U.S. Fish & Wildlife Service

Glacial Ridge
National Wildlife Refuge

Environmental Assessment and Comprehensive Conservation Plan

U.S. Department of the Interior
Fish and Wildlife Service
Region 3 (Midwest Region)
Branch of Conservation Planning;
Bloomington, MN

Cover Photograph: Peter Eades

The mission of the U.S. Fish & Wildlife Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people.

The mission of the National Wildlife Refuge 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.

Comprehensive Conservation Plans provide long-term guidance for management decisions; set forth goals, objectives and strategies needed to accomplish refuge purposes; and, identify the Fish and Wildlife Service's best estimate of future needs. These plans detail program planning levels that are sometimes substantially above current budget allocations and, as such, are primarily for Service strategic planning and program prioritization purposes. The plans do not constitute a commitment for staffing increases, operational and maintenance increases, or funding for future land acquisition.

Glacial Ridge
National Wildlife Refuge

Comprehensive Conservation Plan Approval

Submitted by:

8-2-2016

Gregory A. Knutsen
Refuge Manager, Glacial Ridge and Rydell NWRs

Date

Concur:

8-3-16

Ryan Frohling
Project Leader, Detroit Lakes WMD/Glacial Ridge NWR Complex

Date

8-30-16

Scott Glup
Refuge Supervisor, Area 3

Date

9-1-16

Charles W. Blair
Regional Chief, National Wildlife Refuge System

Date

Approve:

9/1/16

Thomas O. Melius
Regional Director

Charles M. Wooley
Acting Regional Director

Date

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Glacial Ridge

National Wildlife Refuge

Environmental Assessment and Comprehensive Conservation Plan

Table of Contents

List of Figures

List of Tables

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Finding of No Significant Impact

Environmental Assessment and Comprehensive Conservation Plan for Glacial Ridge National Wildlife Refuge, Minnesota

An Environmental Assessment (EA) has been prepared to identify management strategies to meet the conservation goals of Glacial Ridge National Wildlife Refuge. The EA examined the environmental consequences that each management alternative could have on the quality of the physical, biological, and human environment, as required by the National Environmental Policy Act of 1969 (NEPA). The EA evaluated three alternatives for the future management of Glacial Ridge NWR.

The alternative selected for implementation on the refuge is Alternative B. The preferred alternative would approximate ecological processes that maintained native habitats prior to European settlement, emphasizing the use of multiple habitat disturbance regimes (e.g., fire, grazing, mowing). These actions would maintain and increase the diversity of native vegetation and wildlife communities that mimic pre-settlement conditions. Management activities would be "focused" via a refuge prioritization effort to maximize the intended impacts on priority units, given reduced refuge staff and funding.

Public use opportunities would continue with minimal changes. Staff time and funding would focus on improving opportunities for self-guided interpretation of refuge habitats and wildlife, using existing infrastructure.

For reasons presented above and below, and based on an evaluation of the information contained in the Environmental Assessment, we have determined that the action of adopting Alternative B as the management alternative for Glacial Ridge NWR is not a major federal action which would significantly affect the quality of the human environment, within the meaning of Section 102 (2)(c) of the National Environmental Policy Act of 1969.

Additional Reasons:

1. Future management actions will have a neutral or positive impact on the local economy.
2. This action will not have an adverse impact on threatened or endangered species.

Supporting References:

Environmental Assessment
Comprehensive Conservation Plan

Charles M. Wooley 9/1/16

Regional Director Date

Charles M. Wooley
Acting Regional Director

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Glacial Ridge National Wildlife Refuge Final Comprehensive Conservation Plan Executive Summary

In this chapter:

The Final Comprehensive Conservation Plan (CCP) for the Glacial Ridge National Wildlife Refuge (NWR, refuge) is now complete. A separate Environmental Assessment (EA) and CCP documents the National Environmental Policy Act (NEPA) process for developing the CCP.

In general, scoping revealed issues that drove alternative ways of managing the refuge. Implementation of each of those alternative management styles (including the No Action Alternative) had different effects on the physical, biological, and socio-economic environment. Analysis of those effects revealed the "preferred" alternative, which constitutes the CCP. The plan includes goals, objectives, and strategies for the refuge to guide overall management for the next 15 years.

The document can be viewed and downloaded at:

http://www.fws.gov/midwest/planning/GlacialRidge/index.html

A compact disk or paper copy of the plan can be requested by:

E-mail at: r3planning@fws.gov (Please include "Glacial Ridge NWR CCP" in the subject line)

Mail at: U.S. Fish & Wildlife Service
Division of Conservation Planning
Attention: Glacial Ridge NWR CCP
5600 American Blvd. West, Suite 990
Bloomington, MN 55437-1458

Telephone at: 612-713-5429

Glacial Ridge NWR is located 10 miles east of Crookston, MN in Polk County. The refuge is bordered by U.S. Highway 2 to the north and is bisected by MN State Highway 32 (north/south) and Polk County Road 45 (east/west).

Glacial Ridge NWR is located on the eastern edge of the Prairie Pothole Region and within the Partners in Flight Northern Tallgrass Prairie/Aspen Parklands physiographic areas (40 and 30 respectively). The Nature Conservancy identified this refuge as "ecologically significant" in the Northern Tallgrass Prairie Ecoregional Plan in 1998 as it exists within an area containing the

most important pieces of remaining native prairie along the Red River Valley (Brown et al. 2005). Glacial Ridge NWR is especially important because approximately 5,000 acres of virgin (remnant) prairie and savanna and 12,000 acres of wetlands exist within the acquisition boundary. Glacial Ridge NWR represents a remarkable opportunity to restore disrupted ecological processes, species, and function on a landscape scale. The importance of this is amplified, because tallgrass prairie and savanna are globally endangered ecosystems.

Refuge Vision Statement

A wildlife chorus of prairie-chickens, upland sandpipers, sandhill cranes, and bobolinks welcomes visitors to America's most grand prairie and wetland restoration project. Glacial Ridge National Wildlife Refuge is a masterpiece, where tallgrass prairie and a myriad of wetlands function to support an amazing diversity of flora and fauna. This piece of restored Northern Tallgrass Prairie landscape serves as a model of how partnerships can reclaim a lost haven, and through a suite of applied science and management, maintain a working grassland that restores lost ecological function, while benefitting the local economy.

Refuge Goals

The goals are broad statements that describe the desired future conditions of the refuge.

Goal 1: Habitat and Wildlife

Protect, restore, and manage the unique prairie-wetland habitats found within Glacial Ridge NWR using a variety of strategies to emulate the ecological processes and native plant communities that once existed across the Agassiz Beach Ridge landscape. The above conservation actions will result in a diversity of resilient tallgrass prairie and wetland habitats for the benefit of migratory birds, threatened and endangered species, and other native wildlife.

Goal 2: People

Provide a safe environment for visitors of all abilities to enjoy wildlife-dependent recreation, while increasing their knowledge and appreciation of the Northern Tallgrass Prairie ecosystem and the mission of the National Wildlife Refuge System.

Goal 3: Refuge Administration

Maintain and enhance refuge infrastructure and operations responsibly and sustainably for wildlife, the American public, and employees.

Public Involvement

The Notice of Intent to prepare a CCP and EA for Glacial Ridge NWR was published in the *Federal Register* dated January 17, 2013 (Vol. 78, No.12, page 3909–3910).

Internal scoping began in January 2013 when U.S. Fish and Wildlife Service (FWS, Service) planning staff and Glacial Ridge NWR staff developed a preliminary list of issues, concerns, and opportunities associated with management of the refuge. A second internal scoping session

was held with the Service's Midwest Regional Office staff at Bloomington, MN in March 2013 to get input on issues from regional supervisors, biologists, planners, and other program specialists.

Public scoping began in April 2013 when refuge staff hosted open house events in Crookston, MN and at the Rydell NWR headquarters to inform the public of the planning process and to solicit their input on issues of concern. About 20 people attended. In addition, a news release was distributed to area media, and informational posters were displayed in local communities. Written comments were received from 12 stakeholders.

In August 2013, the refuge convened a team of resource professionals to share their perspectives on the biological and visitor services programs at Glacial Ridge NWR. Participants outside the Service included partner agencies, researchers, educators, and refuge volunteers. Purposes of the workshop were to define significant issues and opportunities facing the refuge and identify potential options for addressing them: share knowledge, ideas, and perspectives to ensure that best available information is considered, and begin to develop a shared vision for the future of the refuge and the ecosystem.

Issues

Initial issues and opportunities identified by the planning team, partners and interested individuals included:

Wildlife

- Limited information on wildlife population levels
- Status of endangered butterfly species
- Effects of climate change on wildlife and habitat

Habitat

- Control of invasive plant species
- Cattail control in restored wetlands
- Conversion of forested areas to native prairie

People

- Future growth of the hunting program
- Law enforcement
- Outreach and guidance for non-hunting visitors
- Visitor contact facilities and signage

Implementation of the Plan

Alternative B: Focused Habitat Management

Under this alternative, refuge management actions would approximate ecological processes that maintained native habitats prior to European settlement, emphasizing the use of multiple habitat disturbance regimes (e.g., fire, grazing, mowing). These actions would maintain and increase the diversity of native vegetation and wildlife communities that mimic pre-settlement conditions. Management activities would be "focused" via a refuge prioritization effort to maximize the intended impacts on priority units, given reduced refuge staff and funding.

Public use opportunities would continue, with hunting being the primary use. Staff time and funding would focus on improving opportunities for self-guided interpretation of refuge habitats and wildlife, using existing infrastructure (e.g., 13 parking lot kiosks).

The following are key elements of Alternative B:

- Active management would be focused on the highest priority habitat management units to emulate pre-European settlement conditions.
- Control of invasive species would focus on specific sites to protect native plant communities.
- Land acquisition from willing sellers would continue within the approved refuge acquisition boundary.
- Prairie and wetland restoration would continue on newly-acquired sites. The short-term use of genetically modified crops would be allowed in compliance with current FWS Region 3 policy.
- Existing partnerships would be maintained, and new partnerships would be developed with a focus on high priority habitat and resource information needs.
- Priority public use activities would focus on existing infrastructure and emphasize self-guided experiences.

Chapter 1: Purpose of and Need for the Proposed Action

In this chapter:

The Process and the Plan

This Environmental Assessment (EA) documents the National Environmental Policy Act of 1969 (NEPA) process for developing a Comprehensive Conservation Plan (CCP) for Glacial Ridge National Wildlife Refuge (NWR, refuge). The planning process to develop a CCP includes eight steps (U.S. Fish and Wildlife Service [FWS, Service] 2000):

1. Preplanning: Planning the Plan
2. Initiate Public Involvement and Scoping
3. Review Vision Statement and Goals and Determine Significant Issues
4. Develop and Analyze Alternatives, Including the Proposed Action
5. Prepare Draft Plan and NEPA Document
6. Prepare and Adopt Final Plan
7. Implement Plan, Monitor, and Evaluate
8. Review and Revise Plan

The Refuge

Glacial Ridge NWR was established in 2004 as the 545th refuge in the National Wildlife Refuge System (NWRS, Refuge System). The approved acquisition boundary encompasses a total of 35,670 acres. Glacial Ridge NWR is located 10 miles east of Crookston, MN in Polk County. The refuge is bordered by U.S. Highway 2 to the north and is bisected by MN State Highway 32 (north/south) and Polk County Road 45 (east/west).

Proposed Action

The Service proposes to prepare and implement a CCP for Glacial Ridge NWR. Per the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act) (Public Law, 1997), the CCP must identify and describe the following:

- Purposes of the refuge

- Fish, wildlife, and plant populations, their habitats, and the archeological and cultural values found in the refuge
- Significant problems that may adversely affect wildlife populations and habitats and ways to correct or mitigate those problems
- Areas suitable for administrative sites or visitor facilities
- Opportunities for fish and wildlife-dependent recreation

More specifically per Service Manual direction (FWS 2000), the CCP includes the following:

- A vision for the refuge, which is a concise statement of what the refuge should be, or what it is desired to be, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates
- Goals, which are broad statements of desired future conditions
- Objectives, which are concise statements of what, how much, when, and where to achieve something and who is responsible for the work
- Strategies, which are specific actions, tools, techniques, etc. to meet the objectives

Purpose of and Need for the Proposed Action

The Improvement Act requires the development of a CCP for each refuge of the Refuge System. No CCP currently exists for the refuge, so there is a need to develop one. The purpose then, of the proposed action is to determine the desired future conditions of Glacial Ridge NWR and develop long-range (15-year) guidance and management direction to achieve the purposes of the refuge. This management direction will provide for the conservation of fish, wildlife, and plant resources and their related habitats, as well as opportunities for compatible wildlife-dependent recreational uses especially in the face of a changing climate.

Per the Service Manual (FWS 2000), the CCP for the refuge will not only describe the desired future conditions and management direction to achieve those conditions but will also:

- Help fulfill the NWRS Mission;
- Maintain and where appropriate restore the ecological integrity of the refuge and the greater Refuge System of which it is a part;
- Help achieve the goals of the National Wilderness Preservation System; and
- Meet other mandates, especially Secretarial Order 3289 Amendment 1: Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources of 2010.

Decisions to be Made

The Regional Director for the Service's Midwest Region (Region 3) will make the following two decisions based on this EA:

- Select a management alternative to serve as the CCP and provide long-term management direction for the refuge; and
- 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.

The planning team recommends Alternative B, the preferred alternative, to the Regional Director. The CCP, as described in chapter 3 and appendix A, was developed for implementation based on this recommendation.

Chapter 2: Refuge Planning Context

In this chapter:

Refuge System Planning Guidance

The U.S. Fish and Wildlife Service

The Glacial Ridge National Wildlife Refuge (NWR, refuge) is administered by the U.S. Fish and Wildlife Service (FWS, Service), the primary federal agency responsible for conserving, protecting, and enhancing the Nation's fish and wildlife populations and their habitats. The Service oversees the enforcement of federal wildlife laws, management and protection of migratory bird populations, restoration of nationally significant fisheries, administration of the Endangered Species Act, restoration of wildlife habitat such as wetlands, collaboration with international conservation efforts, and the distribution of conservation funding to states, territories, and tribes. Through its conservation work, the Service also provides a healthy environment in which Americans can engage in outdoor activities. Additionally, as one of three land managing agencies in the Department of the Interior, the Service is responsible for the Nation's National Wildlife Refuge System (NWRS, Refuge System).

FWS Mission

Working with others to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people.

The National Wildlife Refuge System

The National Wildlife Refuge System was founded in 1903 when President Theodore Roosevelt designated a three-acre island off the Florida coast, Pelican Island, as a sanctuary for colonial nesting birds. Today, the Refuge System has grown to a network of 560 national wildlife refuges, 38 wetland management districts, and 49 coordination areas covering over 150 million acres of public lands and waters. Over 50 percent of these lands (over 76 million acres) are contained within Alaska's 16 national wildlife refuges, with the remainder distributed throughout the other 49 states and U.S. territories. Since 2006, Marine National Monuments have been added to the Refuge System, bringing over 50 million additional acres in the Pacific Ocean under federal protection and conservation management.

The Refuge System is the world's largest collection of lands and waters specifically designated and managed for fish and wildlife. Overall, it provides habitat for more than 700 species of birds, 220 species of mammals, 250 reptile and amphibian species, 200 species of fish, and more than 280 threatened or endangered plants and animals. As a result of international treaties for migratory bird conservation and related legislation (e.g., Migratory Bird Conservation Act of 1929), many refuges have been established to protect migratory waterfowl and their migration

flyways that extend from nesting grounds in the north to wintering areas in the south. Refuges also play a vital role in preserving threatened and endangered species.

Refuges also provide important recreation and education opportunities for visitors. When public uses are deemed appropriate and compatible with wildlife and habitat conservation, they are places where people can enjoy hunting, fishing, wildlife observation and photography, environmental education and interpretation, and other recreational activities. Many refuges have visitor centers, wildlife trails, automobile tours, and environmental education programs. Nationwide, over 41 million people visit national wildlife refuges annually.

National Wildlife Refuge System Mission

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

National Wildlife Refuge System Goals

Revised goals for the Refuge System were adopted on July 26, 2006 and incorporated into Part 601, Chapter 1, of the Fish and Wildlife Service Manual (FWS, 601 FW 1). The goals are:

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered;
- Develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges;
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts;
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation); and
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

National Wildlife Refuge System Guiding Principles

- We are land stewards, guided by Aldo Leopold's teachings that land is a community of life and that love and respect for the land is an extension of ethics. We seek to reflect that land ethic in our stewardship and to instill it in others;
- Wild lands and the perpetuation of diverse and abundant wildlife are essential to the quality of the American life;
- We are public servants. We owe our employers, the American people, hard work, integrity, fairness, and a voice in the protection of their trust resources;

- Management, ranging from preservation to active manipulation of habitats and populations, is necessary to achieve Refuge System and Service missions;
- Wildlife-dependent uses involving hunting, fishing, wildlife observation, photography, interpretation, and education, when compatible, are legitimate and appropriate uses of the Refuge System;
- Partnerships with those who want to help us meet our mission are welcome and indeed essential;
- Employees are our most valuable resource. They are respected and deserve an empowering, mentoring, and caring work environment; and
- We respect the rights, beliefs, and opinions of our neighbors.

Legal and Policy Compliance

Wilderness Review

Refuge planning policy mandates that wilderness reviews be conducted through the comprehensive conservation planning process (FWS 2000). The wilderness review process consists of three phases: inventory, study, and recommendation. In the inventory phase, Service-owned lands and waters within the Glacial Ridge NWR that are not currently designated wilderness are analyzed for areas that meet the criteria for wilderness established by Congress. The criteria are size, naturalness, opportunities for solitude or primitive recreation, and supplemental values. Areas that meet the criteria become Wilderness Study Areas (WSAs). In the study phase, a range of management alternatives are developed and evaluated for the WSAs to determine if they are suitable for recommendation for inclusion in the National Wilderness Preservation System. In the recommendation phase, the suitable recommendations are forwarded in a Wilderness Study Report that moves from the Director through the Secretary and the President to Congress.

No lands within Glacial Ridge NWR meet the criteria for wilderness established by Congress and described in Service policy (FWS 2008). The refuge does not contain 5,000 contiguous acres of roadless, natural lands, nor does the refuge possess any units of sufficient size to make their preservation practicable as wilderness. Refuge lands and waters have been substantially altered by humans, especially by agriculture, industrial, and transportation developments.

Brief History of Refuge Establishment and Acquisition

Glacial Ridge NWR was established in 2004 to restore and preserve the character of the historic prairie and savanna landscape (Figure 2-1). The refuge started with an initial transfer of 1,993 acres of land from The Nature Conservancy (TNC) to the Service. These parcels were enrolled in the Wetland Reserve Program (WRP) administered by the Natural Resource Conservation Service.

The initial transfer in 2004 was followed by 5,113 more acres in 2008, 7,056 acres in 2010, and a total of 5,947 acres in 2012 and 2013. The approved acquisition boundary encompasses a total of 35,670 acres. Some of the land inside of the 35,670 acre acquisition boundary is owned the Minnesota Department of Natural Resources and by TNC, and is likely to continue to be

held by conservation partners as state wildlife management areas and TNC preserves (Figure 2-2).

