grassland-dependent passerines, shorebirds and other wetland-dependent species.

Undesirable fish such as fathead minnows, bullheads and carp infest many of the wetlands within the Wisconsin Districts. In addition, a wide variety of mammals inhabit Service owned lands, from small rodents to White-tailed deeer.

3.5 Threatened and Endangered Species

Nineteen threatened and endangered species are known to occur within the Wisconsin Districts (See Table 2: Threatened and Endangered Species within the Wisconsin Wetland Management Districts). In general, the majority of these species will be found in more natural habitats rather than in the farmed lands. Species such as wolves may occasionally use these fields to feed. More detailed information for each species can be found online at: http://www.fws.gov/endangered/

Table 2: Threatened and Endangered Species within the Wisconsin Wetland Management Districts

Wisconsin Wetland Management Districts																				
	Endangered	Endangered	Threatened	Threatened	Threatened	Threatened	Endangered	Endangered	Endangered	Endangered	Endangered	Endangered	Threatened	Endangered	Threatened	Threatened	Endangered	Endangered	Endangered	Endangered
County	**Canada Lynx**	**Dwarf Lake Iris**	**Eastern Massasauga Rattlesnake**	**Eastern Prairie Fringed Orchid**	**Fassett's Locoweed**	**Gray Wolf**	**Higgins' Eye Pearly Mussel**	**Hine's Emerald Dragonfly**	**Karner Blue Butterly**	**Kirtland's Warbler**	**Mead's Milkweed**	**Northern Long-eared Bat**	**Northern Monkshood**	**Piping Plover**	**Pitcher's Thistle**	**Prairie Bush Clover**	**Sheepnose Mussel**	**Snuffbox Mussel**	**Poweshiek Skipperling**	**Whooping Crane**
Adams						X			X	X										X
Barron					X	X										X				
Brown																				
Burnett					X	X			X											
Calumet																				
Columbia			X				X				X									
Dane				X			X				X									
Dodge																				
Door		X						X							X					
Dunn						X										X	X			
Florence	X					X														
Fond du Lac																				
Forest	X					X														
Green											X									
Green Lake																				
Jefferson				X																
Kenosha									X											
Kewaunee								X												
Langlade																				
Manitowoc															X					
Marinette	X					X				X										
Marquette									X											
Menominee						X			X											
Oconto						X			X											
Outagamie									X											
Ozaukee				X				X												

Pepin			X													X	X	X		
Pierce							X									X				
Polk					X	X	X		X							X		X		
Racine																				
Rock			X	X																
Sauk							X					X	X							
Shawano									X											
Sheboygan				X											X					
St. Croix							X									X		X		X
Walworth			X	X																
Washburn					X	X			X	X										
Washington																				
Waukesha				X	X															
Waupaca									X											
Waushara					X				X									X		
Winnebago				X																

3.6 Invasive Species

Invasive species are defined as "non-native species whose introduction does, or is likely to cause economic or environmental harm or harm to human health" (National Invasive Species Council, www.invasivespecies.gov/). Invasive species can be plants, animals and microbes but discussion of invasive species in this EA refers to plant species.

Invasive species are an issue on lands within the Wisconsin Districts. While there are numerous invasive species found throughout Wisconsin, five are considered a major concern because of their ability to invade both native and restored habitat, decreasing their value to wildlife. The five species are:

- Smooth brome
- Kentucky bluegrass
- Common tansy
- Crown vetch
- Wild parsnip

3.7 Socioeconomic

In 2014 the US Census Bureau estimated 3,680,642 people living in the forty-two county area encompassed by the Wisconsin Wetland Management Districts. According to the 2007 Census of Agriculture there were 44,036 farms within the counties services by the Wisconsin Districts (USDA 2014). In 2014 these farms raised soybeans on 952,558[3] acres and corn on 2,168,739[4] acres (USDA 2014). More information regarding agricultural statistics can be found at the following website:

http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Wisconsin/

[3]Soybean acreage totals were not available for Florence, Forest and Menominee Counties

[4]Corn acreage totals were not available for Florence and Menominee Counties.

3.8 Cultural Resources

Both prehistoric and historical cultural resources are distributed throughout the 42 counties comprised by the Wisconsin Districts. All areas that are farmed have been farmed and disturbed in the past and have little likelihood of finding cultural resources.