Figure 2-1: Location of Glacial Ridge National Wildlife Refuge

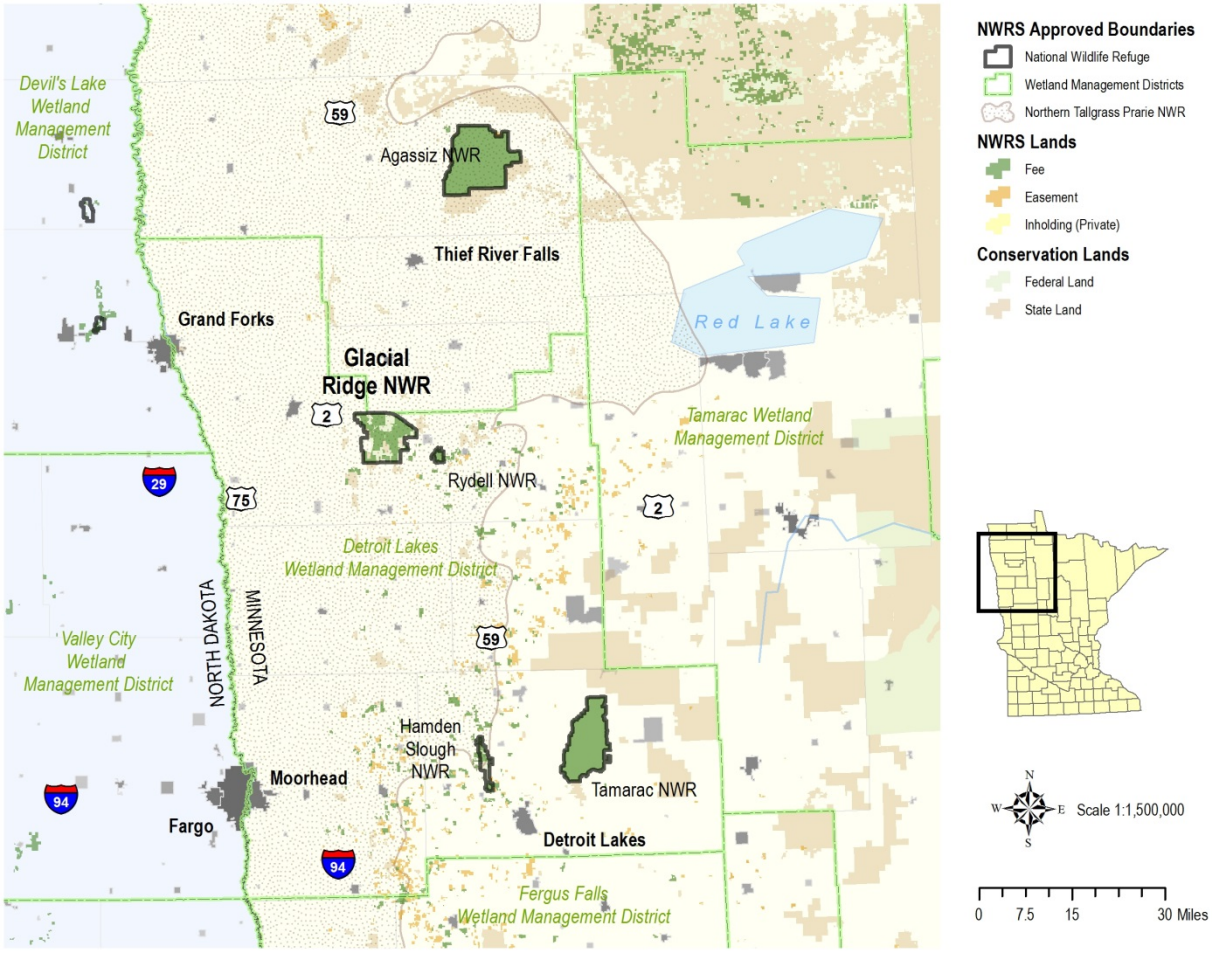
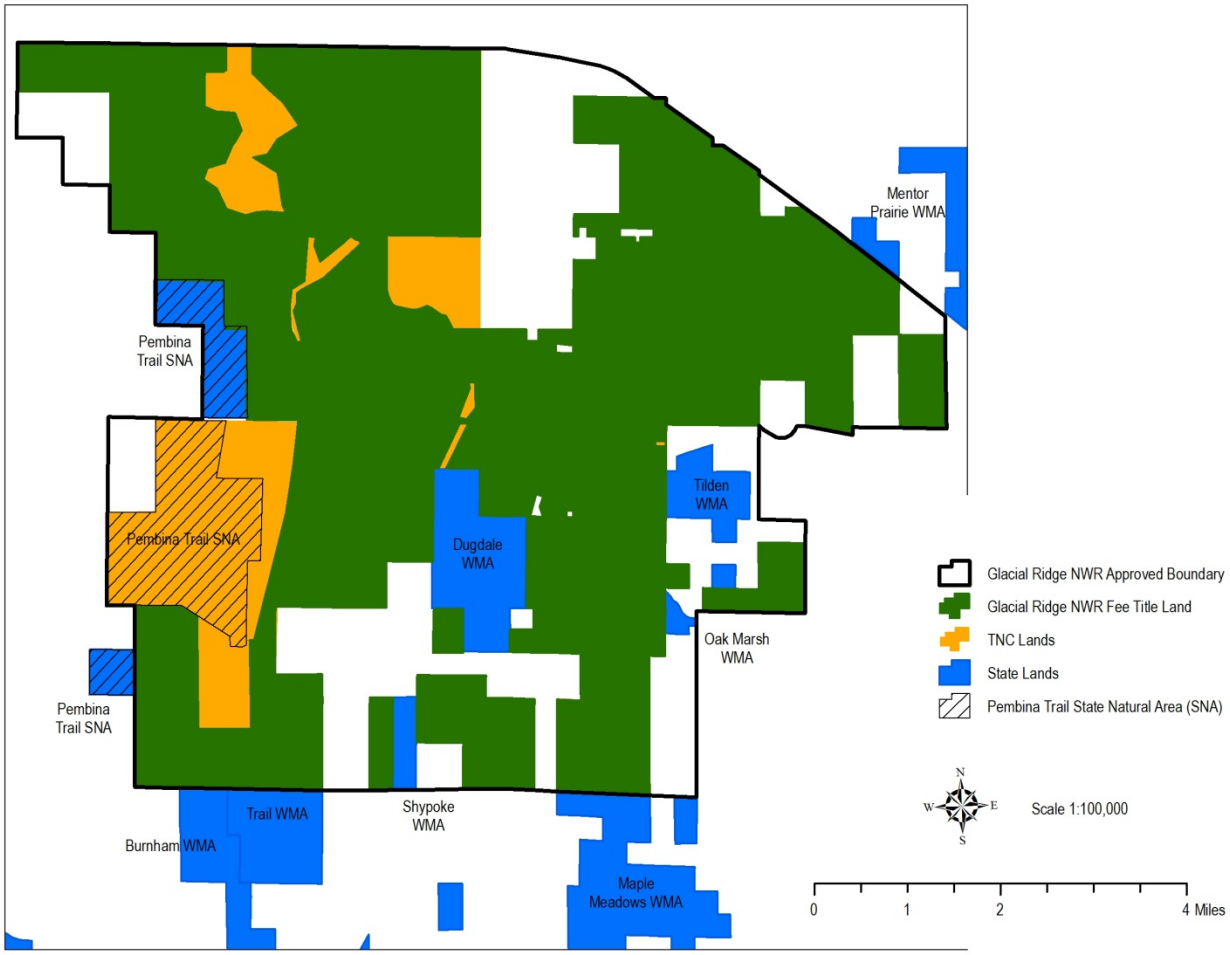


Figure 2-2: Conservation Lands Inside Glacial Ridge NWR



Refuge Purposes

Glacial Ridge NWR was created under the legal authority of the Migratory Bird Conservation Act, Feb. 18, 1929, 16 U.S.C. 715d and the Emergency Wetland Resources Act of 1986, 16 U.S.C. 3901b. Funds appropriated by Congress, and the sale of Federal Duck Stamps were used to acquire land. The lands authorized for acquisition include:

"Sec. 715d. Purchase or rental of approved areas or interests therein; gifts and devises; United States lands. The Secretary of the Interior may –

(2) acquire, by gift or devise, any area or interests therein; which he determines to be suitable for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

"The primary purpose for the refuge under the Migratory Bird Conservation Act is 'for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.'"

Refuge Vision Statement

A wildlife chorus of prairie-chickens, upland sandpipers, sandhill cranes, and bobolinks welcomes visitors to America's most grand prairie and wetland restoration project. Glacial Ridge National Wildlife Refuge is a masterpiece, where tallgrass prairie and a myriad of wetlands function to support an amazing diversity of flora and fauna. This piece of restored Northern Tallgrass Prairie landscape serves as a model of how partnerships can reclaim a lost haven, and through a suite of applied science and management, maintain a working grassland that restores lost ecological function, while benefiting the local economy.

Refuge Goals

The goals are broad statements that describe the desired future conditions of the refuge.

Goal 1: Habitat and Wildlife

Protect, restore, and manage the unique prairie-wetland habitats found within Glacial Ridge NWR using a variety of strategies to emulate the ecological processes and native plant communities that once existed across the Agassiz Beach Ridge landscape. The above conservation actions will result in a diversity of resilient tallgrass prairie and wetland habitats for the benefit of migratory birds, threatened and endangered species, and other native wildlife.

Goal 2: People

Provide a safe environment for visitors of all abilities to enjoy wildlife-dependent recreation, while increasing their knowledge and appreciation of the Northern Tallgrass Prairie ecosystem and the mission of the National Wildlife Refuge System.

Goal 3: Refuge Administration

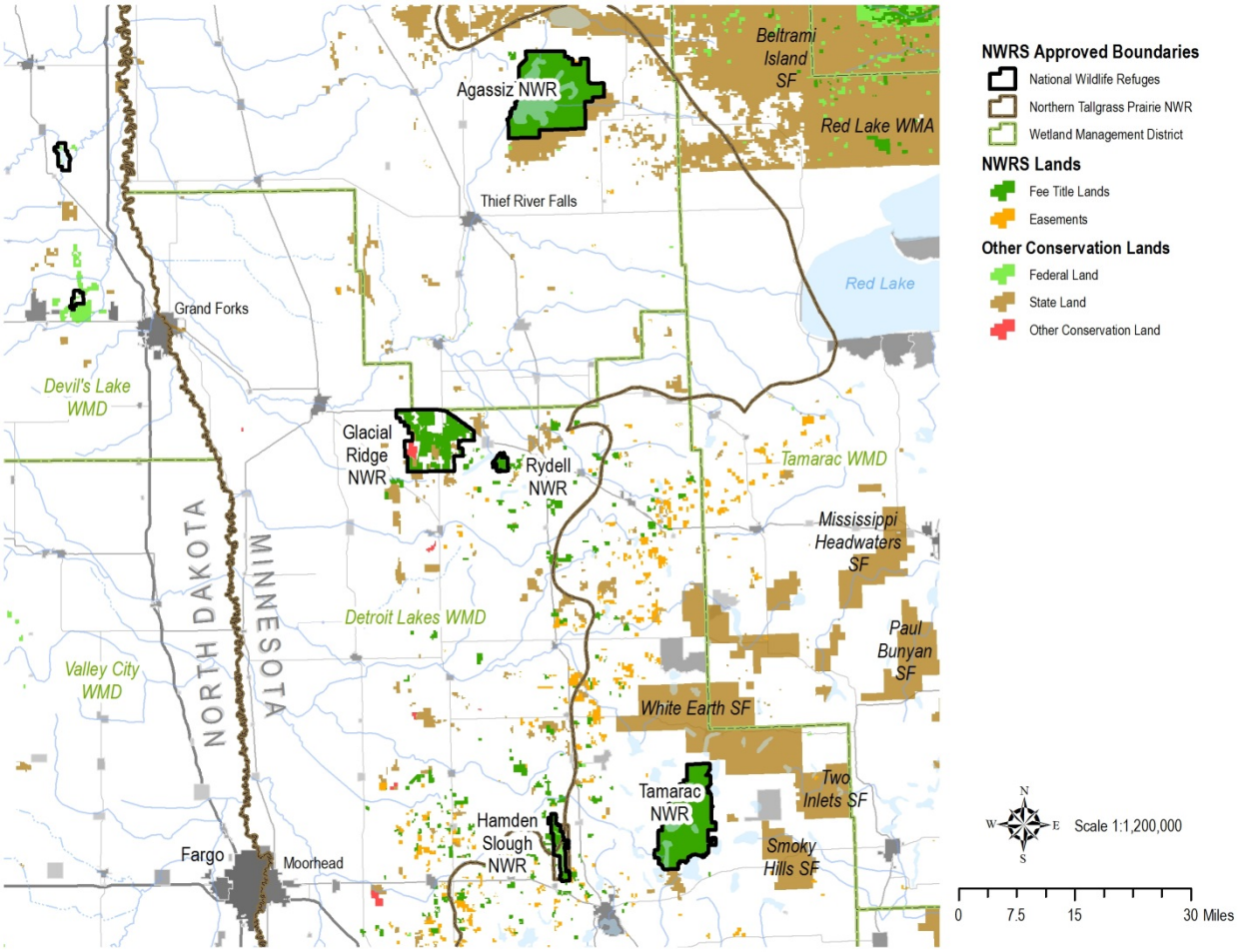
Maintain and enhance refuge infrastructure and operations responsibly and sustainably for wildlife, the American public, and employees.

Relationship to Other Conservation Initiatives

Glacial Ridge NWR contributes approximately 36,000 acres to the conservation landscape. By itself, the refuge will have limited impact on the retention of open space, the persistence of wildlife species, and the maintenance of ecosystem services. However, refuge efforts combined with activities and partnerships across the larger conservation network have great potential to provide a measure of sustainability to the Nation's natural resources and provide the mechanism for the Service to meet its critical mission. The following sections identify a number of conservation initiatives that overlap and complement the vision and goals outlined in this plan (Figure 2-3). Where possible, the refuge collaborates with these efforts and incorporates shared objectives.

The refuge works in concert with several state and regional partners in the conservation of our trust resources through the participatory development of the following plans and programs.

Figure 2-3: Conservation Lands near Glacial Ridge NWR



Glacial Ridge Master Plan

The Master Plan for Glacial Ridge was developed by TNC in 2005. This document is a guide TNC has followed to “restore ecological processes” to Glacial Ridge. The plan includes key ecological attributes, objectives, monitoring plans, etc.

Western Prairie Fringed Orchid Recovery Plan (1996)

This orchid is federally threatened and Minnesota State endangered. The major cause of decline of this species is the conversion of prairie to cropland. The Red River Valley of North Dakota and Minnesota contains 90 percent of the current population. The recovery plan includes protecting existing populations, developing effective management plans, research and monitoring, and public education.

Dakota Skipper and Poweshiek Skipperling Conservation Guidelines

The Dakota skipper (*Hesperia dacotae*) and Poweshiek skipperling (*Oarisma poweshiek*) have recently been listed as Threatened and Endangered, respectively, under the Endangered

Species Act. No known populations currently exist on Glacial Ridge NWR, but the habitat they require is found on the refuge.

Migratory Bird Conservation Initiatives

The North American Waterfowl Management Plan (NAWMP) began in 1986 as a partnership effort to restore waterfowl populations to historic levels through habitat conservation. The 2004 plan update states that its purpose is to “sustain abundant waterfowl populations by conserving landscapes, through partnerships, that are guided by sound science.” NAWMP is international in scope but is implemented through regional partnerships called "joint ventures." Glacial Ridge NWR lies within the Prairie Pothole Joint Venture, which includes 100,000 square miles in Montana, North Dakota, South Dakota, Minnesota, and Iowa.

The 2001 U.S. Shorebird Conservation Plan provides a framework to determine species, sites, and habitats that most urgently need conservation action. The national assessment was stepped down into 11 regional conservation plans. Glacial Ridge NWR lies within the Northern Plains/Prairie Potholes Region, which is especially critical to long-distance migrants that need suitable stopover sites along their migratory routes, such as American golden-plover, Hudsonian godwit, white-rumped sandpiper, pectoral sandpiper, and stilt sandpiper.

The 2002 North American Waterbird Conservation Plan is a framework for the conservation and management of 210 species of wading birds, marsh birds, gulls, terns, pelicans, and seabirds and their habitats. The continental area is organized into several planning regions. Species of high concern in the Northern Prairie and Parkland Region, where Glacial Ridge NWR is located, include western grebe, Franklin’s gull, black tern, horned grebe, American bittern, and yellow rail.

Partners in Flight (PIF) was launched in 1990 and began to develop regional bird conservation plans in response to growing concerns about population declines of many landbird species. Glacial Ridge NWR lies within the Northern Tallgrass Prairie physiographic region, which occupies parts of Iowa, Minnesota, North Dakota, and Manitoba, Canada. Priority bird species in the 1998 Northern Tallgrass Prairie Plan include greater prairie-chicken, Nelson’s (sharp-tailed) sparrow, sedge wren, bobolink, and yellow rail. In 2004, PIF published a North American landbird conservation plan that established population objectives and recommended actions for Species of Continental Importance.

Setting up a prairie-chicken viewing blind; photo: USFWS

The North American Bird Conservation Initiative (NABCI) is a continental effort to integrate all migratory bird conservation programs under one umbrella. The goal is to facilitate bird conservation through regionally based, biologically driven, landscape-oriented partnerships. NABCI has

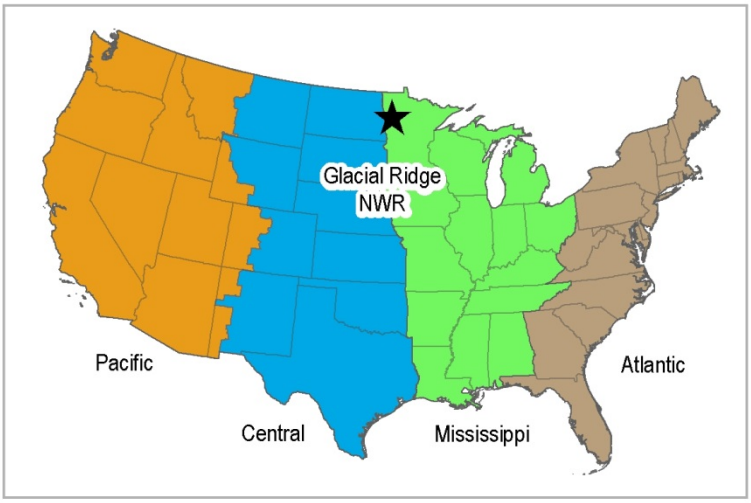
defined Bird Conservation Regions (BCR) as its planning units. Glacial Ridge NWR lies within BCR 11, the Prairie Potholes. In 2000, the U.S. NABCI Committee agreed to promote conservation delivery via existing and new Joint Ventures nationwide, thus eliminating redundant partnership structures and separate biological planning processes. The Service is a member of the U.S. NABCI Committee.

Birds of Conservation Concern 2008 (FWS 2008a) was developed by the Service to identify migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the Service's highest conservation priorities. The list encompasses three distinct geographic scales—NABCI Bird Conservation Regions, FWS Regions, and National—and uses assessment scores from three bird conservation plans: the North American Landbird Conservation Plan, the U.S. Shorebird Conservation Plan, and the North American Waterbird Conservation Plan. The assessment scores are based on several parameters including population trend, threats, distribution, abundance, and the importance of an area to a species.

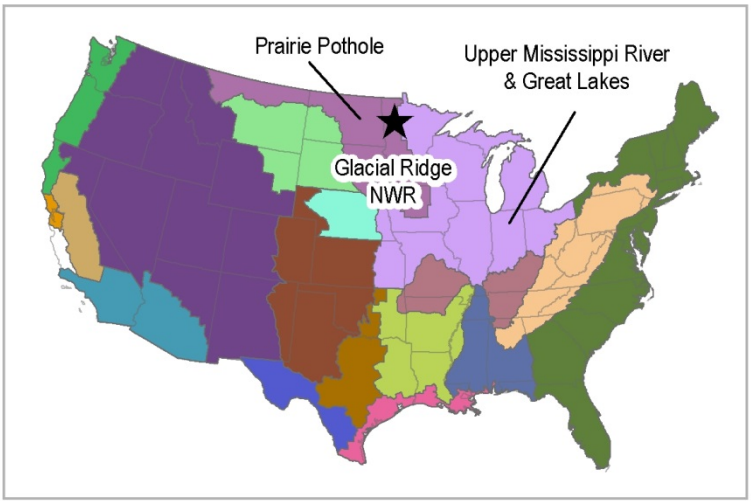
More specifically, the refuge lies within the Prairie Potholes Bird Conservation Region (Bird Conservation Region [BCR] 11) (Figure 2-4). The Prairie Pothole Region is a glaciated area of mixed-grass prairie in the west and tallgrass prairie in the east. This is the most important waterfowl production area on the North American continent, despite extensive wetland drainage and tillage of native grasslands. Breeding dabbling duck density may exceed 100 pairs per square mile in some areas during years with favorable wetland conditions. The region comprises the core of the breeding range of most dabbling duck and several diving duck species, as well as providing critical breeding and migration habitat for over 200 other bird species, including such priority species as Franklin's gull, yellow rail, and piping plover. Baird's sparrow, Sprague's pipit, chestnut-collared longspur, Wilson's phalarope, marbled godwit, and American avocet are among the many priority non-waterfowl species breeding in this region. Wetland areas also provide key spring migration sites for Hudsonian godwit, American golden-plover, white-rumped sandpiper, and buff-breasted sandpiper. Continued wetland degradation and fragmentation of remaining grasslands threaten future suitability of the Prairie Pothole Region for all of these birds.

Ducks on prairie pond; photo: USFWS

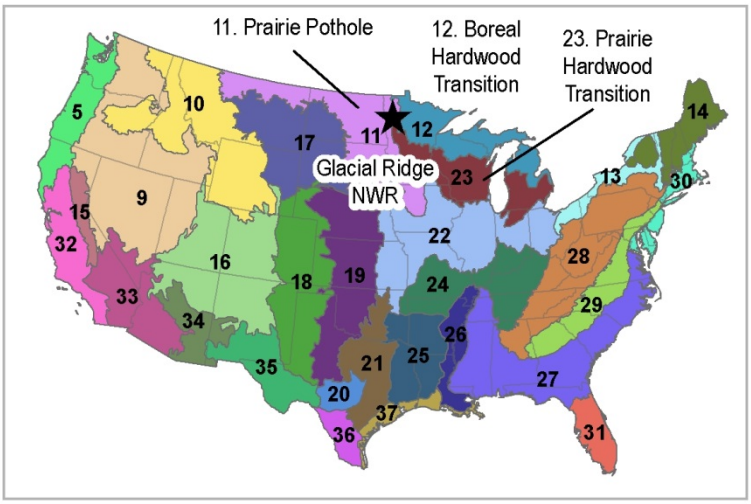
Figure 2-4: Bird Conservation Regions



U.S. Flyway Zones



Joint Ventures



Bird Conservation Regions

Strategic Habitat Conservation

Strategic habitat conservation (SHC) is a science-based approach to conservation focused on providing landscapes capable of sustaining trust species populations at objective levels. This approach is founded on an adaptive, iterative process of biological planning, conservation design, conservation delivery, monitoring, and research. SHC is an application of the scientific method and adaptive management to conservation at multiple spatial scales. This strategic conservation approach will include all Service programs and address both habitat and non-habitat factors limiting fish and wildlife populations.

As a leader in fish and wildlife and habitat conservation and management, the Service is embracing a framework designed to maximize agency efficiency and increase on the ground conservation impacts. SHC enables the Service to:

- Respond to new environmental challenges;
- Advance opportunities with new and existing partners;
- Utilize science-based tools and resources to plan and evaluate our conservation efforts; and
- Continue to ensure conservation successes locally, while advancing landscape objectives.

The Service mission can be met at a landscape scale, especially in the face of climate change, by:

- Fully utilizing existing technology such as Geographic Information Systems (GIS);
- Becoming trained in better decision making through the Structured Decision Making process;
- Reaching out to even more partners that have the necessary expertise to advance knowledge of the resource and its needs at multiple spatial and temporal scales; and
- Being diligent and transparent in planning and decision making processes.

SHC Guiding Principles

- Habitat conservation is simply a means to attain the Service's true goal—the conservation of populations and ecological functions that sustain them.
- Defining measurable population objectives is a key component of SHC, at any scale.
- Biological Planning must use the best scientific information available, both as a body of knowledge and a method of learning. Service understanding of ecological conditions is never perfect. An essential element of SHC is managing uncertainty through an iterative cycle of planning, doing, and evaluating.
- Management actions, decisions, and recommendations must be defensible and explicit about the nature and magnitude of potential errors.
- Conservation strategies consist of dynamic suites of objectives, tactics, and tools that change as new information enters the SHC cycle.

- Partnerships are essential, both for management and for developing conservation strategies.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP) was first signed in 1986 and has been updated several times since then. The most recent version states that "the purpose of the Plan is to sustain abundant waterfowl populations by conserving landscapes, through partnerships that are guided by sound science" (NAWMP, Plan Committee 2004).

Prairie Pothole Joint Venture Implementation Plan

The Prairie Pothole Joint Venture was established under the NAWMP but has since expanded from a focus on waterfowl to planning for "all-bird" conservation. The most recent implementation plan (Ringelman et al. 2005) provides stepped-down objectives from the four major species group plans described earlier (waterfowl, shorebirds, waterbirds, and landbirds).

Tomorrow's Habitat for the Wild and Rare

Tomorrow's Habitat for the Wild and Rare (Minnesota Department of Natural Resources [MNDNR] 2006a) is the Minnesota State Wildlife Action Plan. This strategic plan guides management for species in greatest conservation need: "native animals whose populations are rare, declining, or vulnerable to decline and are below levels desirable to ensure their long-term health and stability."

A Vision for Wildlife and its Use-Goals and Outcomes 2006–2012

Minnesota DNR's strategic wildlife plan is working to conserve wildlife and their habitat throughout the state for the public's use.

Minnesota Department of Natural Resources Long Range Duck Recovery Plan

The Minnesota Duck Recovery Plan (MNDNR 2006b) identifies both challenges and strategies to recover "historical breeding and migrating populations of ducks in Minnesota for their ecological, recreational, and economic importance to the citizens of the state." The Duck Recovery Plan sets a 50-year goal to sustain a breeding duck population of one million birds.

Minnesota Prairie Conservation Plan (2011)

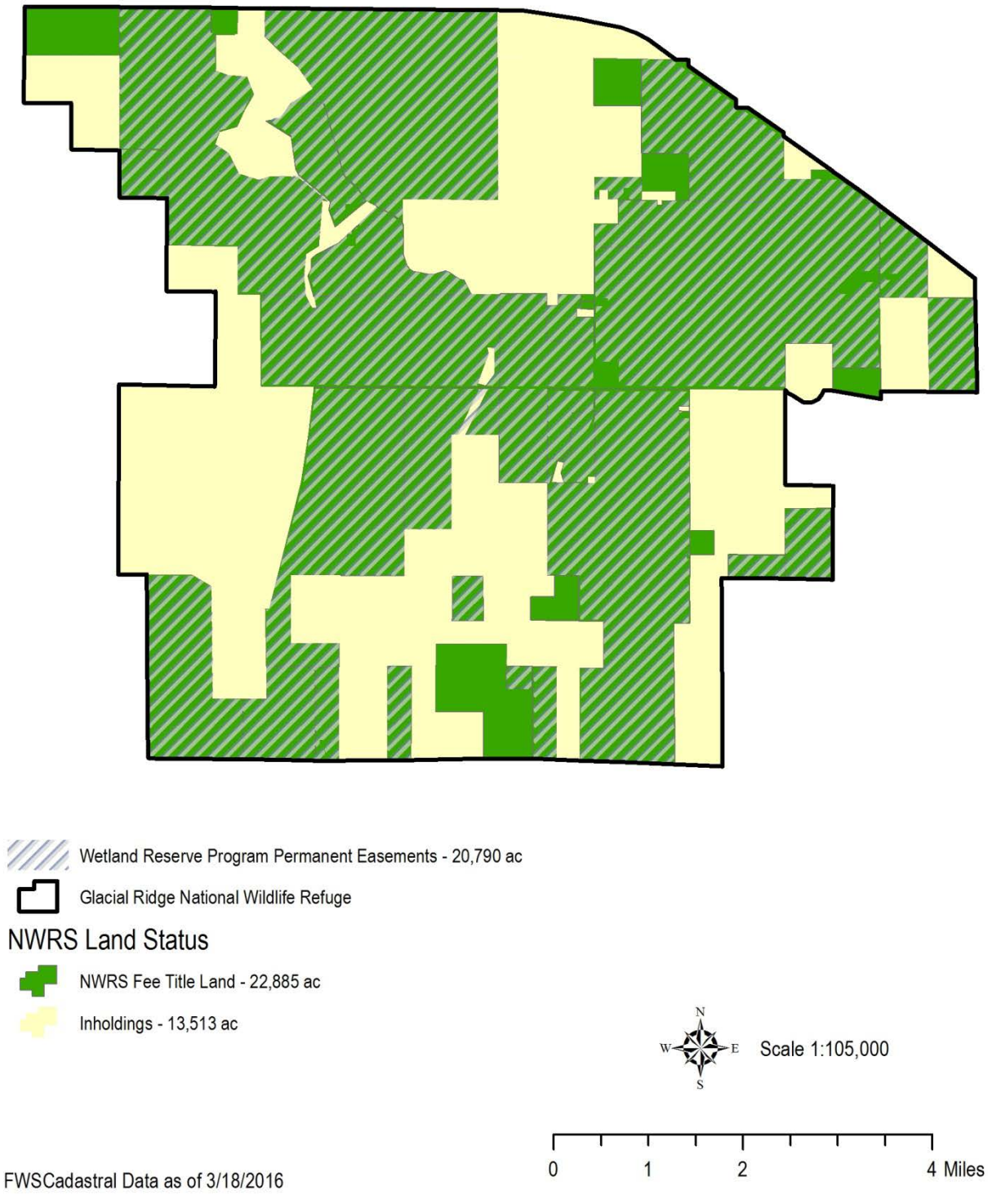
The Prairie Conservation Plan focuses efforts on grassland and wetland and demonstrates unprecedented cooperation between federal agencies, state agencies, and the state's most active conservation organizations. The plan identifies core conservation areas and creates a vision of a connected landscape from Canada to Iowa. The unified 25-year plan by multiple partners provides a more efficient future direction while also building on past conservation actions of a wide array of organizations and agencies.

Wetland Reserve Program (Natural Resources Conservation Service)

The Wetlands Reserve Program (WRP) was a voluntary program that offered landowners the opportunity to protect, restore, and enhance wetlands on their property. The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) provided technical and financial support to help landowners with their wetland restoration efforts through WRP. This program offered landowners an opportunity to establish long-term conservation and wildlife practices and protection. Landowners had the option to enroll their land in a permanent easement, which paid 100 percent of the appraised agricultural land value, or a 30-year easement, which paid 75 percent. Under a WRP easement, the landowner controls the access and use of the land, as the tax liability remains with the landowner.

Congress first authorized the WRP in the 1990 Farm Bill and reauthorized it in three subsequent farm bills which altogether restored over a million acres of wetlands and associated habitats. The 2014 Farm Bill realigned WRP, now called the Wetlands Reserve Easement (WRE), under the Agricultural Conservation Easement Program. WRP remains an important part of habitat management at Glacial Ridge NWR as 91percent of refuge lands (20,790 acres) were enrolled in WRP easements prior to The Nature Conservancy or private landowners transferring parcels to the Service (Figure 2-5). Enrolled lands are subject to certain management restrictions to protect wetland habitats.

Figure 2-5: Wetland Reserve Program Permanent Easements



Region 3 Fish and Wildlife Conservation Priorities

Every species is important; however, the number of species in need of attention exceeds the resources of the Service. To focus effort effectively, Region 3 of the Service compiled a list of Resource Conservation Priorities in 2002. The list includes:

- All federally listed threatened and endangered species and proposed and candidate species that occur in the region;
- Migratory bird species derived from Service-wide and international conservation planning efforts; and
- Rare and declining terrestrial and aquatic plants and animals that represent an abbreviation of the Endangered Species Program's preliminary draft "Species of Concern" list for the region.

Climate Change Planning

U.S. Fish and Wildlife Service

The Service's *Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change* (FWS 2010) establishes a basic framework within which the Service will work as part of the larger conservation community to help ensure the sustainability of fish, wildlife, plants, and habitats in the face of accelerating climate change. It was developed in an effort to rise up and respond to, as well as in recognition of, what is perhaps the 21st century's largest stressors on fish, wildlife, and plants: climate change. Part of the plan's primary purposes is to lay out a vision for accomplishing the Service mission to "work with others to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people" in the face of accelerating climate change. In this plan, a commitment to the Service's vision is expressed through strategic goals and objectives that must be accomplished to sustain fish and wildlife nationally and internationally. A 5-Year Action Plan for Implementing the Climate Change Strategic Plan identifies specific actions that will lead to the accomplishment of these goals and objectives. The goals and objectives most relevant to this planning effort include the following:

- Goal 2: Develop long-term capacity for biological planning and conservation design and apply it to drive conservation at broad, landscape scales.
- Objective 2.1: Access regional climate science and modeling expertise through regional climate science partnerships.
- Objective 2.2: Develop landscape conservation cooperatives to acquire biological planning and conservation design expertise.
- Objective 2.3: Develop expertise in and conduct adaptation planning for key species and habitats.
- Objective 2.4: Incorporate climate change in service activities and decisions.
- Objective 2.5: Provide requested support to state and tribal managers to address climate change issues that affect fish and wildlife service trust resources.

- Objective 2.6: Evaluate fish and wildlife service laws, regulations, and policies to identify barriers to and opportunities for successful implementation of climate change actions.

The *Conserving the Future: Wildlife Refuges and the Next Generation* (FWS 2011b) document is the Service's bold, new vision for the Refuge System. This 21st-century strategic vision for the Refuge System acknowledges the broad social, political, and economic changes that have made habitat conservation more challenging since the agency last set comprehensive goals in 1999. In the intervening 12 years, the new vision states the Nation's population has grown "larger and more diverse . . . and the landscape for conservation has changed—there is less undeveloped land, more invasive species, and we are experiencing the impacts of a changing climate." The document includes 24 recommendations to guide the future of the Refuge System. The recommendation most relevant to this planning effort concerning climate change is:

> Recommendation 2: Develop a climate change implementation plan for the Refuge System that dovetails with other conservation partners' climate change action plans and specifically provides guidance for conducting vulnerability assessments of climate change impacts to refuge habitats and species as well as direction for innovation in the reduction of emissions and improved energy efficiency on federal lands.

The Planning Process

Public Involvement

The Notice of Intent to prepare a Comprehensive Conservation Plan (CCP) and Environmental Assessment (EA) for Glacial Ridge NWR was published in the *Federal Register* dated January 17, 2013 (Vol. 78, No.12, page 3909–3910).

Internal scoping began in January 2013 when Service planning staff and Glacial Ridge NWR staff developed a preliminary list of issues, concerns, and opportunities associated with management of the refuge. A second internal scoping session was held with the Service's Midwest Regional Office staff at Bloomington, MN in March 2013 to get input on issues from regional supervisors, biologists, planners, and other program specialists.

Public scoping began in April 2013 when refuge staff hosted open house events in Crookston, MN and at the Rydell NWR headquarters to inform the public of the planning process and to solicit their input on issues of concern. About 20 people attended. In addition, a news release was distributed to area media and informational posters were displayed in local communities. Written comments were received from 12 stakeholders.

In August 2013, the refuge convened a team of resource professionals to share their perspectives on the biological and visitor services programs at Glacial Ridge NWR. Participants outside the Service included partner agencies, researchers, educators, and refuge volunteers. Purposes of the workshop were to define significant issues and opportunities facing the refuge and identify potential options for addressing them: share knowledge, ideas, and perspectives to ensure that best available information is considered, and begin to develop a shared vision for the future of the refuge and the ecosystem.

Step-Down Management Plans

The CCP is a plan that provides general concepts and specific wildlife, habitat, and people-related objectives. Step-down management plans provide detail to managers and employees who will carry out the strategies described in the CCP. The refuge staff will develop the following step-down plans after completion of this CCP (Table 2-1):

Table 2-1: Step-Down Management Plan Completion Time

Step-Down Management Plan	Amount of Time for Completion after CCP Approval
Habitat Management Plan(HMP)	1 year
Inventory and Monitoring Plan(IMP)	1 year
Visitor Services Plan (VSP)	2 years

Inventory, Monitoring, and Research

Following approval of the CCP and public notification of the decision, implementation will begin. Funding and staff time will be allocated to implementation of the CCP as appropriations and budgets allow. Development of a stepped down Habitat Management Plan (HMP) and other plans (e.g., Visitor Services Plan) will begin and serve to guide habitat management, restoration and reconstruction priorities and public use. A companion Inventory and Monitoring Plan (IMP) or additional chapters on inventory and monitoring appended to the HMP will be written to guide the refuge's priorities for monitoring. Information gained via inventories, monitoring, or research activities will allow the station to evaluate its progress in achieving the planning unit purposes, vision, and goals. The associated step-down plans will address habitat and/or population objectives and provide a means for evaluating the effects of management activities and public use. Through adaptive management, evaluation of monitoring ,and research results may indicate the need to modify refuge objectives or strategies.

Plan Review and Revision

The CCP is meant to provide guidance to the refuge manager and staff over the next 15 years. However, the CCP is also a dynamic and flexible document, and several of the strategies contained in this plan are subject to uncontrollable events of nature. Likewise, many of the strategies are dependent upon Service funding for staff and projects. For these reasons, the recommendations in the CCP will be reviewed annually and revised if necessary. The annual plan review process will include an evaluation of changing information and ecological conditions related to climate change. If significant changes are identified that compromise the refuge's purpose, vision, or goals, then the CCP will be revised. The CCP will be revised every 15 years or sooner when significant new information becomes available, ecological conditions change, major refuge expansion occurs, or when determined necessary by the periodic review. All plan revisions will follow the Service's planning process and will be compliant with NEPA. Minor plan revisions that meet the criteria of a categorical exclusion will be handled in that manner; however, if the plan requires a major revision, then the CCP process starts anew at the preplanning step.

Planning Issues

An issue is any unsettled matter that requires a management decision, such as an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition. Issues arise from both within and outside of the Service. Public scoping as well as scoping of refuge and regional Service staff and other agencies produced many issues that suggest alternative ways of managing the refuge.

The planning team sorted the issues into the categories of wildlife, habitat and people.

Wildlife

- Limited information on wildlife population levels
- Status of endangered butterfly species
- Effects of climate change on wildlife and habitat

Habitat

- Control of invasive plant species
- Cattail control in restored wetlands
- Conversion of forested areas to native prairie

People

- Future growth of the hunting program
- Law enforcement
- Outreach and guidance for non-hunting visitors
- Visitor contact facilities and signage

Public Review of the EA/Draft CCP

The EA/Draft CCP was officially released for public review on May 10, 2016; the 42-day comment period ended on June 20, 2016. A notice of availability and news release were sent via e-mail to numerous individuals, organizations, and local media outlets. During the comment period the refuge hosted two 3-hour open house events at the Rydell NWR Visitor Center to receive public comments on the EA/Draft CCP. Attendance was minimal at these events, and no written comments were received.

Written comment letters were received from one federal agency and one non-governmental organization during the comment period. Both respondents endorsed the selection of Alternative B and the general approach of the proposed future management of the refuge. No specific changes were suggested for the EA/Draft CCP. Consequently, we did not produce a formal Response to Comments Appendix for the final plan.

Chapter 3: Refuge Environment and Management

In this chapter:

Geographic/Ecoregional Setting

Glacial Ridge National Wildlife Refuge (NWR, refuge) is located on the eastern edge of the Prairie Pothole Region (PPR) and within the Partners in Flight Northern Tallgrass Prairie/Aspen Parklands physiographic areas. The Nature Conservancy (TNC) identified this refuge as "ecologically significant" in the Northern Tallgrass Prairie Ecoregional Plan in 1998 (TNC) as it exists within an area containing the most important pieces of remaining native prairie along the Red River Valley (Brown et al. 2005). Glacial Ridge NWR is especially important because approximately 5,000 acres of virgin (remnant) prairie and savanna and 12,000 acres of wetlands exist within the acquisition boundary. Remnant prairie includes "communities that have some components of their natural character surviving, although often in a highly degraded form" (Packard and Mutel 2005). In addition, 18,000 acres of prairie have been restored (U.S. Fish and Wildlife Service [FWS, Service] 2005a). Within one mile of the Glacial Ridge NWR boundary lies 7,800 acres of remnant grassland in a combination of private and public ownership (Brown et al. 2005). As such, Glacial Ridge NWR represents a remarkable opportunity to restore disrupted ecological processes, species, and function on a landscape scale. The importance of this is amplified, because tallgrass prairie and savanna are globally endangered ecosystems.