Chapter 4: Environmental Consequences

This chapter discusses the potential effects of the actions proposed in the alternatives. Included in the discussion are the effects to the environment and human communities associated with the use of farming and GMGT corn and soybeans on Wisconsin Wetland Management Districts' land.

4.1 Effects Common to All Alternatives

4.1.1 Endangered and Threatened Species

The use of GMGT corn and soybeans on Wisconsin Districts' land will not affect any threatened or endangered species. None of the plants and few of the animals listed as threatened or endangered in Wisconsin spend any time in corn or soybean fields. The USDA's APHIS completed environmental assessments of the use of GMGT corn and soybeans and concluded:

> 1. There are no significant differences between the chemical compositions of GMGT and non-GMGT corn and soybeans. Contact with, or ingestion of GMGT corn and soybeans are very unlikely to have any effect on any plant and animal.
>
> 2. Feeding experiments with chickens failed to detect any differences between GMGT and non-GMGT corn and soybeans regarding mortality rates, weight gain and reproductive rates.
>
> 3. There are no known species of weeds that are sexually compatible with corn or soybeans, so there is no likelihood there can be an unintended transfer of genes to a threatened or endangered species.
>
> 4. Corn and soybeans are very unlikely to escape into natural habitats because corn and soybeans can only persist with intensive human management, so there is no chance they will escape into native habitats occupied by threatened or endangered species.
>
> 5. Use of GMGT corn and soybeans will not significantly alter cultivation practices. Grain production on private lands within the Wisconsin Wetland Management Districts will be dominated by soybeans and corn that are treated with herbicides, neonicotinoids and synthetic fertilizers.
>
> (USDA-APHIS 2000; USDA-APHIS 2007)

The USDA's APHIS routinely reviews potential impacts for proposals of the general release of genetically modified crops. In that agency's environmental assessment of GMGT corn and soybeans, APHIS included and evaluation on threatened and endangered species prior to general release. The final EAs and Findings of No Significant Impact (FONSI) for both crops 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 GMGT corn or soybeans or from exposure to label rates of glyphosate expected to be used in conjunction with GMGT soybeans and corn. In addition, the U.S. Environmental Protection Agency has not received any reported adverse effects on threatened or endangered species or their habitats from exposure to glyphosate or GMGT soybeans and corn.

The use of conventional corn and soybeans on Wisconsin Districts' land will not affect any threatened or endangered species. None of the plants and few of the animals listed as threatened or endangered in the Wisconsin Wetland Management Districts spend any time in corn or soybean fields. Eastern prairie fringed orchid (*Platanthera leucophaea)* is a threatened plant found in a few locations in the Wisconsin Districts (See Table #2). Eastern prairie fringed orchid, dwarf lake iris, Fassett's locoweed, mead's milkweed, northern monkshood, pitcher's thistle and prairie bush clover may be negatively affected if exposed to herbicides during the growing season. This potential affect would need to be considered prior to herbicide application if any plants are located within the vicinity. However, many of these species are almost exclusively located on native prairie sites and no known locations of these species are located in close proximity to farm fields on Wisconsin Districts' land. Using herbicides will not impact the aforementioned species if:

1. Herbicides are applied following pesticide label instructions. These instructions include information regarding the use of a particular herbicide around water, near sensitive habitats and near threatened and endangered species.

2. Conditions outlined in the Service's cooperative farming agreement are followed. Many of these conditions relate to the best management practices designed to protect soil and water, and manage pest and nutrients.

3. Pesticide Use Proposals are completed, as required by Service policy. Pesticide Use Proposals are required before the application of pesticides on Service lands. Impacts to threatened or endangered species are considered during this annual review.

4.1.2 Wildlife Habitat

Both alternatives will result in high quality, native wildlife habitat. All land that is being farmed will be restored back to native habitats instead of remaining in row crops such as soybeans or corn. These restored native habitats are more valuable to wildlife, particularly ground nesting waterfowl and grassland nesting birds. In addition, restoring row crop fields to native habitat reduces the amount of fertilizers and herbicides used as they are typically more sustainable in the long term.