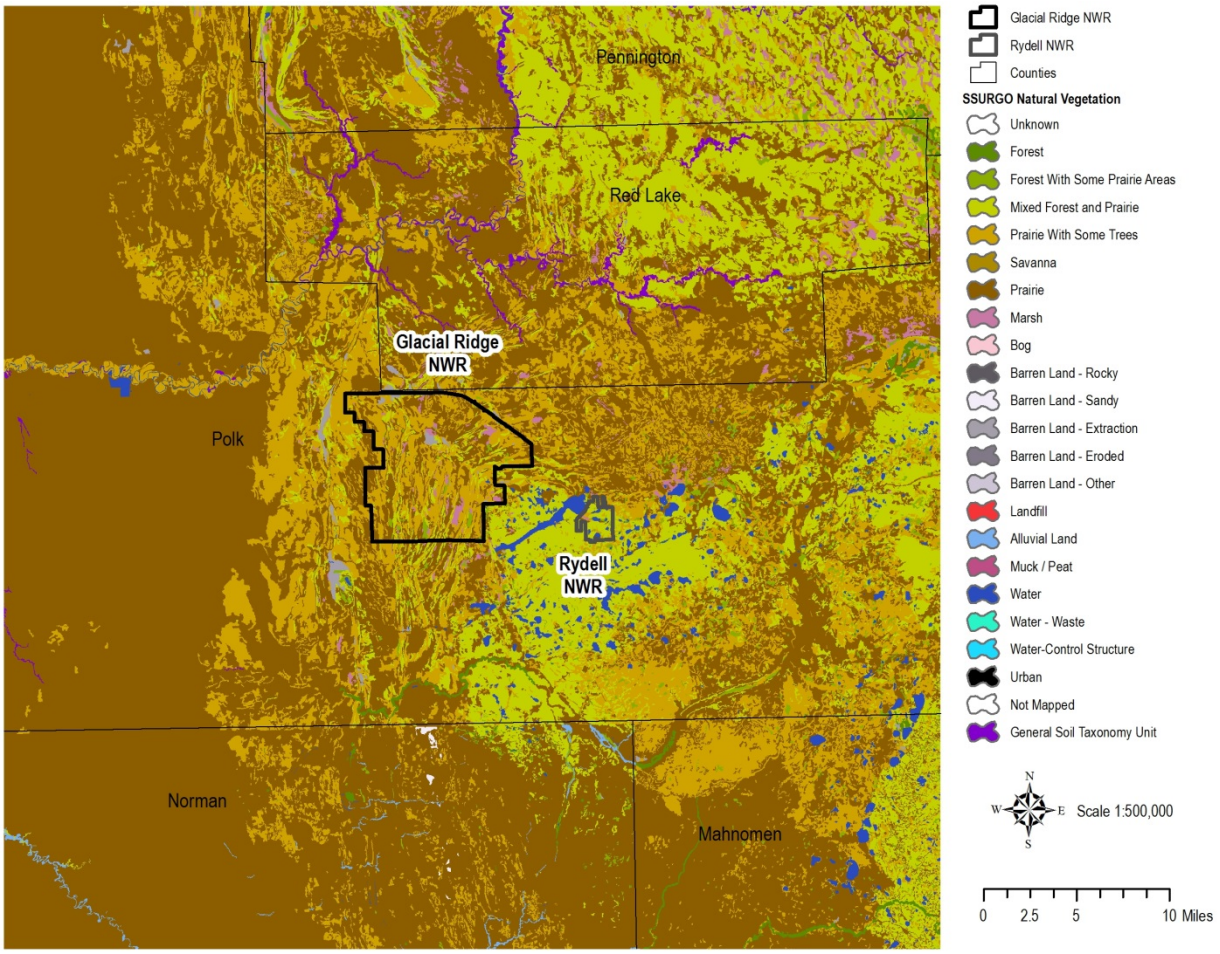
The Refuge and Local Context

Glacial Ridge NWR is located 10 miles east of Crookston, MN in Polk County. The refuge is bordered by U.S. Highway 2 to the north and is bisected by MN State Highway 32 (north/south) and Polk County Road 45 (east/west). Other county and township roads offer access, such that approximately 23,000 acres are less than ½ mile from the nearest road (FWS 2005a).

Land Cover: Past and Present

The refuge landscape is the product of a long and complex series of climatic changes and glaciations (Figure 3-1). The final retreat of the Red River Lobe of the Laurentide Ice Sheet occurred during the late Pleistocene Epoch approximately 12,000 years ago, forming the large Glacial Lake Agassiz. Small, nomadic bands of big game hunters dominated the landscape of northern Minnesota during this time. The refuge acquisition area was not accessible to human settlement until the recession of Glacial Lake Agassiz started around 11,500 Before the Present (BP) and was not fully accessible until at least 9,500 BP.

Figure 3-1: Potential Historic Natural Vegetation of Glacial Ridge NWR (Based on Soil Types)



The Archaic Tradition (8,000 to 4,000 BP) generally is characterized by the development of efficient hunting and gathering cultures and greater exploitation of local environments for food and tools. The large mammals of the Pleistocene Epoch (mammoth, horse, camel, etc.) were by then extinct, and environmental conditions had largely stabilized. Increasing regionalization occurred throughout the Archaic that appears to be linked in part to major biomes (e.g., prairie, deciduous forest, lake-forest).

Pre-settlement, northern Minnesota was occupied by the Cheyenne in the west and by the ancestors of the historic Sioux, or Dakota/Lakota in the east. French Jesuits and fur traders first arrived there at the end of the 17th Century. By the mid-1700s, the Ojibwe (or Chippewa) moved into Minnesota from the east as a direct result of the spread of the French fur trade. The Cheyenne were decimated by smallpox during the early 1780s, leaving the upper Red River Valley open for the Ojibwe who became the dominant people in the region until the mid-1800s.

At the end of the French and Indian War in 1763, the French abandoned fur trading activities in the Red River Valley to British- and American-born traders. The British regime ended with the purchase of the Louisiana Territory by the United States in 1803. The period between 1803 and 1837 was characterized by the exploration and mapping of the region. The first land cession by

the southern Ojibwe was made in 1837. Multiple treaties with the Ojibwe, Dakota, and Winnebago tribes soon opened up central Minnesota to logging and settlement.

Settlers arrived in the Glacial Ridge NWR area in the early 19th century. European settlement of the prairie meant a change from the natural landscape to row crops and cattle pastures. Farmsteads were established along beach ridges and used for hay production, and wetlands were used as water sources for livestock. Livestock grazing was a major use of this prairie, especially in the early years of European settlement. The land was interspersed with wetlands, and what was dry often quickly became wet when abundant rainfall occurred, as the water table is close to the surface throughout much of this landscape. Cattle were often pastured in high concentrations in the area, and resulted in sparse vegetation and densely compacted soils. Sheet runoff of rainfall resulted in extensive erosion under these conditions but was less intensive than that occurring in cropland, as perennial plant roots buffered the effects of erosion.

Beginning in 1920, however, large wetlands in the Tilden Township area were drained and small grain crops began to replace native prairie. Over 100 miles of private ditches were established in the early 1980s to drain wetlands, making these former wetlands suitable for row-crop agriculture. Tile lines were established in three locations within what is currently the refuge; further disrupting the hydrology of the area. However, the fluctuating hydrology that sustained the natural landscape could not be entirely controlled by man. Farming in the area is still limited due to periodic flooding and high water tables (FWS 2005a).

When TNC purchased the majority of the land now designated as Glacial Ridge NWR in 2001, approximately 17,000 acres were in row crops. Tile lines established to accommodate agriculture were an impediment to TNC's intended restoration plans. As such, tiles have all been either broken or plugged for conservation purposes. Farming rights ended after the 2009 field season. At that time, prairie and prairie wetland seed mixes were scheduled to be planted on remaining croplands (Brown et al. 2005).

Glacial Ridge NWR; photo: USFWS

In addition to grazing and farming practices, gravel mining has had an impact on the prairie that is now Glacial Ridge NWR. The course gravel laid down in strips as Glacial Lake Agassiz receded was valuable for construction purposes, and eventually mines were established. Gravel mining was deemed an inappropriate use by TNC and mining activity was reduced to four beach ridges. This has reduced the mining pressure from the remaining beach ridges (Brown et al. 2005) and has allowed TNC to restore the dry prairies affected by mining.

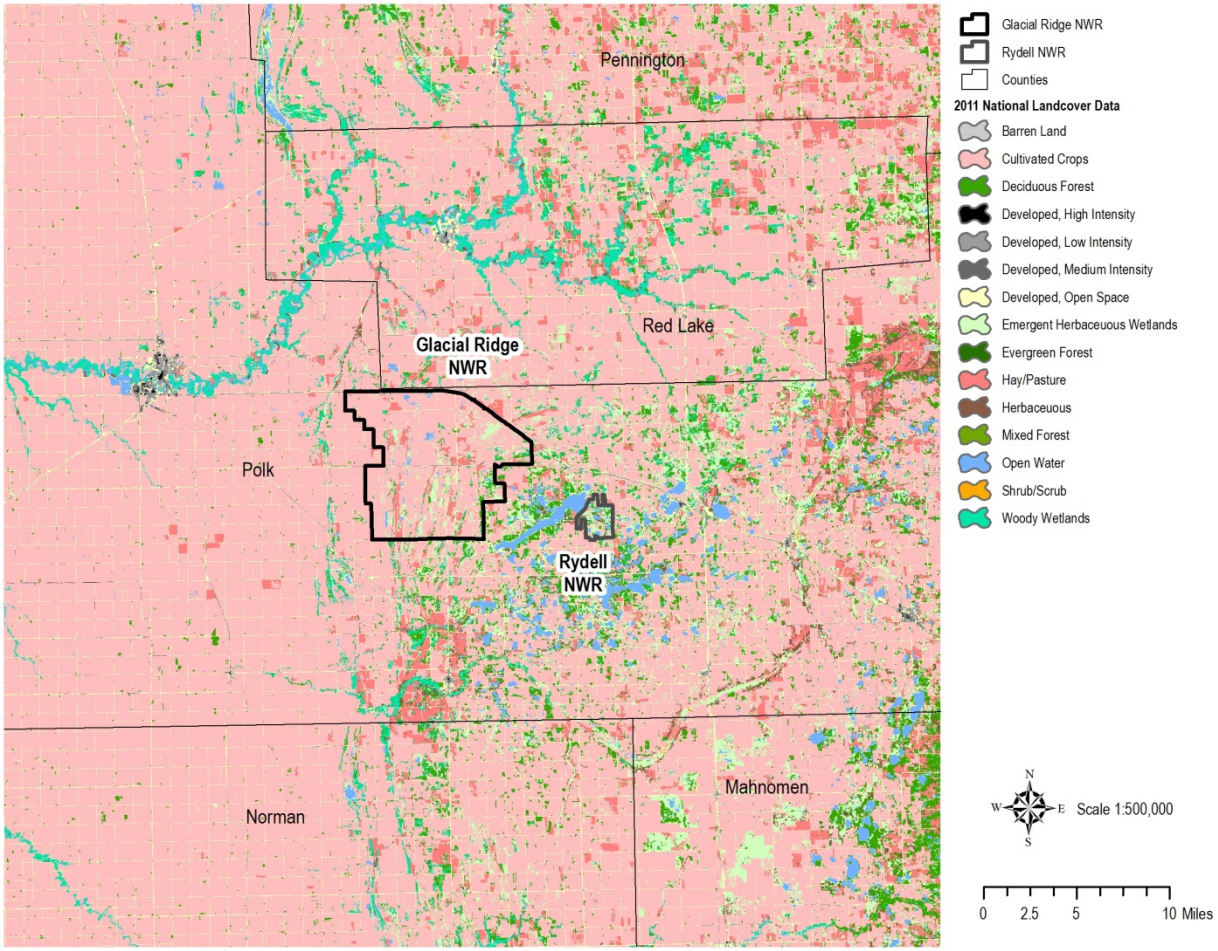
Topography and Geology

Glacial Ridge NWR lies in the footprint of ancient Glacial Lake Agassiz, formed 12,000 to 9,000 years ago. The wave action of this lake created beach ridges that still exist. The Agassiz beach ridges encompass an area greater than 600,000 acres in the Northern Tallgrass Prairie ecoregion (Teller and Clayton 1983). The beach ridges run from northeast to southwest with a glacial moraine located on the east side of the refuge. This moraine helped form lakes which in turn created a "fire shield." The fire shield stopped the frequent fires that occurred throughout the beach ridge landscape and allowed forests to develop where fire was rare, with grasslands in the fire-prone area. Thus, the refuge is situated with its eastern edge bordered by lakes and hardwood forests and the western edge adjacent to the Red River Valley, historically occupied by tallgrass prairie (FWS 2005a). Non-wooded areas east of the refuge are now almost entirely farmed (Figure 3-2).

Winter on Glacial Ridge NWR; photo: USFWS

North American hydrology is influenced by continental divides causing water to flow in general directions and drain into various water bodies. Among these is the Northern or Laurentian Divide that causes water to flow to the Arctic Ocean. Glacial Ridge NWR is located north of this divide and so water flowing through the refuge drains toward the Hudson Bay. Native peoples referred to the ridge causing this divide and running from east of Grand Rapids to Hoyt Lakes as the "sleeping giant" or "Mesabi" (Continental divides in North Dakota and North America 2008).

Figure 3-2: Land Cover of Glacial Ridge NWR and the Surrounding Area (National Land Cover Data 2001)



Climate

The current climate of Glacial Ridge NWR is sub-humid continental with an average of 20.79 inches of precipitation annually. There are 13.9 inches of precipitation during the May through September growing season. The average temperature is 4.3 °F in January and 69.5 °F in July (Cowdery et al. 2008). Prevailing winds are generally westerly.

Predicted Change

Some potential impacts of climate change on the prairie pothole ecosystem in Minnesota have been identified that may need to be considered and addressed in the future. For example:

- If climate conditions continue to be warmer and wetter in the Glacial Ridge area, more water may enter the refuge, resulting in decreased water quality and increased sedimentation in wetland habitats. Downstream flooding and nutrient loading could be exacerbated unless regional land use changes and water discharge/runoff could be mediated.

- More frequent drought conditions in the western portion of the PPR could shift waterfowl use eastward, making habitat restoration in the eastern portion of the PPR (including Glacial Ridge NWR) even more important for waterfowl populations.
- Many plant and animal communities may change as species' ranges shift due to changes in climate, with less adaptable species becoming threatened by the changing conditions and more tolerant species moving in to take their place. Invasive, non-native species often are tolerant to changing conditions and may out-compete native species for resources. Climate changes (e.g., increased growing season precipitation) can result in more favorable conditions for exotic invaders, such as smooth brome and Kentucky bluegrass.

Physical Environment

Glacial Ridge NWR is located in the outwash plain of the historic Glacial Lake Agassiz. Ancient beach ridges, which run northeast to southwest, were created by wave action of the massive body of freshwater. Over time, lake outlets formed in the lake and water levels receded allowing the creation of an extensive tallgrass prairie and wetland complex. Natural forces such as floods and fire were constantly at work to maintain the balance of this ecosystem as water levels within the beach ridge wetlands adjusted to the seasonal deposition of rainfall and snow. A glacial moraine node exists immediately to the east of the refuge. The resulting collection of lakes within the node created a "fire shield" on the edge of the prairie that resulted in the establishment of a maple-basswood forest community, the farthest west extension of this habitat type in the United States.

The Soil Resource

The typical soils of Polk County are generally dark and range in texture from clayey to sandy. Soils in the western half of the county where Glacial Ridge NWR is located formed in silty and clayey lacustrine sediments. Soils in the eastern half of the county in the forest-prairie transition zone formed in loamy glacial till and sandy and gravelly outwash material (U.S. Department of Agriculture [USDA]).

Water Resources

The retreat of Glacial Lake Agassiz and gravel beach ridges, which the massive lake left behind have greatly influenced the hydrology and the mosaic of habitats found today. Dry and mesic prairies formed on the well-drained ridge tops while groundwater discharges from the western slope of the ridges created fens, wet meadows, wet prairies, and shallow wetlands. In recent times, agriculture has severely altered the natural hydrology of the refuge as the drainage of wetlands has allowed more productive farmland and has set the foundation for development in some areas. Approximately 125 miles of drainage ditches existed at the time TNC purchased the property in 2000. In addition to the construction of drainage ditches, portions of the beach ridges throughout the refuge acquisition area have been mined for gravel (Brown et al. 2005).

Habitat

Glacial Ridge NWR is situated on the edge of the PPR of western Minnesota between the flat Red River Valley floodplain on the west and the rolling hardwood forest and lakes region on the

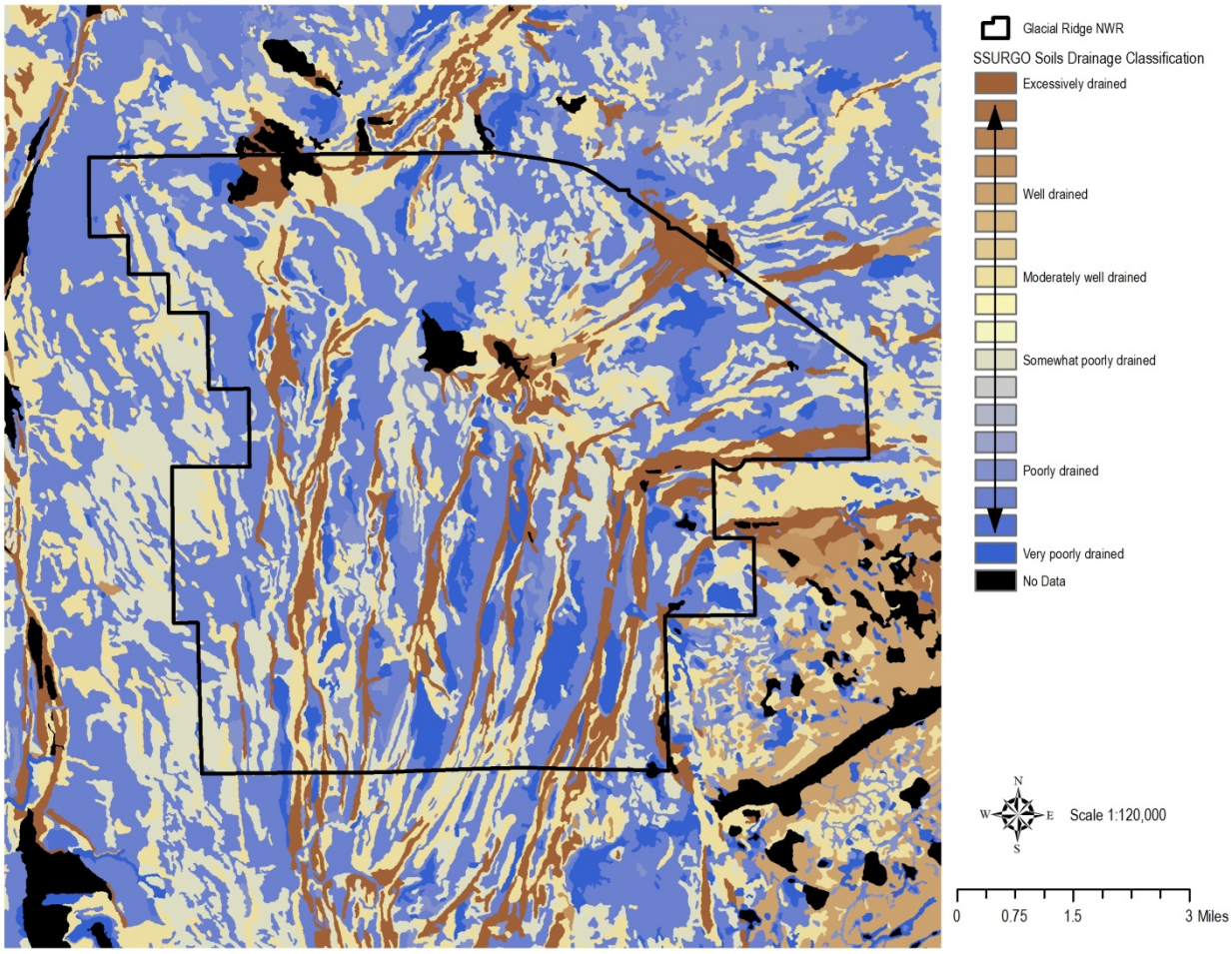
east. The acquisition area is a mosaic of pastures, cropland, small aspen woodlots, ungrazed prairie, numerous undrained and drained wetland basins, fen habitat, and several gravel/sand operations. The original goal of the Glacial Ridge Project is to facilitate restoration of the grasslands and wetlands to as close to pre-settlement conditions as practical.

Wetlands

The retreat of the Wisconsin glacier left approximately 25 million depressional wetlands of all shapes and sizes in the PPR. A variety of typical wetland types are found on Glacial Ridge NWR, defined by soil type, duration of standing water, and vegetation communities. Some are fed by groundwater, but most are fed by rain and snowmelt. Temporary and seasonal wetlands, those that hold water for a few days to a couple months after thaw, make up the greatest number but the least acreage of the all wetland types. Semi-permanent and permanent wetlands, which typically hold water for an entire growing season or longer, are found at lesser densities but have the most surface acres of water (Stewart and Kantrud 1971; Kantrud and Stewart 1977).

Historically, numerous wetlands and fens were located between the beach ridges, however many of these have been either completely or partially drained (Figure 3-3). Wetlands of the PPR are extremely important to North American waterfowl populations. The availability of wetlands (Kantrud and Stewart 1977) and distribution of emergent cover (Weller and Spatcher 1965; Murkin et al. 1982) drive the numbers of breeding waterfowl in the PPR. Hemi-marsh (equal interspersion of open water and emergent vegetation) has been shown to support the greatest waterfowl breeding pair density and species diversity (Weller and Spatcher 1965; Kaminski and Prince 1981; Murkin et al. 1982) and can be present in seasonal and semi-permanent wetlands. Although only 10 percent of the available waterfowl breeding habitat is found in the PPR, nearly 50 percent of waterfowl production occurs there (Batt et al. 1989). Historically, when the Dakotas and Saskatchewan experienced drought conditions, waterfowl shifted to the eastern and northern fringes of the PPR to breed, including the area of Glacial Ridge NWR.

Figure 3-3: Soil Drainage on Glacial Ridge NWR

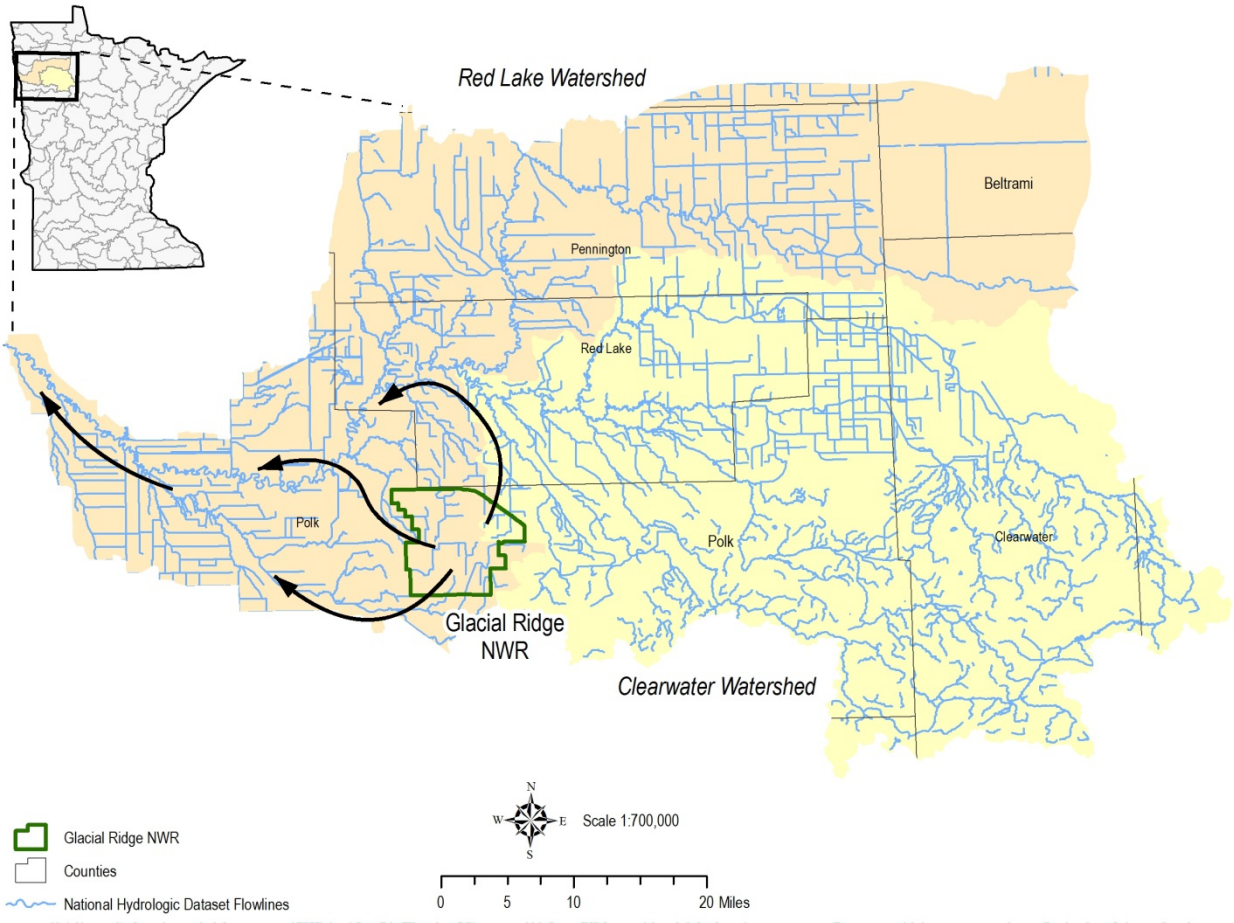


Many wetlands were drained for farming as settlers began making their livelihood in the PPR. Rudimentary drainage ditches were dug to release water from small temporary or seasonal basins. As technology advanced, larger networks of surface ditches were created or subsurface tile installed to more efficiently drain all types of wetlands. Despite the extensive drainage, many former wetland sites still retain enough water to make crop production very difficult during wet years. Many farmers in this area have trouble with planting crops in wet fields and flooding losses are common. Today, interconnected temporary, seasonal, and semi-permanent wetlands are drained into basins at lower elevations, which increases their water level and permanence—a process known as consolidation drainage (Krapu et al. 2004).

Consolidation drainage changes the hydrology and chemistry of wetlands, favoring the establishment and proliferation of cattail (Kantrud 1986c), sustaining introduced fish communities (Anteau 2011), and ultimately diminishing wetland quality for waterfowl breeding and brood rearing (Krapu et al. 2004; Anteau 2011) and shorebird foraging (Anteau 2011). This practice continues in force today. It is estimated that over 85 percent of wetlands in Minnesota's PPR have been lost to drainage (Johnson et al. 2008). The former wetlands on the east side of the acquisition area once served as a major groundwater recharge location for the prairie habitats located on the west side. The instream waters of Burnham, Badger/Maple Creek and

the Gentilly River, the field drainage ditches, gravel pit ponds, and a few remaining natural basins comprise the extent of permanent wetland types in the study area (Figure 3-4).

Figure 3-4: Watershed of the Glacial Ridge NWR



Prairie

The prairies found throughout the refuge acquisition area are in varying states of health; remnant prairies showcase the diversity that was once abundant throughout the landscape, whereas other sites have experienced a high rate of degradation. Prairie plants can be divided into three groups: grasses, shrubs, and forbs. Grasses make up 90 percent or more of the biomass of the prairie, but there are relatively few species. Shrubs make up a small percentage of the biomass, and like grasses, there are few species. Forbs account for 90 percent or more of the diversity in high quality remnant prairies. Therefore, utilizing remnant prairies as reference sites enables managers to set a level of quality and establish a benchmark for prairie assessment and measuring restoration success.

Prior to refuge establishment, pasture and croplands, including cultivated row crop fields, alfalfa, and agricultural lands enrolled in the Conservation Reserve Program (CRP), encompassed over 80 percent of the acquisition area. The CRP is a voluntary program that offers annual rental payments and cost-share assistance to establish long-term resource-conserving covers on

eligible land. Annual rental payments are made based on the agriculture rental value of the land. The program also provides cost-share assistance for establishing natural vegetative cover and for other approved conservation practices. The cultivated fields are planted primarily to soybeans or wheat. Additional tracts of tallgrass prairie have been cleared of boulders to facilitate future cultivation.

Historically, fires and bison herds were major sources of disturbance on the prairie landscape (Collins and Wallace 1990; Biondini et al. 1998). Tallgrass prairie is a fire-dependent ecosystem (Collins and Wallace 1990). The climate is actually wet enough to support trees (Briggs 2005), but fire kept the trees in check and favored grasses (Leopold 1949). Fire removes residual vegetation and litter layers, allowing seeds to germinate and new plants to become established. It also revitalizes the soil, building up nutrients important for flower and seed production. When fire is removed from the system, prairie eventually succeeds to trees and forests (Heisler et al. 2003).

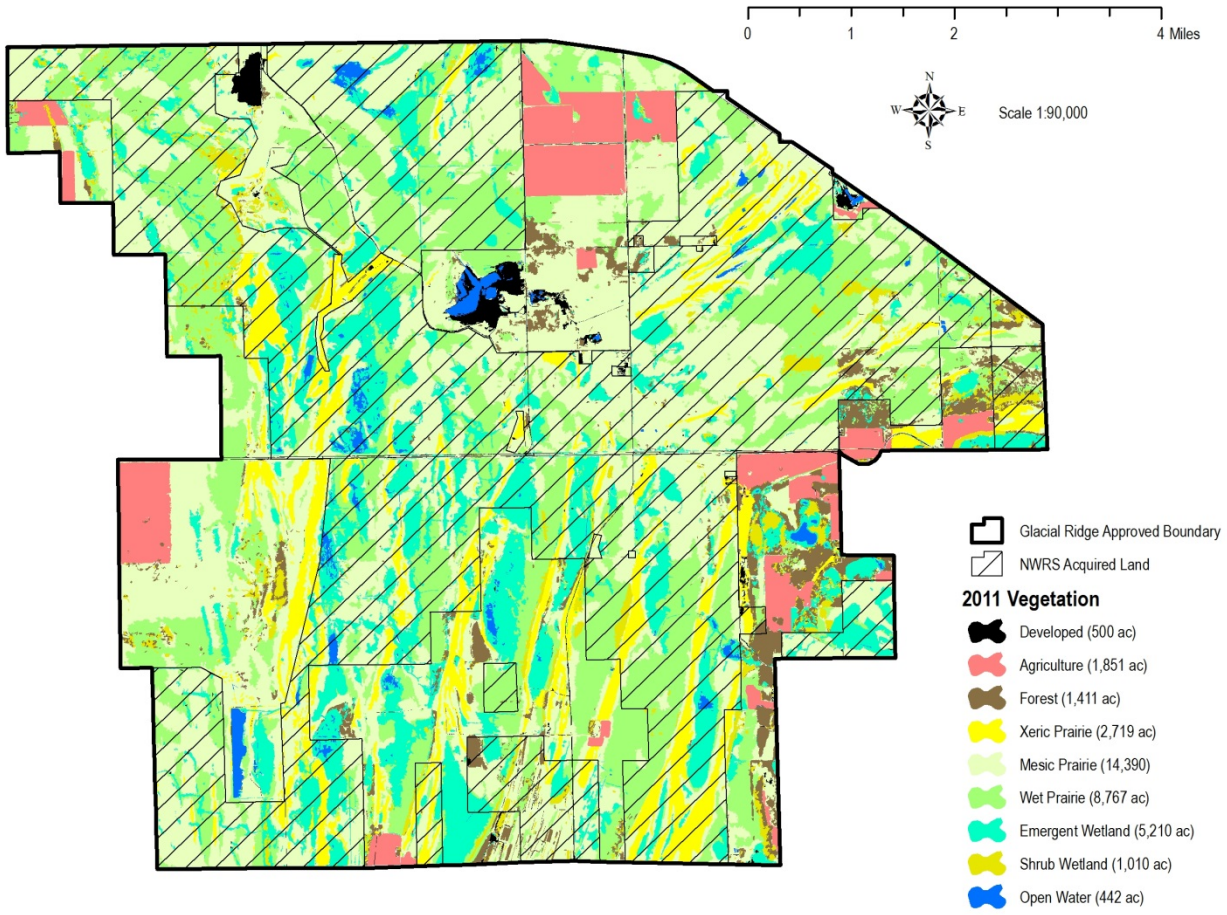
Most accounts from the historic literature show that fires in the tallgrass prairie region were most common in the fall (Wilcox 1907; Higgins 1986; McClain and Elzinga 1994; Pyne 1997), primarily the month of October. These same sources show that fires were quite frequent, with fires often referred to as “annual,” but not necessarily in the same location. Given the topography of the tallgrass prairie, Wright and Bailey (1980) suggest a fire frequency of five to ten years is reasonable. However, a more recent literature review suggests fire frequencies in the tallgrass region of Minnesota and Wisconsin were between two and three years but were highly dependent on the climate (Dickmann and Cleland 2002).

While lightning is the primary source of ignition in western forests, lightning in the Midwest is usually accompanied by heavy rains. Lightning does cause fires in tallgrass prairie, but only rarely. The vast majority of historic fires were set by indigenous people. The frequent records of October fires are during a time of the year when lightning storms are rare, lending more evidence that most fires were started by people. As Europeans settled the tallgrass prairie region, most fires were caused by locomotives and equipment used to clear the land, and fire frequencies remained high. By the 1920s, fire frequency and intensity waned as settlement increased and effective fire suppression programs began.

Grazing also is important to the maintenance of tallgrass prairie (Biondini et al. 1998). Bison were the primary grazers in western Minnesota, with deer browsing on shrubs and young woody vegetation and elk never being widespread and abundant like bison. Over 95 percent of the bison diet is grasses (Plumb and Dodd 1993). Removal of these grasses releases the forb community from competition, dramatically increasing plant species diversity in grazed prairie (Hartnett et al. 1996; Towne et al. 2005). The increased plant diversity increases the diversity and abundance of invertebrates (Joern 2005). Grazing creates a patchwork of vegetation structure from ungrazed to lightly grazed to heavily grazed areas. Patterns of standing vegetation affect fire pattern and behavior.

Fire and grazing interactions were important in the distribution of prairie vegetation communities across the landscape. Based on historical fire and grazing patterns, animals preferentially selected burned areas because of the young, green shoots and grazed them heavily. When another area burned, they moved to the newly burned patch. The interaction between fire and grazing created a shifting mosaic of microhabitats for grassland birds, prairie invertebrates, other wildlife, and vegetation (Figure 3-5).

Figure 3-5: Current Vegetation on Glacial Ridge NWR (2011)



Forest

Immediately to the east of the refuge, the Des Moines ice lobe deposited a number of moraines from the last glaciation (Minnesota Department of Natural Resources 2005). The resulting collection of lakes along the node created a “fire shield” on the edge of the prairie that resulted in the development of a maple–basswood forest community, the farthest north and west extension of this habitat type in Minnesota (Kuchler 1964). In addition, a few wooded areas are scattered throughout the acquisition area—mostly on state and private lands.

Savanna/Successional

Locally, sandy flat areas that received periodic disturbance from fire-formed sand plains which occur locally within the moraines. These areas were dominated by prairie, savanna, and oak and aspen woodlands. This is especially true of the Anoka Sand Plains and the sandy terraces along the major rivers. In these areas, droughty soils and absence of impediments to the spread of fire promoted fire-dependent prairie and woodland vegetation.

Agriculture

According to the 2012 USDA Census, Polk County had 1,322 farms totaling nearly 1.1 million acres which encompasses over 87 percent of the county's total land base. The average farm size is about 828 acres, which is almost double the national average. Crops are planted on 991,405 acres which is higher than the national average, while buildings, woodland, and pasture/rangeland compose the remaining 100,000 acres (Table 3-1). Cash receipts from livestock and products has remained relatively stable for the past 30 years while cash receipts from crops has greatly fluctuated through time (Table 3-2). Farm employment accounts for 9.6 percent of the jobs in Polk County, which has remained relatively stable for the past 30 years.

Table 3-1: The Composition of Farm Land use in Polk County, MN Compared to the U.S. Average

Data was obtained from the 2014 National Agricultural Statistics Service of the U.S. Department of Agriculture.

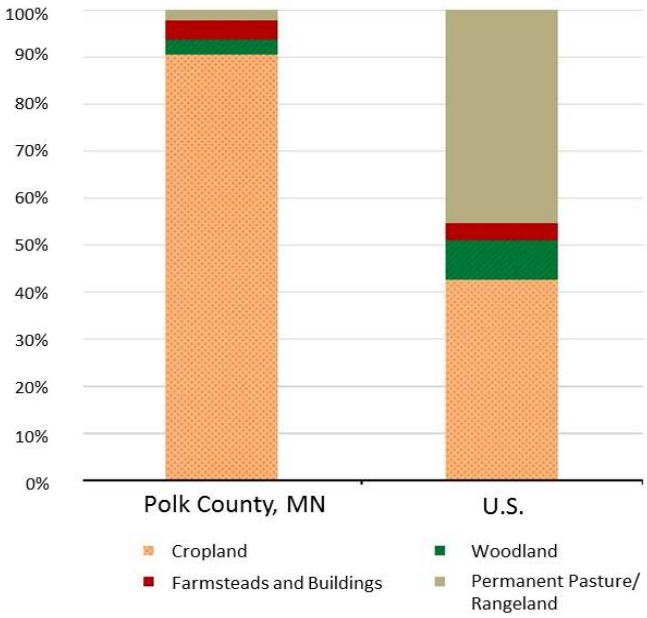
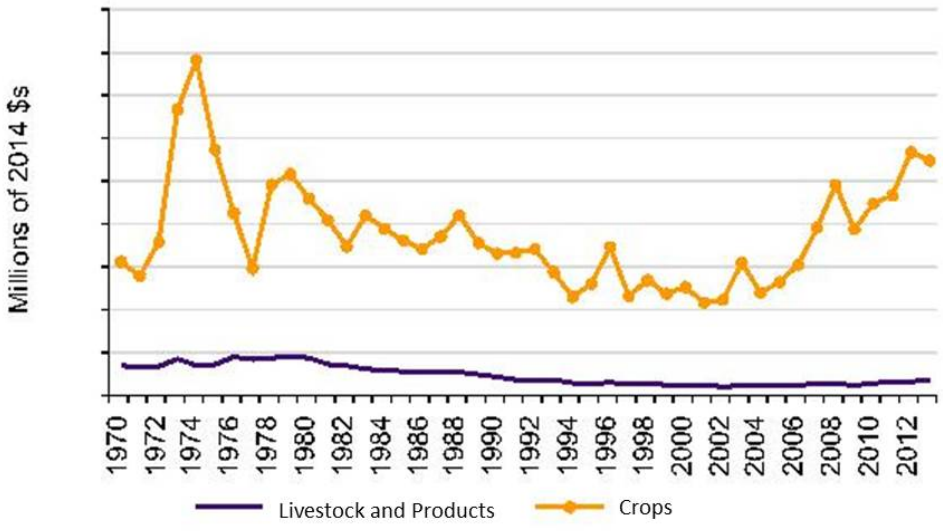


Table 3-2: A 30-year View of the Cash Receipts from Livestock/Products and Crops in Polk County, MN

Data was obtained from the 2014 National Agricultural Statistics Service of the U.S. Department of Agriculture.



Wildlife

Birds

The tallgrass prairie and wetlands in the area that is now Glacial Ridge NWR are key habitats for resident birds, migratory birds, and other wetland- and grassland-obligate species. An estimated 98 percent of the tallgrass prairie and 90 percent of the wetlands have vanished from the prairie pothole region of Minnesota that once existed prior to settlement (Minnesota Prairie Plan Working Group 2011). Greater prairie-chickens and sharp-tailed grouse are residents of the refuge. In 1999, at least 21 greater prairie-chicken booming grounds were documented within the acquisition area (Minnesota Prairie Chicken Society). Booming grounds, also known as dancing grounds or Leks, are gathering sites for male greater prairie-chickens and sharp-tailed grouse trying to attract females during the breeding season. Use of the recorded sites ranged from three to 30 individual males. Other birds known to use the area include Le Conte's sparrow, clay-colored sparrow, vesper sparrow, Wilson's snipe and western meadowlark. Farming practices have changed dramatically in the past 30 years. Much of the grazing of the past has given way to large-scale row crop farming. The loss of hay and pasture acreage is strongly correlated with declines in grassland bird populations throughout the Midwest (Herkert 1995).

The existing beach ridge wetlands are an important stopover in spring and fall for many migratory birds. Puddle ducks—primarily mallards, some wood ducks, American wigeon, and blue-winged teal—and Canada geese are frequently observed where water is available. The refuge is used during the migration periods by numerous shorebirds, waterfowl, sandhill cranes

and tundra swans. Large numbers of sandhill crane (estimates of over 20,000) also frequent the area to refuel on their journey from wintering to nesting grounds and again during their return south each autumn. A small number currently nest in the area each summer. Large flocks of American white pelicans and tundra swans are also seen in the spring when water conditions are favorable. Resident Canada geese (giant) use the open water wetlands, including the gravel pit located in the center of the acquisition area. Concentrations of geese are often observed on the pit during the fall migration period and provide local hunting opportunities.

Sandhill Cranes; photo: USFWS

Mammals

The refuge supports a variety of resident mammals that are locally abundant depending on the availability of food sources, loafing areas and security habitat. White-tailed deer and white-tailed jackrabbits are common throughout the acquisition area. Furbearers, including fox, coyote, long- and short-tailed weasels, skunk, mink, beaver and raccoons also are locally common and seen in the area on a regular basis. All of these species are very familiar to local farmers, hunters and highway motorists. Mammals tend to be most abundant in “edge” habitats, especially those that border agricultural fields. Agricultural crops are seasonally important food sources to some of the resident mammals, especially deer. However, the availability of natural foods during winter, spring, and early summer places a strict limit on local mammal populations. Moose were common inhabitants of what is now Glacial Ridge NWR through the mid-1990s, but they are now uncommon due to a widespread population decline throughout Minnesota.