4.1.3 Cultural Resources

The consequences of the planned management on cultural resources are the same across all alternatives. Since most of the agricultural activities have resulted in ongoing ground disturbance, any additional effects to cultural or historic resources are likely to be minor or non-existent. Any management actions with the potential to affect cultural resources require appropriate District Manager review, as well as review by the Service's Regional Historic Preservation Officer 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 to cultural resources will occur.

4.1.4 Organic Soybeans

Organic farming is managed in accordance with the Organic Foods Production Act of 1990 to respond to site-specific conditions by integrating cultural, biological and mechanical practices that foster cycling of resources promote ecological balance and conserve biodiversity. The USDA National Organic Program

(NOP) develops implements and administers national production, handling and labeling standards (USDA NOP, n.P). The use of genetic engineering is prohibited in the production of organic crops.

A review of potential impacts of glyphosate-tolerant soybeans and corn to Certified Organic Farmers was completed by APHIS prior to general release (USDA 2000, USDA 2007). The conclusion made was that for soybeans, there should be no apparent potential for significant impact to organic farming through deregulation and general release. Soybeans are highly self-pollinated with large, heavy seeds that are not easily dispersed. Therefore minimal buffer zones are needed to prevent cross-pollination to other soybeans or contamination of adjacent agricultural land (USDA 2007).

No negative impacts to organic soybean farming are anticipated under either alternative evaluated.

4.2 Effects of Management Alternatives

This analysis of effects compares how each of the two alternatives adheres to Service policy and how they affect environmental issues related to *Wildlife Issues*, *Habitat Issues* and *Socioeconomic Issues.* Table 3 below summarizes the effects of both alternatives.

Table 3: Summary of Alternative Effects

Summary of Alternatives		
Issues	**Alternative A** (Preferred Alternative) GMGT Crops Allowed	**Alternative B** GMGT Crops Prohibited
Wildlife	Increase in nesting waterfowl	Increase in nesting waterfowl
	Increase in grassland nesting birds	Increase in grassland nesting birds
	No increase in toxicity to aquatic resources	Potential increase in toxicity to aquatic resources
Habitat	Increase in high diversity native habitat	Increase in high diversity native habitat
	No herbicide movement into adjacent surface water	Potential increase in herbicide movement into adjacent surface water
	No residual herbicide carryover impacting habitat restoration	Potential herbicide carryover negatively impacting habitat restoration
	No herbicide movement into ground water	Potential herbicide movement into ground water
Socioeconomic	Small reduction in overall acreage of cropland within the District	Small reduction in overall acreage of cropland within the District
	No impact to local cooperators by changing farming practices	Potential impact to local cooperators by changing farming practices using non-GMGT crops

4.2.1 Alternative A: Farming for Habitat Restoration Purposes Only, GMGT Corn and Soybeans Allowed

Under Alternative A, the use of GMGT corn and soybeans for habitat restoration on Wisconsin Districts' land would be allowed. Currently 100 percent of the farmed acres on District lands will be restored by 2017. One hundred four and eight tenths acres would be farmed in 2016 and restored in 2016 or 2017. Under Alternative A, the District would adhere to the present schedule for restoring farmland to native habitat. Newly acquired tracts could also be farmed until being restored to native habitat.

The amount of cropland being actively farmed when acquired by the Districts is expected to decrease. This is due to the donation of lands by partner organizations. Typically when these lands are donated to the Service they are already restored. However, there will be some tracts acquired by the Districts where active farming is taking place. Once these lands are acquired they will be restored to native vegetation within three-five years as described within the Region 3 Farming Guidance (2014).

Glyphosate-resistant (GR) weeds are a concern in GMGT cropping systems. Fourteen GR weed species have been identified in the United States (Heap 2015). Of the 14 GR species identified in the US, two species have been reported in Wisconsin (Fysken 2014). The continued use of glyphosate as the primary herbicide in GMGT systems is the primary contributor to glyphosate-resistance in weeds (Livingston et al., 2015). Twelve best management practices (BMPs) were recommended by the Weed Science Society of America (WSSA) to reduce herbicide resistance in weeds (Norsworthy et al., 2012). These BMPs ranged from gaining an understanding of weeds to preventing the spread of weeds. Two of the most important practices were utilizing a diverse approach to weed management and using multiple modes of action (MOAs) to tackle difficult weed problems.

The two species of weeds (giant ragweed (*Ambrosia trifida*) and common waterhemp (*Amaranthus rudis)*) identified in WI as GR are annuals. These annual weeds, while a concern for agricultural producers, have not been shown to negatively impact the Wisconsin Districts' native habitat restorations.

While there is controversy regarding glyphosate's effect on human health, the Environmental Protection Agency (EPA) has established Maximum Contaminant Levels (MCL) for this herbicide. Exposure to levels above the MCL could result in congestion of the lungs and increased breathing rate (EPA 2009). Long-term exposure to levels above the MCL could result in kidney damage and/or reproductive effects EPA (EPA 2009). According to the EPA (2009) insufficient evidence exists to determine if glyphosate has the potential to cause cancer. Glyphosate does not bioconcentrate in aquatic organisms.

Alternative A would not increase the threat of herbicide toxicity to wildlife compared to Alternative B. In fact, Alternative A is advantageous to wildlife because it encourages conservation tillage and is an efficient, cost-effective method of preparing farm land for conversion to native habitats. Alternative A would have no effect on seed availability or the local farming economy. It would have no effect on cooperators operations for weed control in crop fields as approximately 90 percent and 96 percent of corn and soybeans, respectively, are currently sprayed with Glyphosate within the forty-two county Wisconsin Districts. Ultimately, local cooperators would be affected due to fewer acres being farmed. The managers of the Wisconsin Districts must determine whether the use of farming and genetically modified crops is required to accomplish the establishing purpose of the lands they manage. Use also requires specific concurrence by the Midwest Region Refuge Chief.

4.2.2 Alternative B: Farming for Habitat Restoration Purposes Only, GMGT Corn and Soybeans Not Allowed

Under alternative B, the use of GMGT corn and soybeans would be prohibited. Only conventional (non-GMGT) corn and soybeans would be allowed. Currently 100 percent of the farmed acres on Wisconsin Districts' land will be restored by 2017. One hundred four and eight-tenths acres would be farmed in 2016 and restored in 2016 or 2017. Under Alternative B, the Wisconsin Districts would adhere to the present schedule for restoring farmland to native habitat. Newly acquired tracts could also be farmed until being restored to native habitat.

The amount of cropland being actively farmed when acquired by the Wisconsin Districts is expected to decrease. This is due to the donation of lands by partner organizations. Typically when these lands are donated to the Service they are already restored. However, there will be some tracts that the Districts acquire in which active farming is taking place. Once these lands are acquired they will be restored to native vegetation within three to five years.

Negative impacts of herbicides evaluated under Alternative B include: known toxicity to fish and aquatic invertebrates, potential toxicity to other wildlife through movement into adjacent waters, and herbicide carryover in the soil. Alternative B would have no effect on seed availability. However, this alternative may impact local cooperators because their equipment is not set up for non-glyphosate chemical application. Alternative B would likely not impact the overall local farm economy but may have a negative impact on individual cooperators. Cooperators would likely need to change their overall farming practices for relatively few acres, thereby reducing profitability.

4.3 Environmental Justice

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 low-income community's access to public information and participation in matters relating to human health or the environment. The proposed actions will have no impact on minority or low income populations.

4.4 Cumulative Impacts Analysis

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 effects for the alternatives are described in this section. The discussion considers the interaction of activities on Wisconsin Districts' land with other actions occurring over a larger spatial and temporal frame of reference.

Service policy states:

> "We do not allow refuge 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 purpose(s)." (601 FW 3 Biological Integrity, Diversity, and Environmental Health).

This policy and trends in land management practices indicate that future actions will result in more restoration of crop land to natural habitats on Wisconsin Districts' land. This trend is unlikely to have any significant impacts on a regional (forty-two county) scale when Wisconsin Districts' land currently cover far less than one percent of total acres within this area.

4.4.1 Alternative A: Farming for Habitat Restoration Purposes Only, GMGT Corn and Soybeans Allowed

4.4.1.1 Wildlife Issues

In general, the cumulative effect of the Wisconsin Districts farming program is there will be fewer farmed acres and more restored natural areas under Alternative A. On a forty-two county scale, this reduction in farmed acres will likely have a positive impact on most wildlife-related issues by providing more suitable habitat for nesting grassland birds, species diversity for pollinators, and winter cover for resident wildlife.