Reptiles and Amphibians

Streams, ditches and wetland basins provide the aquatic habitat required for a variety of turtles, frogs, toads, salamanders, and snakes. Site-specific abundance data is limited for the refuge; however, at least 18 species of amphibians and reptiles have been documented at the nearby Rydell NWR (FWS 2000). These species are important food sources for many mammals, birds and fish. Their numbers and diversity are often indicators of the health of an ecosystem. Many species of reptiles and amphibians are declining on state and national levels.

Fish and Other Aquatics

Three drainage systems occur within Glacial Ridge NWR. A fishery survey of the Red Lake River system documented 46 species. No current information is available on the Sandhill River system. In addition, no surveys have been conducted on the streams or lakes within the refuge. Populations of gamefish, such as perch, sunfish, and northern pike are probably restricted to

Bakken Lake and the scattered deepwater lakes on the southeast end of the acquisition area. The extensive drainage that has occurred throughout the study area has left limited fish habitat; however, some small native species, such as white sucker and creek chub can be observed in the drainage ditches and in pools near road culverts.

Focal Species

Priority resources of concern and other benefiting species on Glacial Ridge NWR are represented in the table below (Table 3-3). The bird habitat requirements in this table are summarized from the respective species accounts in Johnson et al. (2002), Johnson et al. (2004), Poole (2005), and expert opinion (S. Lewis, R. Russell, and T. Will, FWS, personal communication). Information for prairie butterflies is from the Service (2007), Selby (2010), and expert opinion (P. Delphey, FWS, personal communication). Additional resources of concern will be identified during the Habitat Management Plan process using the Rocstar method developed by the Service and Cardno.

Table 3-3: Focal Species Associated with Glacial Ridge NWR

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
Dakota skipper Poweshiek skipperling	Dry prairie	Stubble heights ≥20 cm in tallgrass prairies; low to moderate litter	Whole life cycle	Regal fritillary, sharp-tailed grouse, dicksissel, prairie vole, plains pocketmouse, Richardson's ground squirrel, northern harrier, savannah sparrow, chestnut-collared longspur, western meadowlark
Grasshopper sparrow Greater prairie-chicken Upland sandpiper		Clumped vegetation interspersed with bare ground; moderate litter	Full season Breeding Foraging	
Upland sandpiper Greater prairie-chicken		Moderate to tall, patchy	Brood rearing and nesting	Sedge wren, savannah sparrow, clay-colored sparrow, western meadowlark
Greater prairie-chicken Western meadowlark	Mesic prairie	Short, open vegetation	Breeding Full season	Short-eared owl, plains pocketmouse, marbled godwit
Dakota skipper Poweshiek skipperling		Moderate to tall, patchy	Whole life cycle	Henslow's sparrow, regal fritillary, northern harrier
Greater prairie-chicken Blue-winged teal Western meadowlark			Nesting and brood rearing Nesting Full season	

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
Mallard Northern harrier Sedge wren		Tall, dense	Nesting Full season Full season	Henslow's sparrow, common yellowthroat, bobolink, American bittern, badger
Marbled godwit	Wet prairie	Disturbed prairie – hayed or grazed areas with low vegetation	Breeding	Hudsonian godwit, Wilson's phalarope, LeConte's sparrow (wet years), black-crowned night heron
Mallard Sedge wren		Tall, dense	Nesting Full season	Sandhill crane, bobolink, American bittern, Henslow's sparrow
Marbled godwit	Depressional wetlands	Shallow water, short/sparse to open shoreline vegetation Short to intermediate height grassland with <40% dead vegetation and average cover height 17 cm	Foraging	Virginia rail, sora, trumpeter swan, American bittern, least bittern, black tern, black-crowned night heron, pied-billed grebe
Mallard Blue-winged teal		Hemi-marsh, interspersed vegetation and open water, shallow	Breeding, brood rearing, molting	Waterfowl
Northern harrier Sedge wren		Tall, dense	Full season	Marsh wren, greater prairie-chicken
Mallard	Shallow lakes	Hemi-marsh, submerged vegetation	Molting, staging, and migration	Waterfowl, western grebe, Forster's tern, green heron, Virginia rail, sora, trumpeter swan, least bittern, black tern, black-crowned night heron, great egret, great blue heron, marsh wren

Threatened and Endangered Species

The Endangered Species Act (16 U.S.C. §§ 1531–1544, December 28, 1973, as amended 1976–1982, 1984 and 1988) designates the Service as the responsible agency through which the authority of the Endangered Species Act will be carried out. Section 7(a)(1) of the Act further requires all federal agencies and departments to use their authority in furtherance of the purposes of this Act by carrying out conservation programs for the benefit of endangered and threatened species.

To identify federally threatened or endangered species of relevance to Glacial Ridge NWR we reviewed:

- Federal Threatened and Endangered Species List
- Recovery Plans for federally listed species in the FWS Midwest Region

Poweshiek Skipperling

The endangered Poweshiek skipperlings (*Oarisma poweshiek*) are small butterflies most often found in remnants of native prairie in Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin and in fens in Michigan. This moth-like butterfly is closely tied to high quality remnant prairies in which critical habitat has been designated in Polk County but not on the refuge. Unfortunately, this skipperling may have been extirpated from the Dakotas, Minnesota, and Iowa within the last 10 years—an area that, until recently, contained the vast majority of the surviving populations. It is now known to exist only in Wisconsin, Michigan, and Manitoba. During surveys in 2014, the species could be found only at a few sites in a single Michigan county, in very limited numbers at one site in Wisconsin, and in Canada at the single Manitoba site.

Dakota Skipper

The threatened Dakota skipper *(Hesperia dacotae*) is a small butterfly that lives in high-quality mixed and tallgrass prairie. It has been extirpated from Illinois and Iowa and now occurs in remnants of native mixed and tallgrass prairie in Minnesota, the Dakotas, and southern Canada. Critical habitat exists in Polk County; however, critical habitat has not been designated on Glacial Ridge NWR. To recover the species, its remaining habitats must be managed with grazing, fire, or haying to maintain the diversity of native prairie plant species on which Dakota skipper relies. Unless implemented appropriately, however, these practices may also result in levels of mortality that are not sustainable, or they may degrade habitat conditions to the degree that the species is extirpated.

Western Prairie Fringed Orchid

The threatened western prairie fringed orchid (*Platanthera praeclara*) has been documented at several sites on the refuge. This orchid occurs most often in mesic to wet unplowed tallgrass prairies and meadows but it has also been found in old fields and roadside ditches. Threats to this species in the region include land conversion, competition with alien invaders, wetland destruction, intensive haying, fire suppression, and overgrazing.

Invasive Species

Non-native invasive plants are organisms that are introduced into a foreign ecosystem and that cause, or are likely to cause, harm to the economy, environment, or human health. These invaders are a major threat to the habitats of Glacial Ridge NWR, and currently, a host of invasive plants can be found at varying levels across the entire refuge. Executive Order 13112 (Invasive Species 1999) directs federal agencies to prevent introduction while detecting, rapidly responding to, and controlling new invasions in a cost effective and environmentally sound manner.

In the uplands of Glacial Ridge NWR, Canada thistle (*Cirsium arvense*) and plumeless thistle (*Carduus acanthoides*) are present only in young restorations and rarely pose a threat to the long-term quality of the uplands, although they are easily visible. Birdsfoot trefoil (*Lotus corniculatus*), crown vetch (*Securigera varia*), spotted knapweed (*Centaurea stoebe*), wild parsnip (*Pastinaca sativa*), leafy spurge (*Euphorbia esula*), and common tansy (*Tanacetum vulgare*) are problematic species for refuge staff as they are prolific seeders, have a long-lasting seedbank and are easily moved around by mowing or other means. Smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*) are problem exotic grass species common on refuge uplands.

Problematic invasives found in or near wetlands on the refuge include reed canary grass (*Phalaris arundinacea*), narrow-leaved cattail (*Typha angustifolia*) and hybrid cattail (*Typha x glauca*). Reed canary grass is extremely aggressive and forms dense monocultures, offering little habitat to wildlife seeking structural diversity. Hybrid cattail, an aggressive invasive emergent, forms dense stands when the correct hydrology is present and can become established during drawdowns or on the perimeter of wetland with permanent water.

People

Socioeconomic Setting

Glacial Ridge NWR is located in Polk County in northwestern Minnesota, east of Crookston, MN. According to the 2010 U.S. Census, the total population in Polk County was 31,600, which is about a 0.01 percent increase since the 2000 U.S. Census. The population is 93 percent from a European descent, primarily German and Norwegian, 5.4 percent Hispanic or Latino, and 1.4 percent Native American. Twenty percent of the population has attained a bachelor's degree or higher, and about 17 percent of the population is over the age of 65.

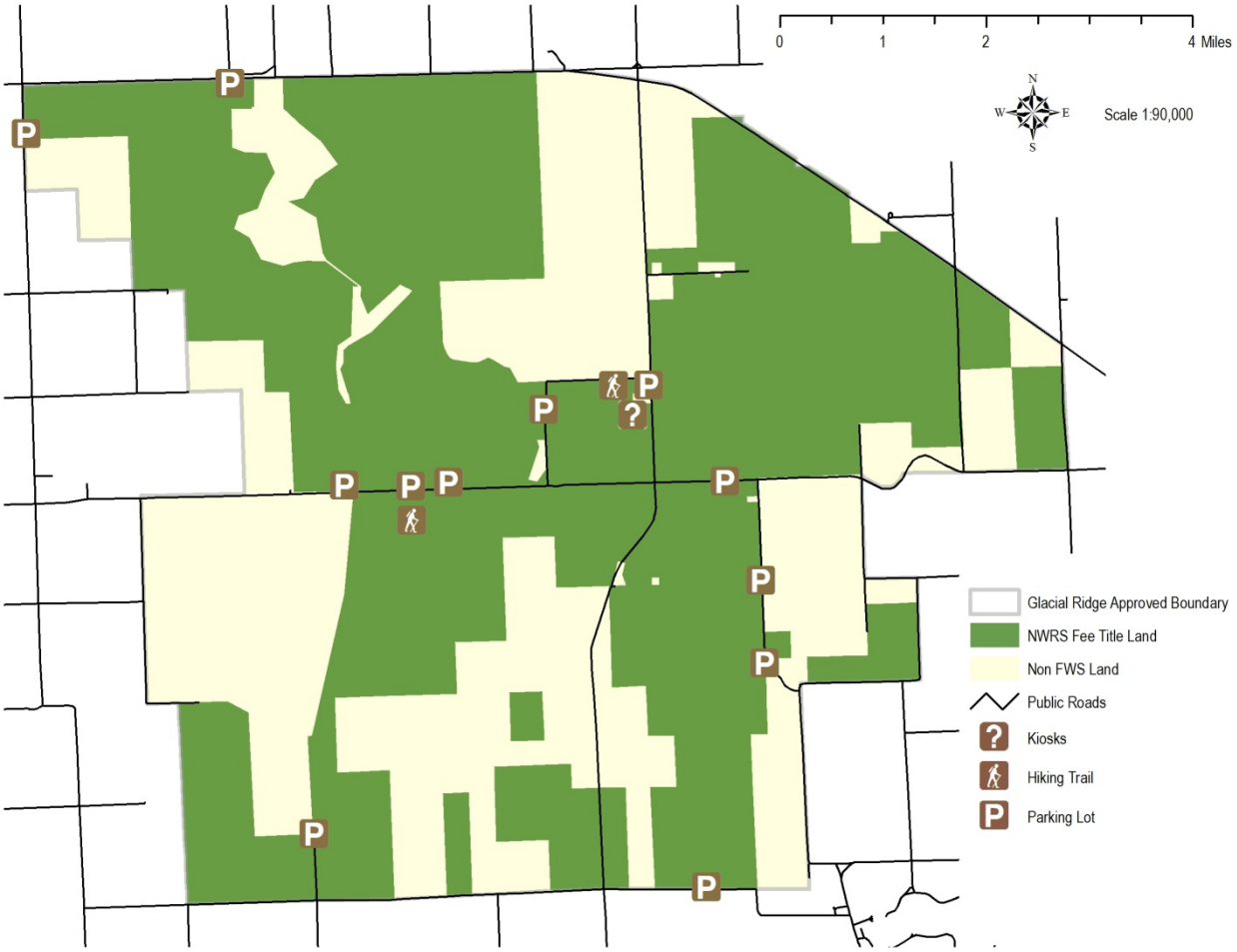
The median income in 2009 for Polk County was $43,731, which is lower than the state median. From 2000 to 2010 Polk County's unemployment rate increased from 4.8 percent to 5.7 percent. A total of 14,610 housing units exist in which 72.7 percent are owner occupied. Equipment manufacturing, crop farming, and wholesale trade are the major industries in Polk County. Polk county is highly ranked within the state of MN in terms of total value of agricultural goods sold. The major crops of Polk County include oilseed, sunflowers, small grains, sugar beet, corn, and soybean.

Visitor Services/Public Use

Facilities

A Service-owned visitor contact station is conveniently located off MN State Highway 32 where visitors can receive information about the refuge from an interpretive kiosk. Currently, Minnesota Department of Natural Resource staff is housed at this contact station, and refuge staff is not present on site. Other infrastructure, including wildlife observation blinds, accessible hunting blinds, and information panels are located throughout the refuge in close proximity to designated parking areas (Figure 3-6).

Figure 3-6: Current Visitor Facilities at Glacial Ridge NWR



Hunting

Glacial Ridge NWR is open to the hunting of white-tailed deer, waterfowl (ducks, geese, coots), other migratory birds (rails, snipe, woodcock, mourning doves), and upland game (prairie-chicken, sharp-tailed grouse) as compatible with the purpose for the establishment of the refuge and where appropriate, in concurrence with the State of Minnesota. Federal law generally prohibits the Service from opening over 40 percent of a national wildlife refuge (acquired with the approval of the Migratory Bird Conservation Commission) to migratory bird hunting. Hunting activities can only occur in designated areas identified in the Hunting Management Plan, which will be updated as needed. Hunter access parking lots are located at several convenient and safe locations where various information (maps, regulations) can be found. Accessible hunting blinds are available in two locations to make hunting accessible for hunters with mobility disabilities.

Fishing

The restored shallow wetland basins within the refuge are unsuitable to support consistent populations of game fish; therefore, this use is currently not permitted on the refuge.

Wildlife Observation and Photography

The combination of diverse wildlife and landscape beauty creates excellent wildlife observation and photography opportunities at several sites around the refuge. Minimally developed parking areas throughout the refuge offer visitors access points to the refuge while reducing the impact to the habitat and reducing the amount of annual maintenance. The refuge staff work with the local communities and private conservation groups to develop public wildlife celebrations and participate in citizen science projects like International Migratory Bird Day and the Christmas Bird Count. These events help build community awareness of the refuge while connecting people of all ages to the tallgrass prairie and wetland areas of the refuge.

Environmental Education

At the present time, Glacial Ridge NWR does not have an established environmental education program. Staff opportunistically provide programs that focus on understanding of the Northern Tallgrass Prairie ecosystem, the ecological significance of the area, and developing a life-long appreciation of prairie, wetlands, and associated biological diversity at off-refuge locations or Rydell NWR. These opportunities may include school field trips, guided tours, and classroom presentations.

Interpretation

National wildlife refuges across the country provide opportunities for visitors to make their own connections to the natural world. Glacial Ridge NWR has limited on-site interpretive facilities, and currently refuge staff are not present on-site. A kiosk and 1/2 mile walking trail located 3 1/4 miles south of U.S. Hwy 2 on MN State Highway 32, at the Glacial Ridge Project Headquarters, provides an introduction of the refuge and a starting point for other places to explore. The major themes for Glacial Ridge NWR include interpreting the tallgrass prairie ecosystem, the refuge's habitat restoration and management, and the refuge's place in the Refuge System. These themes are the core messages of the refuge's limited interpretive program and will be included in different forms of interpretive signs, leaflets, exhibits, and potentially staff or volunteer led programs and events.

Historic and Cultural Resources

As of September 26, 2000, Polk County contains six properties on the National Register of Historic Places, and all are historic period structures located in cities. European settlement of the Glacial Ridge area was slow and sparse compared to other regions of Minnesota. During the mid-19th century the study area was part of the historic Red River oxcart trail system. The oxcart trails were used by immigrants traveling between St. Paul, MN and the Selkirk Settlement near present day Winnipeg, Manitoba. The Woods (Pembina) Trail, a segment of the main route, traversed the west end of the study area (Minnesota Historical Society 1979). Despite such a limited data base, the assumption must be made that undiscovered prehistoric sites are likely, especially for the Woodland culture (500 BP to anno Domini [AD] 1650), as well as the sites of former buildings and structures. The Cheyenne tribe is the earliest historic period tribe in the area, replaced by the Ojibwa.

Cultural Resource Management

Cultural resources (archaeological sites, historic structures, and Native American traditional cultural properties) are important parts of the nation's heritage. The Service strives to preserve evidence of these human occupations, which can provide valuable information regarding interactions between individuals, as well as between early peoples and the natural environment. Protection of cultural resources is accomplished in conjunction with the Service's mandate to protect fish, wildlife, and plant resources.

The Service is charged with the responsibility, under Section 106 of the National Historic Preservation Act of 1966, of identifying historic properties (cultural resources that are potentially eligible for listing on the National Register of Historic Places) that may be affected by Service actions. The Service is also required to coordinate these actions with the State Historic Preservation Office, Native American tribal governments, local governments, and other interested parties. Cultural resource management in the Service is the responsibility of the Regional Director and is not delegated for the Section 106 process when historic properties could be affected by Service undertakings, for issuing archaeological permits, and for tribal involvement.

The Archaeological Resources Protection Act of 1979 (ARPA) Section 14 requires plans to survey lands and a schedule for surveying lands with "the most scientifically valuable archaeological resources." This Act also affords protection to all archeological and historic sites more than 100 years old (not just sites meeting the criteria for the National Register) on federal land and requires archeological investigations on federal land be performed in the public interest by qualified persons.

The Regional Historic Preservation Officer (RHPO) advises the Regional Director about procedures, compliance, and implementation of these and other cultural resource laws. The actual determinations relating to cultural resources are to be made by the RHPO for undertakings on Service fee title lands and for undertakings funded in whole or in part under the direct or indirect jurisdiction of the Service, including those carried out by or on behalf of the Service; those carried out with federal financial assistance; and those requiring a federal permit, license, or approval.

The responsibility of the refuge manager is to identify undertakings that could affect cultural resources and coordinate the subsequent review process as early as possible with the RHPO and state, tribal, and local officials. Also, the refuge manager assists the RHPO by protecting archeological sites and historic properties on Service managed and administered lands, by monitoring archaeological investigations by contractors and permittees, and by reporting ARPA violations.

Refuge Administration

Glacial Ridge NWR is managed by five permanent service staff stationed on Rydell NWR, located east of Mentor, MN. Both refuges are complexed with Detroit Lakes Wetland Management District, which is also responsible for the management of Hamden Slough NWR. The average budget the past five years for the Glacial Ridge and Rydell NWRs is about $700,000.

Refuge Support

The Friends of Rydell and Glacial Ridge Refuges Association, a not for profit refuge advocate group, has a long history with Rydell NWR and has recently adopted Glacial Ridge NWR. This association has the ability to reach out to the community for support and assistance for refuge projects and conservation issues. The Friends of Rydell and Glacial Ridge Refuges Association coordinates numerous events and projects throughout the year. Currently, the board consists of 10 members including a president, vice-president, treasurer, and secretary.

Partners play a critical role at Glacial Ridge NWR; photo: USFWS

Glacial Ridge NWR was established through a partnership of 30 non-profit organizations, universities, government and other agencies. Partners continue to play a critical role in the function and future of Glacial Ridge NWR. These partnerships will enable staff to accomplish goals that any one organization could not achieve alone. The objectives outlined in this CCP need the support and the partnerships of federal, state, and local agencies, non-governmental organizations, and individual citizens. This broad-based approach to managing fish and wildlife resources extends beyond social and political boundaries and requires a foundation of support from many. The refuge works with a wide variety of partners including but not limited to: The Nature Conservancy, Minnesota Department of Natural Resources, Minnesota Sharp-tailed Grouse Society, Natural Resources Conservation Service, Minnesota Pollution Control Agency, Ducks Unlimited, Audubon Minnesota, Minnesota Prairie Chicken Society, University of Minnesota – Crookston, Bemidji State University, University of North Dakota, and more. Many of these partners were instrumental in the initial establishment and restoration of the refuge. The staff at Glacial Ridge NWR will continue to seek creative partnership opportunities to achieve its vision for the future.