4.4.1.2 Habitat Issues

The loss of grassland and wetland habitat within the forty-two county area continues. More than 2,000,000 acres of tallgrass prairie existed in Wisconsin prior to European settlement and of those acres, less than 10,000 acres (<1%) remain today (WDNR 2005). It is estimated that between 86 and 99 percent of tallgrass prairies in Canada and the United States have been lost (Johnson et al., 2008). Wetland losses in Wisconsin have reached at least 50% since European settlement when over 10 million acres of wetlands existed in the state. Today less than five million acres remain.

Under Alternative A utilizing farming as a short-term management tool to convert row-crop fields to native grassland and wetland habitats allows the District to provide valuable habitat for a diversity of wildlife.

4.4.1.3 Socio-economic Issues

Because row crops on Wisconsin Districts' land are such a small part (<0.00003 percent) of the row crop acreage in the forty-two county area, it's unlikely they would impact the larger economy. Alternative A does have a short-term impact on cooperative farmers because agricultural land will be converted to native habitats. Cooperative farmers will lose farming opportunities as all current cropland will be restored to native habitats by 2017 or 2018.

4.4.2 Alternative B: Farming for Habitat Restoration Purposes Only, GMGT Corn and Soybeans Not Allowed

4.4.2.1 Wildlife Issues

Alternative B, as in Alternative A will result in an increase of native habitat and likely have a positive impact on most wildlife-related issues. However, Alternative B would not allow the use of Glyphosate to control weeds. This would require the use of alternative herbicides that may be more harmful to wildlife. Table 4 shows the most common herbicides used on private lands within Wisconsin as well as their environmental concerns and length of carryover.

4.4.2.2 Habitat Issues

Similar to Alternative A, Alternative B utilizes farming as a short term management tool to convert row-crop fields to native grasslands, allowing the Wisconsin Districts to provide a diversity of wildlife habitat. However, unlike Glyphosate, which has no carryover, non-Glyphosate herbicides have the potential for significant carryover which impacts habitat restoration efforts. See Table 4 for a comparison of commonly used herbicides and length of carryover as well as water quality concerns.

4.4.2.3 Socio-economic Issues

Alternative B would likely have a minimal impact on the larger overall economy because of the small acreage of cropland. Glyphosate use has oscillated in response to various factors, including glyphosate-resistant weeds. In 1996 only 7% of planted soybean acres were treated with glyphosate; in 2006 71% were treated with glyphosate. By 2012 that number had decreased again to 44% (Livingston 2015). Because Glyphosate products are frequently used, this may require a change in cooperators operations to apply these alternative chemicals, potentially impacting their profitability.

Table 4: Common Herbicides Used on Corn and Soybeans on Private Land Within the Wisconsin Wetland Management Districts (MDA 2014)

Active Ingredient	Potential Alternative Used	Trade Name	Crop	Carryover	Environmental Impacts*
Glyphosate	Alternative A	Roundup® Ultra	Corn/ Soybeans	none	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark
Mesotrione	Alternative B	Callisto ®	Corn	18 mo. For grasses** 10-18 mo. For broadleaves***	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark High potential for runoff several weeks after application
Acetochlor	Alternative B	Harness®	Corn	18 mo. For grasses** 9 mo. For broadleaves***	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark Toxic to fish Potential ground water contamination Potential surface water contamination
Dicamba	Alternative B	Banvel®	Corn	120 days for grasses and broadleaves****	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark
Diflufenzopyr	Alternative B	Distinct ®	Corn	120 days for grasses** Up to 120 days for broadleaves***	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark Known to leach into groundwater
S-metolachlor	Alternative B	Dual II Magnum	Corn	12 months for grasses** 4-9 mo. For broadleaves***	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark Known to leach into groundwater High potential for runoff into surface water for several months
Clopyralid	Alternative B	Stinger ®	Corn	None for grasses** 10.5-18 mo. For broadleaves***	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark Potential to leach into groundwater Potential to impact surface water

Flumetsulam	Alternative B	Python® WDG	Corn	9 months for grasses** 4-18 mo. For broadleaves***	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark Potential to leach into groundwater
Clethodim	Alternative B	Clethodim 2E	Soybeans	30 days for grasses** 30 days for broadleaves***	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark
Thifensulfuron	Alternative B	Harmony® GT XP	Soybeans	45 days for grasses** 45 days for broadleaves***	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark
Flumioxazin	Alternative B	Surveil™ V	Soybeans	None for grasses**** 10-12 mo. For some broadleaves****	Do not apply: • Directly to water • To areas surface water is present • To intertidal areas below the high water mark Toxic to non-target plants Toxic to aquatic invertebrates

* Environmental Impacts taken from specified herbicide labels. http://www.cdms.net/Label-Database

** Carryover information gathered from Herbicide Carryover Potential for Forage Grasses table. http://ipm.missouri.edu/IPCM/2012/8/Consider-Herbicide-Carryover-Potential-before-Planting-Wheat-or-Forage-Grasses-this-Fall/

*** Carryover information taken from specified herbicide labels. http://www.cdms.net/Label-Database

**** Carryover information taken from crop restrictions and potential to injure fall cover crops. http://extension.psu.edu/plants/crops/soil-management/cover-crops/herbicide-persistence/herbicide-carryover-table

Literature Cited

Agriculture – Insect Pests Generally. USC 7. 136r-1

Brookes, G. and P. Barfoot, 2010. GM Crops: global socio-economic and environmental impacts 1996-2008. PG Economics Ltd, Dorchester, UK

Curtis, J.T. 1959. The Vegetation of Wisconsin: An Ordination of Plant Communities. University of Wisconsin Press.

Exec. Order No. 12898, 3 C.F.R. (1994). "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations."

Finley, R.W. 1976. University of Wisconsin Center System. Digital Data prepared by Maribeth Milner and Steve Ventura, University of Wisconsin – Madison. http://dnr.wi.gov/topic/landscapes/documents/StateMaps/Map_S2_Finley.pdf

Fysken, J.F. 2014. Agr-View. http://www.agriview.com/news/crop/confirmed-and-suspect-resistant-weeds-growing/article_0213d5cf-f013-53f7-ade8-741fda086d81.html

Hagen, C. 2008. Reversing the Loss: A strategy to Protect, Restore and Explore Wisconsin Wetlands 2008. *Wisconsin Wetland Team.* Retrieved from http://dnr.wi.gov/topic/wetlands/documents/ReversingLoss08_gs.pdf

Heap, I. The International Survey of Herbicide Resistant Weeds. Accessed 9 October 2015 at: http://weedscience.org/summary/moa.aspx?MOAID=12

Iowa State University Extension and Outreach. 2015. 2015 Iowa Farm Custom Rate Survey. File A3-10. Revised March 2015. https://www.extension.iastate.edu/agdm/crops/pdf/a3-10.pdf

Johnson, R.R., F.T. Oslund, and D.R. Hertel. 2008. The past, present, and future of prairie potholes in the United States. Journal of Soil and Water Conservation 63(3):84a-87a.

Livingston, M., J. Fernandez-Cornejo, J. Unger, C. Osteen, D. Schimmelpfennig, T. Park, and D. Lambert. 2015. The Economics of Glyphosate Resistance Management in Corn and Soybean Production. ERR-184. U.S. Department of Agriculture, Economic Research Service

Minnesota Department of Agriculture. 2014. 2011 Pesticide Usage on Four Major Crops in Minnesota. 152pp. http://www.mda.state.mn.us/chemicals/pesticides/~/media/Files/chemicals/pesticides/2011pesticiderpt.pdf

Monsanto. (2009). Herbicide Application Handbook: A Guide to Proper Handling and Application of Monsanto Herbicides.

The National Historic Preservation Act of 1966, 16 USC 470.

National Invasive Species Information Center (NISIC). 2016. "What is an invasive species?" *United States Department of Agriculture National Agriculture Library.* Accessed 13 July 2016 at: https://www.invasivespeciesinfo.gov/whatis.shtml

National Wildlife Refuge System Administration Act of 1966, 16 USC 668dd-668ee

The National Wildlife Refuge System Improvement Act of 1997, P.L. 105-57. 16USC668dd

Norsworthy, J.K., S. M. Ward, D. R. Shaw, R. S. Llewellyn, R. R. Nichols, T. M. Webster, K. W. Bradley, G. Frisvold, S. B. Powles, N. R. Burgos, W. W. Witt, and M. Barrett. 2012. Reducing the Risks of Herbicide Resistance: Best Management Practices and Recommendations. Weed Science 60(sp 1):31-62.