Chapter 4: Future Management Direction

In this chapter:

This chapter describes and compares three management alternatives for Glacial Ridge National Wildlife Refuge (NWR, refuge): the No Action Alternative, which is the continuation of the current management direction; and two action alternatives including Alternative B, the preferred alternative. Each of the three alternatives describes general management direction for the entire planning area. It is separate from site-specific direction, which is not part of this planning process, but which will occur in subsequent step-down management planning. The No Action Alternative is the baseline for analysis. The descriptions of the action alternatives as well as their environmental consequences are relative to those of the No Action Alternative. The preferred alternative is the one identified by the U.S. Fish and Wildlife Service (FWS, Service) as best meeting the purpose and need described in chapter 1.

Development of the Management Alternatives

Alternatives are different approaches or combinations of management objectives and strategies designed to achieve refuge purposes, the vision and goals identified in the Comprehensive Conservation Plan (CCP), and the mission and goals of the National Wildlife Refuge System (NWRS, Refuge System) and the Service. Alternatives are formulated to address the significant issues, concerns, and opportunities identified by the Service and by the public during the scoping period.

The three alternatives identified and evaluated represent different approaches to protecting, restoring, and managing refuge wildlife, plants, habitats, and other resources as well as compatible wildlife-dependent recreation. The planning team assessed the existing biological conditions and external relationships affecting the refuge. This information contributed to the development of refuge goals and, in turn, helped to formulate the alternatives.

Selecting the Preferred Alternative

In selecting a preferred alternative, we considered environmental, economic, and social factors and our ability to implement the actions necessary to accomplish the alternatives. We based our decision on how well each alternative met the goals of the refuge and the environmental consequences of each alternative. We selected Alternative B as our preferred alternative. Alternative B will fulfill our statutory mission and responsibilities, and we have adequate authority to implement it.

Alternative A: Current Direction (No Action)

The Council of Environmental Quality's regulations for implementing the National Environmental Policy Act require that all environmental assessments include the alternative of taking no action.

In the case of a CCP, no action means that the refuge will continue on the same path of management.

Current management is focused on providing a variety of upland and wetland habitats to benefit an array of migratory and resident wildlife species. Uplands are actively managed to benefit grassland-nesting birds and other wildlife.

Public use under current management is limited, with hunting being a priority visitor use. Efforts have recently been made to increase visitor use and interpretation through the construction of a one-half mile long walking trail and interpretive panel development at the Glacial Ridge Project Office.

The following are key elements of Alternative A:

- Control of noxious weed species is a priority.
- The primary upland management tool is prescribed fire. Limited grazing and tree removal activities also occur.
- Land acquisition from willing sellers occurs within the approved refuge acquisition boundary.
- Habitat restoration occurs on newly-acquired agricultural sites.
- Hunting is a priority use with two accessible waterfowl hunting blinds. Refuge visitors have one accessible walking trail near the Glacial Ridge Project Office.
- Partnerships are a key component of habitat management. Existing partnerships would be maintained, and new partnerships would be developed with a focus on high priority habitat and resource information needs.

Alternative B: Focused Habitat Management (Preferred)

Under this alternative, refuge management actions would approximate ecological processes that maintained native habitats prior to European settlement, emphasizing the use of multiple habitat disturbance regimes (e.g., fire, grazing, mowing). These actions would maintain and increase the diversity of native vegetation and wildlife communities that mimic pre-settlement conditions. Management activities would be “focused” via a refuge prioritization effort to maximize the intended impacts on priority units, given reduced refuge staff and funding.

Public use opportunities would continue with minimal changes. Staff time and funding would focus on improving opportunities for self-guided interpretation of refuge habitats and wildlife, using existing infrastructure (e.g., 13 parking lot kiosks).

The following are key elements of Alternative B:

- Active management would be focused on the highest priority habitat management units to emulate pre-European settlement conditions.
- Control of invasive species would focus on specific sites to protect native plant communities.

- Land acquisition from willing sellers would continue within the approved refuge acquisition boundary.
- Prairie and wetland restoration would continue on newly-acquired sites. The short-term use of genetically modified crops would be allowed in compliance with current FWS Midwest Region (Region 3) policy (see appendix H – Cooperative Farming Compatibility Determination).
- Existing partnerships would be maintained, and new partnerships would be developed with a focus on high priority habitat and resource information needs.
- Priority public use activities would focus on existing infrastructure and emphasize self-guided experiences.

Alternative C: Woody Vegetation Reduction Focus

The focus of Alternative C would be the reduction of invasive woody vegetation cover (e.g., willow, aspen) across the refuge landscape during the lifespan of this CCP. The extent of woody cover is increasing due to a lack of regular vegetative disturbance and other factors. Management actions would focus on refuge units exhibiting woody vegetation cover that exceeds the amount found prior to European settlement..

Public use opportunities would continue with minimal changes. Staff time and funding would focus on improving opportunities for self-guided interpretation of refuge habitats and wildlife, using existing infrastructure (e.g., 13 parking lot kiosks).

The following are key elements of Alternative C:

- Habitat management units determined to have greater woody vegetation cover, as compared to pre-settlement conditions, would receive management priority over other refuge units.
- Management units without woody vegetation issues would not be actively managed on a regular basis.
- Multiple management tools, including fire and cutting, would be used to meet objectives in priority areas.
- Land acquisition from willing sellers would continue within the approved refuge acquisition boundary.
- Prairie and wetland restoration would continue on newly-acquired sites. The short-term use of genetically modified crops would be allowed in compliance with current FWS Region 3 policy (see appendix H – Cooperative Farming Compatibility Determination).
- Existing partnerships would be maintained, and new partnerships would be developed with a focus on woody cover reduction and related information needs.
- Priority public use activities would focus on existing infrastructure and emphasize self-guided experiences.

Elements Common to All Alternatives

Since Glacial Ridge NWR is a relatively new refuge and in the early stages of development, a lot of the information that is needed to make management decisions has yet to be compiled. Therefore, many of the objectives for Glacial Ridge NWR will be to obtain this information to make informed decisions.

Although the alternatives differ in many ways, there are similarities as well. These common features are listed below to reduce the length and redundancy of the individual alternative descriptions.

- The Service would ensure that refuge management complies with all federal laws and regulations that provide direction for managing units of the Refuge System.
- No adjacent landowners would be adversely impacted by any action taken by the Service without a mutual agreement and adequate compensation.
- All alternatives would provide equal protection and management of cultural resources.

Description of the Alternatives

(A summary of actions by alternatives (Table 4-1) is located later in this section.)

Alternative A: Current Direction (No Action)

The Council of Environmental Quality's regulations for implementing the National Environmental Policy Act require that all environmental assessments include the alternative of taking no action. In the case of a CCP, no action means that the refuge will continue on the same path of management.

Current management is focused on providing a variety of upland and wetland habitats to benefit an array of migratory and resident wildlife species. Uplands are actively managed to benefit grassland-nesting birds and other wildlife.

Public use under current management is limited. Efforts have recently been made to increase visitor use and interpretation through the construction of a half-mile mile long walking trail and interpretive panel development at the Glacial Ridge Project Office.

The following are key elements of Alternative A:

- Control of noxious weed species is a priority.
- The primary upland management tool is prescribed fire. Limited grazing and tree removal activities also occur.
- Land acquisition from willing sellers occurs within the approved refuge acquisition boundary.
- Habitat restoration occurs on newly-acquired agricultural sites.
- Continued maintenance of the two accessible waterfowl hunting blinds. Refuge visitors have one accessible walking trail near the Glacial Ridge Project Office.

- Partnerships are a key component of habitat management. Existing partnerships would be maintained, and new partnerships would be developed with a focus on high priority habitat and resource information needs.

Alternative B: Focused Habitat Management (Preferred)

Under this alternative, refuge management actions would approximate ecological processes that maintained native habitats prior to European settlement, emphasizing the use of multiple habitat disturbance regimes (e.g., fire, grazing, mowing). These actions would maintain and increase the diversity of native vegetation and wildlife communities that mimic pre-settlement conditions. Management activities would be "focused" via a refuge prioritization effort to maximize the intended impacts on priority units, given reduced refuge staff and funding.

Public use opportunities would continue with minimal change. Staff time and funding would focus on improving opportunities for self-guided interpretation of refuge habitats and wildlife, using existing infrastructure (e.g., 13 parking lot kiosks).

The following are key elements of Alternative B:

- Active management would be focused on the highest priority habitat management units to emulate pre-European settlement conditions.
- Control of invasive species would focus on specific sites to protect native plant communities.
- Land acquisition from willing sellers would continue within the approved refuge acquisition boundary.
- Prairie and wetland restoration would continue on newly-acquired sites. The short-term use of genetically modified crops would be allowed in compliance with current FWS Region 3 policy (see appendix H – Cooperative Farming Compatibility Determination).
- Existing partnerships would be maintained, and new partnerships would be developed with a focus on high priority habitat and resource information needs.
- Priority public use activities would focus on existing infrastructure and emphasize self-guided experiences.

Alternative C: Woody Vegetation Reduction Focus

The focus of Alternative C would be the reduction of invasive woody vegetation cover (e.g., willow, aspen) across the refuge landscape during the lifespan of this CCP. The extent of woody cover is increasing due to a lack of regular vegetative disturbance and other factors. Management actions would focus on refuge units exhibiting woody vegetation cover that exceeds the amount found prior to European settlement.

Public use opportunities would continue with minimal change. Staff time and funding would focus on improving opportunities for self-guided interpretation of refuge habitats and wildlife, using existing infrastructure (e.g., 13 parking lot kiosks).

The following are key elements of Alternative C:

- Habitat management units determined to have greater woody vegetation cover, as compared to pre-settlement conditions, would receive management priority over other refuge units.
- Management units without woody vegetation issues would not be actively managed on a regular basis.
- Multiple management tools, including fire and cutting, would be used to meet objectives in priority areas.
- Land acquisition from willing sellers would continue within the approved refuge acquisition boundary.
- Prairie and wetland restoration would continue on newly-acquired sites. The short-term use of genetically modified crops would be allowed in compliance with current FWS Region 3 policy (see appendix H – Cooperative Farming Compatibility Determination).
- Existing partnerships would be maintained, and new partnerships would be developed with a focus on woody cover reduction and related information needs.
- Priority public use activities would focus on existing infrastructure and emphasize self-guided experiences.

Table 4-1: Summary of Actions by Alternative

Issue/Topic	**Alternative A** Current Direction (No Action)	**Alternative B** Focused Habitat Management	**Alternative C** Woody Vegetation Reduction Focus
WILDLIFE AND HABITAT			
Wetlands	Continue to restore drained wetlands.	Same as Alternative A.	Same as Alternative A.
Prairies	Convert acquired cropland to native prairie vegetation. Prescribed fire in spring is primary tool for upland habitat management.	Same as Alternative A with emphasis on the highest priority habitat management units to emulate pre-European settlement conditions.	Convert cropland to native prairie vegetation. Habitat management units determined to have greater woody vegetation cover, as compared to pre-settlement conditions, would receive management priority over other refuge units.
Control of Invasive Plant Species	Control of noxious weed species is a priority and is completed based on staff observation of need.	Focus on highest priority habitat management units to emulate pre-European settlement conditions.	Habitat management units determined to have greater invasive woody vegetation cover, as compared to pre-settlement conditions, would receive management priority over other refuge units.
PEOPLE			
Welcome and orient visitors	Continue to provide current leaflets, directional signs, kiosks, and website.	Continue to provide current leaflets, directional signs, kiosks, and website. Staff time and funding would focus on improving opportunities for self-guided interpretation of refuge habitats and wildlife, using existing infrastructure (e.g., 13 parking lot kiosks).	Same as Alternative B.
Hunting	Refuge is open to the hunting of white-tailed deer, waterfowl (ducks, geese and coots), other migratory birds (rails, snipe, woodcock, mourning doves) and upland game (prairie-chicken and sharp-tailed grouse).	Develop annual youth hunting program and investigate the adoption of state hunting rules and regulations on the refuge.	Same as Alternative B.
Wildlife observation and photography	Maintain existing facilities including parking areas and Project Office trail. Refuge is open from sunrise to sunset.	Same as Alternative A.	Same as Alternative A.
Environmental education and interpretation	Work with local schools and organizations by request when staff is available.	Continue current environmental education programs. Continue current interpretive events. Expand opportunities for self-guided interpretation.	Same as Alternative B.

Issue/Topic	**Alternative A** Current Direction (No Action)	**Alternative B** Focused Habitat Management	**Alternative C** Woody Vegetation Reduction Focus
Outreach	Continue current level of outreach to off-site audiences including community group presentations by request, news releases for special events, and participation in local community events.	Continue current outreach activities and expand when resources allow.	Same as Alternative B.
Volunteers and community partnerships	Existing partnerships would be maintained, and new partnerships would be developed with a focus on high priority habitat and resource information needs.	Same as Alternative A.	Existing partnerships would be maintained, and new partnerships would be developed with a focus on woody cover reduction and related information needs.

Environmental Consequences

Effects Common to All Alternatives

(A summary of impacts by alternative (Table 4-2) is located later in this section.)

Air Quality

None of the management alternatives would have appreciable, long-term impacts on ambient air quality conditions in the area. Habitat management involving prescribed fire would occur under each alternative, but prescribed fire would be used only under ideal weather conditions. Approved smoke management practices developed by state and federal land management agencies would be implemented in all burning events. Nevertheless, under each alternative there would be some potential for temporary air quality impacts from smoke in areas near the refuge.

Actions to manage smoke include altering ignition techniques and sequence, halting ignition, suppressing the fire, use of local law enforcement as traffic control, and roadway signs. Burning will be done only on days that the smoke will not be blown across nearby communities and/or refuge neighbors or when the wind is sufficient as not to cause heavy concentrations. The Annual Prescribed Fire Plan for each unit will have specific mitigation measures to deal with unexpected smoke management problems. Refuge staff will work with neighboring agencies and in consultation with Minnesota air quality personnel to address smoke issues that require additional mitigation.

Environmental Justice

Executive Order 12898 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” was signed by President Bill Clinton on February 11, 1994, to focus federal attention 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 program, 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 communities with access to public information and participation in matters relating to human health or the environment.

None of the alternatives described in this Environmental Assessment (EA) will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low-income populations. Public use activities that would be offered under each of the alternatives would be available to any visitor regardless of race, ethnicity, or income level.

Cultural Resources

The Service is responsible for managing archaeological and historic sites found on refuges. Under each of the alternatives evaluated in this EA, refuge management would ensure compliance with relevant federal laws and regulations, particularly Section 106 of the National Historic Preservation Act. Prior to all habitat and facility projects, appropriate efforts will be

made to identify and protect cultural resources within the area of potential impact by contacting the Regional Historic Preservation Officer for project review.

Climate Change

The U.S. Department of the Interior issued an order in January 2001 requiring federal agencies under its direction that have land management responsibilities to consider potential climate change impacts as part of long-range planning endeavors. Some potential impacts of climate change on the prairie pothole ecosystem in Minnesota have been identified that may need to be considered and addressed in the future. For example:

- If climate conditions continue to be warmer and wetter in the Glacial Ridge NWA area, more water may enter the refuge, resulting in decreased water quality and increased sedimentation in wetland habitats. Downstream flooding and nutrient loading could be exacerbated unless regional land use changes and water discharge/runoff could be mediated.
- More frequent drought conditions in the western portion of the Prairie Pothole Region (PPR) could shift waterfowl use eastward, making habitat restoration in the eastern portion of the PPR (including Glacial Ridge NWR) even more important for waterfowl populations.
- Many plant and animal communities may change as species' ranges shift due to changes in climate, with less-adaptable species becoming threatened by the changing conditions and more-tolerant species moving in to take their place. Invasive non-native species often are tolerant to changing conditions and may out-compete native plants for resources.

Managers and resource specialists on the refuge need to be aware of the potential effects of climate change. When feasible, documenting long-term vegetation, wildlife, and hydrologic changes should become a part of research and monitoring programs. Adjustments in management direction may be necessary over time to adapt to a changing climate.

Carbon Sequestration

Increased carbon dioxide in the atmosphere has been linked to global climate change. In relation to comprehensive conservation planning for refuges, carbon sequestration is one of the primary climate-related management strategies that can be considered despite uncertainty surrounding site-specific climate change effects. The U.S. Department of Energy (USDOE 1999) defines carbon sequestration as " . . . the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

Vegetation is an important factor in global carbon sequestration. Both wetlands and grasslands have been shown to be carbon sinks, capturing and storing carbon, thereby removing a portion of the atmospheric carbon dioxide. The USDOE report notes that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere.

Prescribed burning releases carbon dioxide directly to the atmosphere from plants consumed during combustion. However, new vegetation quickly replaces the burned vegetation and, over multiple years of burns, an increasing root network develops below the soil surface in prairies,

effectively capturing large quantities of carbon. No net decrease in the amount of carbon sequestered on the refuge will occur due to prescribed burning. Restoration of uplands and wetlands previously cleared for agriculture will increase the total quantity of sequestered carbon on the refuge under all alternatives. All alternatives would result in increased carbon storage due to continuing land acquisition and restoration. Grasses and forbs characteristic of the refuge ecosystem are effective at capturing and storing carbon both above and below the ground.

Table 4-2: Summary of Impacts by Alternative

Issues	**Alternative A** Current Direction (No Action)	**Alternative B** Focused Habitat Management (Preferred)	**Alternative C** Woody Vegetation Reduction Focus
HABITAT AND WILDLIFE			
Wetland	Small increase in acreage. Stable plant diversity. Stable wetland wildlife habitat.	Same as Alternative A.	Same as Alternative A.
Prairie	Stable or small increase in acreage. Stable plant diversity. Stable habitat structure.	Some increase in acreage. Increase in plant diversity. Some increase in structural habitat diversity.	Some increase in acreage. Increased plant diversity Significant increase in structural habitat diversity.
Undesired Woody Vegetation	Increase in acreage.	Stable or slightly decreased.	Decreased in acreage.
Water quantity and quality	Little or no change.	Improved.	Improved.
Waterfowl populations	Stable or small increase.	Same as Alternative A.	Same as Alternative A.
Grassland bird populations	Stable or small increase.	Same as Alternative A.	Increased.
PEOPLE			
Hunting	Stable opportunities. No program changes.	Increase opportunities for hunting according to state regulations/seasons.	Same as Alternative B.
Wildlife observation opportunities	Stable.	Some increases with future habitat conversions.	Same as Alternative B.
Quality of environmental education and interpretation	Stable	Increase in self-guided interpretation.	Same as Alternative B.
Visitor contact facilities and signage	Stable onsite with Rydell NWR headquarters as primary contact station.	Same as Alternative A.	Same as Alternative A.

Appendix A: Implementation of the Preferred Alternative

In this appendix:

The purpose of this appendix is to make it easier for the reader to understand the preferred alternative and what would be required to implement it. U.S. Fish and Wildlife Service (FWS, Service) policy directs that certain elements be included in a Comprehensive Conservation Plan (CCP). Most of those elements are included in the Environmental Assessment / Comprehensive Conservation Plan/ (EA/ CCP). Elements dealing with the implementation of the plan, not included in the EA/ CCP, are included in this appendix. Following public review and comment of the EA/ CCP, we will produce a stand-alone CCP that draws on much of the information in the EA.

GOAL 1: Habitat and Wildlife

Protect, restore, and manage the unique prairie-wetland habitats found within Glacial Ridge National Wildlife Refuge (NWR, refuge) using a variety of strategies to emulate the ecological processes and native plant communities that once existed across the Agassiz Beach Ridge landscape. The above conservation actions will result in a diversity of resilient tallgrass prairie and wetland habitats for the benefit of migratory birds, threatened and endangered species, and other native wildlife.

Objective 1-1: Prioritize management unit needs through a peer-developed ranking system assessing biological integrity, connectivity, and value to priority species within three years of plan approval. Review prioritization rankings on an annual basis while incorporating recent land acquisitions.

Strategies

a. Develop a Habitat Management Plan to further guide management direction and set annual habitat work plans.
b. Complete a native plant community inventory throughout the refuge.
c. Conduct baseline wildlife surveys to assess diversity and identify species of concern.
d. Create a centralized management unit database to store biologically relevant information for each management unit.
e. Inventory baseline habitat and wildlife data while establishing a comprehensive monitoring framework for management units.
f. Develop an adaptive ranking model to provide support for refuge management actions.
g. Use model rankings to develop annual refuge work plans to assist with management prioritization.

h. Create detailed management action reports while including future monitoring actions into a centralized database.

i. Acquire/review high resolution Light Detection And Ranging (LiDAR) to aid in planning and restoration efforts.

j. Investigate new technologies (unmanned aerial vehicles, thermal imaging) to acquire and monitor habitat needs and wildlife population trends.

k. Develop an Inventory and Monitoring Plan for the refuge.