Samson, F. B., F. L. Knopf, and W. R. Ostlie. 1998. Grasslands. Pages 437-472 in M. J. Mac, P. A. Opler, C. E. Puckett Haecker, and P. D. Doran, eds. Status and trends of the nation's biological resources, Vol. 2. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.

Smith, A. G., J. H. Stoudt, and J. B. Gollop. 1964. Prairie potholes and marshes. Pages 39–50 *in* J. P. Linduska, editor. Waterfowl Tomorrow. U.S. Fish and Wildlife Service, Washington, D.C.

St. Croix Wetland Management District. 2011. Comprehensive Conservation Plan. U.S. Fish and Wildlife Service. pp 9.

Tilman, D., J. Fargione, B. Wolff, C. D'Antonio, A. Dobson, R. Howarth, D. Schinkler, W. H. Schlesinger, D. Simberloff and D. Swackhamer. 2001. Forecasting agriculturally driven global environmental change. Science 292:281-284.

U.S. Census Bureau. 2015. State and County QuickFacts. Accessed 14 October 2015 at: http://quickfacts.census.gov/qfd/states/27000.html

U.S. Department of Agriculture-APHIS. 2000. Environmental Assessment and FONSI in response to petition 00-011-01p corn line NK603. http://www.aphis.usda.gov/brs/aphisdocs2/00_01101p_com.pdf

U.S. Department of Agriculture-APHIS. 2007. Environmental Assessment and FONSI in response to petition 06-178-01p soybean line MON 89788. http://www.aphis.usda.gov/brs/aphisdocs2/06_17801p_com.pdf

U.S. Department of Agriculture. 2014. Census of Agriculture, County Profile. National Agricultural Statistics Service. Accessed 14 October 2015 at: http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Minnesota/

U.S. Department of Agriculture. 2014. National Agricultural Statistics Service, Quick Stats. Accessed 13 July 2015 at: http://quickstats.nass.usda.gov

U.S. Department of Agriculture National Organic Program (USDA NOP). n.p. National Organic Program. *United States Department of Agriculture Agricultural Marketing Service.* Accessed 13 July 2016 at: https://www.ams.usda.gov/about-ams/programs-offices/national-organic-program

U.S. Environmental Protection Agency. 2009. Technical Factsheet on: Glyphosate. Accessed 14 October 2015 at: http://water.epa.gov/drink/contaminants/basicinformation/historical/upload/Archived-Technical-Fact-Sheet-on-Glyphosate.pdf

U.S. Fish and Wildlife Service. 1985. Refuge Manual. Part 6 Section 4 Cropland Management (6 RM 4) 15pp, Arlington, VA

U.S. Fish and Wildlife Service. 2000. Compatibility, Refuge Manual. Part 2.6 Section B. (603 FW 2).

U.S. Fish and Wildlife Service. 2000. Appropriate Refuge Uses, Refuge Manual. Part 1.11. (603 FW 1).

U.S. Fish and Wildlife Service. 2001. Biological Integrity, Diversity, and Environmental Health, Refuge Manual. (601 FW3).

U.S. Fish and Wildlife Service. 2010. Integrated Pest Management, Refuge Manual. (569 FW 1).

U.S. Fish and Wildlife Service. 2011. Environmental Assessment. Use of Row Crop Farming and Genetically-modified, Glyphosate-tolerant Corn and Soybeans on National Wildlife Refuges and Wetland Management Districts. 91pp.

U.S. Fish and Wildlife Service. 2014. Appendix P: 2014 Region 3 Farm Program Guidance. *Big Muddy NFWR Comprehensive Conservation Plan.* pp. 239.

Wisconsin Department of Natural Resources (WDNR). 2005. Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need. Madison, WI.

Wisconsin Department of Natural Resources (WDNR). 2006. Wisconsin Land Legacy Report.