Rationale

Baseline biotic and abiotic information is the foundation of information required for credible long-term refuge planning and management. An integrated effort to collect baseline data will fill critical information gaps and will help managers prioritize and evaluate the effectiveness of annual conservation strategies while reducing uncertainties. A defensible prioritization plan will assist staff in making informed management decisions while maintaining a high level of efficiency during times of limited staff and resources. Glacial Ridge NWR was created through the success of partnerships; therefore, continuing this effort and including stakeholders throughout the process will allow transparency and collaboration on management efforts.

Objective 1-2: Over the next five years, contact all private individuals who own land within Glacial Ridge NWR's acquisition boundary to gauge their interest in selling these lands to the Service.

Strategies

a. Contact private landowners, either in-person or in written form (e.g., for absentee landowners) to gauge their interest in for future land purchase.

b. Hold a meeting/forum annually for landowners located within the acquisition area to promote transparency on land management activities and reinforce that land will only be purchased from willing sellers.

c. Develop partnerships in the communities to facilitate communication and promote a positive public image.

Rationale

A number of privately held inholdings are present within the acquisition area of Glacial Ridge NWR. Inholdings can fragment habitats, be a source of invasive species, and be problematic for management actions due to irregular boundaries. In order to make positive steps in land acquisition, refuge staff must foster a positive relationship with landowners as well as the communities in order to build support for future acquisitions.

Objective 1-3: Manage and enhance fen habitat (according to the Field Guide to the Native Plant Communities of Minnesota; Minnesota Department of Natural Resources [MNDNR] 2005b) on a minimum of 25 percent of the high priority management units throughout the life of the CCP.

Strategies

a. Inventory known fen locations refuge wide in order to effectively prioritize management, enhancement, and restoration needs.

b. Identify high quality fen locations to use as reference sites for future restorations.

c. Compile and prioritize invasive species treatment needs on all identified fens located on Glacial Ridge NWR.

d. Maintain or restore hydrologic function in high priority management units.

e. Develop a fen inventory protocol with identifying metrics to aid in future inventory, management, enhancement, and restoration.

Rationale

The existence and maintenance of fens almost entirely depend upon the hydrologic function that forms in thick peat soil fed by groundwater. The rich peat fens of Glacial Ridge NWR contain primarily bog birch in addition to an abundance of herbaceous species and mosses. Fens were likely grazed by large herbivores as were the other natural communities comprising the tallgrass prairie. In fens, soil compaction is an issue in areas where concentrated cattle herds replaced bison and elk herds. Agriculture, with altered hydrology, pollution, and the installation of tile lines and ditches has threatened the integrity of fens at Glacial Ridge NWR. Development, fire suppression, and the invasion of exotic species like reed canary grass and purple loosestrife continue to affect the quality and subsistence of fens resulting in very little habitat representation across the refuge.

Objective 1-4: Protect known populations of the western prairie fringed orchid while increasing the overall population on the refuge by 10 percent over the life of the CCP.

Strategies

a. Continue refuge-scale inventory to identify unknown populations or areas where suitable habitat may exist to aid in the repatriation of populations.

b. Place a higher model weight on threatened and endangered species in the refuge prioritization model to focus limited resources on areas critical to the survival of the western prairie fringed orchid.

c. Limit prescribed fire once prairie fringed orchids emerge from the soil on management units where known populations exist. This will be potentially in early–mid April, but it will need to be adjusted annually.

d. Schedule prescribed grazing activities on management units where the western prairie fringed orchid is known to occur before or after periods when the plant is most susceptible (June 1–September 15).

e. Control invasive species in fen habitats using a variety of herbicide mixes that have been proven to not harm populations of the western prairie fringed orchid.

f. Provide private landowners within the acquisition area of Glacial Ridge NWR information on the best management practices of the western prairie fringed orchid including land conversion, overgrazing, intensive hay mowing, drainage, woody encroachment, and

herbicide use to aid populations that may exist outside the boundary of Glacial Ridge NWR.

g. Prioritize land acquisition efforts on parcels that contain populations or suitable habitat for the western prairie fringed orchid.

Rationale

The western prairie fringed orchid was classified as threatened under the Endangered Species Act of 1973 and is known to occur in 41 counties of 6 states, in addition to a population in Manitoba (FWS 2009). Historically, populations of the western prairie fringed orchid decreased largely due to the conversion its preferred habitats of unplowed, calcareous prairies and sedge meadows to cropland (FWS 2009). Today, populations are also threatened by overgrazing, intensive haying, invasive species, drainage, and herbicide/pesticide use. Therefore, the refuge staff will evaluate management options on an annual basis to incorporate new research management in order to effectively manage the population.

Objective 1-5: Restore 173 acres of wetlands over the life of the CCP, to provide suitable habitat for focal species, such as blue-winged teal, marbled godwits, mallards, and sedge wrens. This acreage represents 50 percent of the total acres of wetlands indicated as being "restorable" on all private land within the Glacial Ridge NWR acquisition boundary (Polk Co. Restorable Wetland Inventory [RWI], FWS Habitat and Population Evaluation Team).

Strategies

a. Assess historic wetland condition, and identify reference sites on Glacial Ridge NWR.

b. Complete a hydro geomorphic analysis to effectively evaluate the wetland ecosystem.

c. Use wetland restoration strategies that require minimal maintenance.

d. Prioritize wetland restoration in all refuge management units.

e. Cost-share restoration efforts whenever possible with partners or adjacent landowners.

f. Coordinate restorations with adjacent landowners to ensure that project outcomes will not alter water resources/hydrology on privately held land, without their concurrence.

g. Ground-truth the condition of wetland basins indicated as being "restorable" in the Polk Co. RWI, either as land is acquired by the Service or on private land where landowners are willing to work with the Service's Partners for Fish and Wildlife Program.

Rationale

Depressional wetlands were a dominant feature of the tallgrass prairie landscape of western Minnesota prior to European settlement. However, presently throughout much of Minnesota, fewer than 10 percent of the original wetlands still exist (Dahl 2011). The other 90 percent has been drained or filled, largely to facilitate intensive agricultural production. Consequences of this loss of aquatic habitats are widespread, including the loss of habitat critical for wetland-dependent wildlife, as well as impacts to water quality and flood attenuation capabilities on a watershed scale.

The majority of temporary and seasonal wetlands within what is now Glacial Ridge NWR were drained via surface ditches or subsurface drain tile prior to the land being acquired by The Nature Conservancy (TNC) in 2000. TNC and the Natural Resources Conservation Service partnered to accomplish widespread wetland restorations throughout this area, prior to the land ownership transfer to the Service.

As we acquire private land within the Glacial Ridge NWR acquisition boundary, refuge staff will complete the necessary wetland restorations in order to further provide multiple natural resource and socioeconomic benefits to the area. Continuing to restore wetlands, as opportunity exists within the refuge's acquisition boundary, will ultimately help to restore some level of hydrological function on a watershed scale, in addition to providing important habitat to multiple focal wildlife species identified in this CCP.

Objective 1-6: Reduce populations of invasive cattail (*Typha angustifolia* and *Typha x glauca*) and reed canary grass (*Phalaris arundinacea*) by 10 percent in seasonal/temporary wetlands located in 50 percent of the high priority management units, over the life of this CCP.

Strategies

a. Assess invasive species cover and diversity in each wetland.
b. Use a combination of prescribed fire, grazing, mechanical and chemical treatments, and native plantings to reduce invasive coverage and restore wetlands to the desired species composition and structure.
c. Investigate alternative methods for non-native and hybrid cattail and reed canary grass removal and control.
d. Monitor the success of management actions through collaboratively developed protocols or remote sensors.
e. Maintain transparency with partners on proposed treatment cycles while developing collaborative management efforts on a large scale.
f. Educate private landowners on adjacent tracts about the threat of invasive species and programs to aid in the control of invasive species to help prevent the spread of invasives on refuge lands.

Rationale

Invasive cattail and reed canary grass are highly adaptable, spread quickly, and form dense litter mats that restrict wildlife use. A multi-faceted management approach has been successful in reducing populations on localized scales. Shifting this success to the landscape scale has been difficult due to management costs, repetitive treatment requirements, and the high rate of spread of these species. Prioritizing management unit needs while utilizing an adaptive framework for control will help managers determine the quality and success of actions to reduce these invasive populations through extended time frames.

Objective 1-7: Provide between 30–70 percent coverage of emergent vegetation on semi-permanent wetlands within the refuge on average, over 10 of the 15 years to provide for a variety of migratory and breeding waterbird species.

Strategies

a. Estimate percent coverage of emergent vegetation through either visual estimation or GIS-area determination using available aerial imagery.

b. Reduce extent of emergent vegetation through a combination of tools, including chemical application, prescribed fire, grazing, mashing, mowing, and haying.

c. On wetlands with some level of water management capability, manipulate water levels in order to promote the desired vegetative response.

Rationale

Previous research has indicated that wetlands with an approximate 50:50 ratio of open water and emergent vegetation (e.g., cattails, bulrushes), often termed “hemi-marshes,” attract the highest densities and diversity of wetland birds (Weller and Spatcher 1965). Wetland birds that utilize Glacial Ridge NWR and find hemi-marsh conditions favorable include various waterfowl and shorebird species, herons, terns, blackbirds, and cranes. Refuge staff anticipate being able to achieve open water to emergent vegetation ratios close to the 50:50 ratio (i.e., 30:70 ratio, 70:30 ratio) as recommended by Weller and Spatcher (1965), in most years (approximately 10 of 15), through targeted vegetation management. Because of the dynamics involved with prairie-wetland conditions over time, in certain years the coverage of emergent wetland vegetation may fall well outside of our target range (30–70 percent coverage). During periods of extreme drought, cover of wetland emergents may exceed the upper-end target of 70 percent, whereas during extremely wet periods, refuge wetlands may revert to a more open water state, supporting far less than 30 percent coverage of emergent vegetation.

Objective 1-8: Restore new acquisitions in the refuge uplands within five years. Strive to achieve 75 percent comparability to the native plant communities in 50 percent of the restorations, within 10 years of each initial seeding effort—as described in the Field Guide to the Native Plant Communities of Minnesota (MNDNR 2005b).

Strategies

a. Identify remnant prairie reference sites to create restoration seed lists.

b. Use local ecotype seeds for tallgrass prairie restoration efforts.

c. Follow best restoration practices while annually incorporating new research and techniques.

d. Use a farming cooperator to prepare seedbed, if applicable, with traditional or genetically modified crops as outlined in the compatibility determination for cooperative farming (see appendix H – Cooperative Farming Compatibility Determination).

e. Include stakeholders throughout the design and restoration phase.

f. Cost-share restoration efforts whenever possible.

Rationale

An estimated 98 percent of the tallgrass prairie and 90 percent of the wetlands have vanished from the Prairie Pothole Region of Minnesota that once existed prior to settlement (Minnesota

Prairie Plan Working Group 2011). Grassland obligate species have exhibited sharp declines throughout their respective ranges, likely due to the drastic reduction in available habitat. It is of the utmost importance that the remaining habitat be protected, enhanced, or restored in an effort to mitigate these population declines. The remnant prairies and wetlands of Glacial Ridge NWR contain a number of regional priority species, in addition to some of the largest remaining populations of the federally threatened western prairie fringed orchid.

Objective 1-9: Reduce the frequency of occurrence of exotic cool-season grasses (e.g., smooth brome, Kentucky bluegrass) by five percent, over a 15-year period on 50 percent of all refuge upland acres. Correspondingly, increase the frequency of occurrence of both cool- and warm-season native grasses (e.g., little bluestem, porcupine grass, Junegrass) by five percent over the same timeframe on the same acreage.

Strategies

a. Collect baseline inventory data on the occupancy of cool-season grasses and prioritize management actions to mitigate the rate of spread.
b. Manage refuge units with prescribed fire, grazing, mowing, haying, chemical, or some combination of these actions.
c. Interseed (no till) a mix of cool- and warm-season native grass seed.
d. Monitor change over time by collecting, analyzing, and evaluating monitoring data collected from collaboratively developed protocols.

Rationale

Prairies throughout North America continue to decline in quality and quantity, due in part to invasion by exotic plant species (Samson and Knopf 1994, Bragg and Steuter 1995). Many areas of native and reconstructed prairie on the refuge have been heavily invaded by several exotic cool-season grass species, primarily smooth brome and Kentucky bluegrass. Numerous scientific studies suggest that a number of grassland-dependent birds, including marbled godwits, upland sandpipers, and western meadowlark, favor areas dominated by native vegetation (Lindmeier 1960, Fairfield 1968, Owens and Myres 1973, Maher 1974, Stewart 1975, Kaiser 1979, Ryan 1982, Faanes 1983, White 1983, Ryan et al. 1984, Wilson and Belcher 1989, Kantrud and Higgins 1992, Dhol et al. 1994, Anstey et al. 1995, Skeel et al. 1995, Prescott and Murphy 1996, Davis and Duncan 1999). Johnson and Igl (2001) consider the degradation of remaining grassland areas in the northern Great Plains, due to inadequate or improper management, as one of the principal factors in the declining populations of numerous grassland bird species.

Objective 1-10: Reduce the total acreage of noxious weeds (e.g., leafy spurge, spotted knapweed, crown vetch) by a total of 10 percent, over a 15-year period in 50 percent of high priority refuge units.

Strategies

a. Complete refuge-wide inventory of invasive species, assessing the cover and diversity throughout each management unit.

b. Adopt the idea of early detection and rapid response for new or highly noxious invasive species.

c. Assign a larger weight to management units where highly noxious invasive species have been detected in the management prioritization model.

d. Coordinate with partners on assessing the severity of new invasions while developing a simple framework for a coordinated response.

e. Treat invasives using best management practices with or a combination of chemical, mechanical, or biological applications.

f. Use prescribed fire to treat areas infested with invasive species to prepare the site for other control practices (e.g., biological control agents, chemical control).

g. Investigate new or alternative biological control agents, and release when appropriate (e.g., leafy spurge flea beetles).

h. Monitor change over time utilizing a variety monitoring methods or protocols that have been collaboratively developed with partners or through project initiatives for vegetation monitoring (e.g., Grassland Monitoring Team, Native Prairie Adaptive Management, or the Prairie Reconstruction Initiative).

Rationale

Invasive species are one of the biggest threats to lands in the National Wildlife Refuge System. The current distribution of invasives on a refuge scale is unknown at this point, which creates uncertainties in regard to treatment prioritization and early detection and rapid response. In order to maintain a healthy prairie community, the spread of invasive species must be stopped while significant effort is made to reduce invasive populations in high quality prairie sites.

Objective 1-11: Restore and maintain savanna habitat by the removal of at least 50 percent of species not commonly found within the overstory and midstory of the savanna community as described in the Field Guide to the Native Plant Communities of Minnesota (MNDNR 2005b), over the life of the CCP.

Strategies

a. Use a combination of prescribed fire, grazing, chemical, mechanical, and biological management actions to reach the desired understory community and structure.

b. Alter the forest overstory on current refuge lands and future acquisitions through logging activities to restore the desired canopy cover.

c. Create sub-management units, where required, to implement unique fire-return intervals and other management activities to promote the regeneration of oak seedlings.

d. Plant tree seedlings at savanna restoration sites that exhibit low species diversity using species that have been identified at reference locations or species listed in the Field Guide to the Native Plant Communities of Minnesota (MNDNR 2005b).

e. Investigate and use other timber stand improvement techniques such as cull tree removal, sanitation cutting, and release to improve the quality of the savanna.

Rationale

Savannas, typically located in the prairie-forest transition zone, now only occur in a fraction of the historical range in North America. The east side of Glacial Ridge NWR supported savanna habitat in areas that received periodic fires, which promoted the oak dominated community. Fire was highly important in the development and maintenance of this community, which has been widely suppressed since European settlement. The lack of frequent fires, in addition to invasive species, timber harvest, agriculture, overgrazing, habitat fragmentation, and development, have severely degraded the few remaining savanna sites.

Objective 1-12: On 75 percent of high priority refuge units, decrease the woody vegetation (tall brush, trees) by a minimum of 15 percent over the life of the CCP.

Strategies

a. Assess woody encroachment on a refuge scale while incorporating this data into the overall prioritization model.
b. Use a variety of disturbance techniques including fire, grazing, mechanical, and chemical treatments to meet desired habitat structure and species composition objectives.
c. Manage all units with appropriate herbicides to minimize damage to the prairie community.
d. Mow woody vegetation with a variety of heavy equipment, with a temporal focus that minimizes impacts to nesting birds and sod disturbance. Areas that are mowed will typically receive follow-up management (e.g., fire, grazing, chemical) as part of a tiered management approach to reducing woody vegetation.
e. Monitor change over time by collecting, analyzing, and evaluating data collected from collaboratively developed protocols or remote sensors.
f. Develop and pilot a framework for prescribed fire monitoring to test and evaluate conditions for maximum woody vegetation control.
g. Coordinate with partners identified in the Minnesota Prairie Landscape Conservation Plan on management strategies and activities.

Rationale

In addition to the negative effects on the biodiversity of native prairie caused by the invasion of exotic grasses (e.g., smooth brome, Kentucky bluegrass) and forbs (e.g., leafy spurge), expansion of native woody vegetation (e.g., willow, aspen) has occurred over time since European settlement and the subsequent loss or misapplication of historical ecological disturbance regimes (e.g., fire, herbivory). Extirpation of bison and wildfire suppression are factors that have been tied to expansion of woody vegetation (Samson and Knopf 1994). Multiple studies have documented the negative effects of woody cover to multiple bird species of importance on the refuge, including the bobolink (Johnson and Temple 1986, Helzer 1996, Sample 1989, Bollinger and Gavin 1992, Madden 1996), grasshopper sparrow (Johnson and Odum 1956, Smith 1963, Bent 1968, Wiens 1969, Wiens 1970, Kahl et al. 1985), marbled godwit (Renken and Dinsmore 1987), upland sandpiper (Buss and Hawkins 1939, Rotenberry and Wiens 1980, Renken 1983, Skinner et al. 1984, Sample 1989, Kantrud and Higgins 1992,

Hull et al, 1996), and western meadowlark (Sample 1989, George and McEwen 1991, Kimmel et al. 1992, Anstey et al. 1995, Hull et al. 1996, Madden 1996). Additionally, Arnold and Higgins (1986) found that brown-headed cowbirds, which are obligate nest parasites (Johnsgard 1979), were one of the most abundant species in woody study sites.

Objective 1-13: Maintain a minimum of 35 percent of all upland acres in a high visual obstruction reading (VOR) category (>8 inches; Robel et al. 1970), a minimum of 25 percent in a medium VOR category (4–8 inches), and a minimum of 10 in a low VOR category (<4 inches).

Strategies

a. Manage units or portions of units with prescribed fire, grazing, or a combination of both.
b. Manage units with a rotational herbicide disturbance regime, where applicable, to remove noxious or unwanted species.
c. Measure VOR using a methodology outlined in protocols developed by the Grassland Management Team (Grant 2004), Native Prairie Adaptive Management, or the Prairie Reconstruction Initiative.
d. Measure VOR annually, for a period of 15 years, at a representative sample of high priority management units

Rationale

The structure of idled vegetation is extremely important for waterfowl and a number of other grassland nesting birds (Naugle et al. 1999). According to Robel et al. (1970), vegetative species composition alone does not typically provide all of the information necessary to appraise the habitat potential of a grassland. Further, Emlen (1977) suggested that vegetative density and screening efficiency were at least as important as species composition in describing avian habitats. This is particularly true for birds that are vegetative species generalists, such as upland nesting ducks. Sample and Mossman (1997) suggest that diversity of structure (and cover types) should be promoted at a variety of landscape scales, and that the structural diversity should be achieved by planting and managing for a diverse plant community.

Objective 1-14: Within three years, work with the Habitat and Population Evaluation Team (HAPET) office to create a step down management plan for the Prairie Pothole Joint Venture Waterfowl Implementation Plan (2005) population targets specific to Glacial Ridge NWR. Once refuge-specific target populations have been identified, ensure that population levels meet or exceed target population goals in at least 50 percent of the years, over the life of this CCP.

Strategies

a. In cooperation with HAPET, investigate waterfowl use on Glacial Ridge NWR to collect baseline population levels.
b. Acquire land from willing sellers to perpetually protect habitat for waterfowl conservation.
c. Develop a systematic approach to wetland restoration to increase available habitat on the refuge scale.
d. Manage and restore upland habitat to high quality native tallgrass prairie.

e. Work with partners and adjacent landowners to develop a collaborative approach for water management and prairie conservation, where applicable.

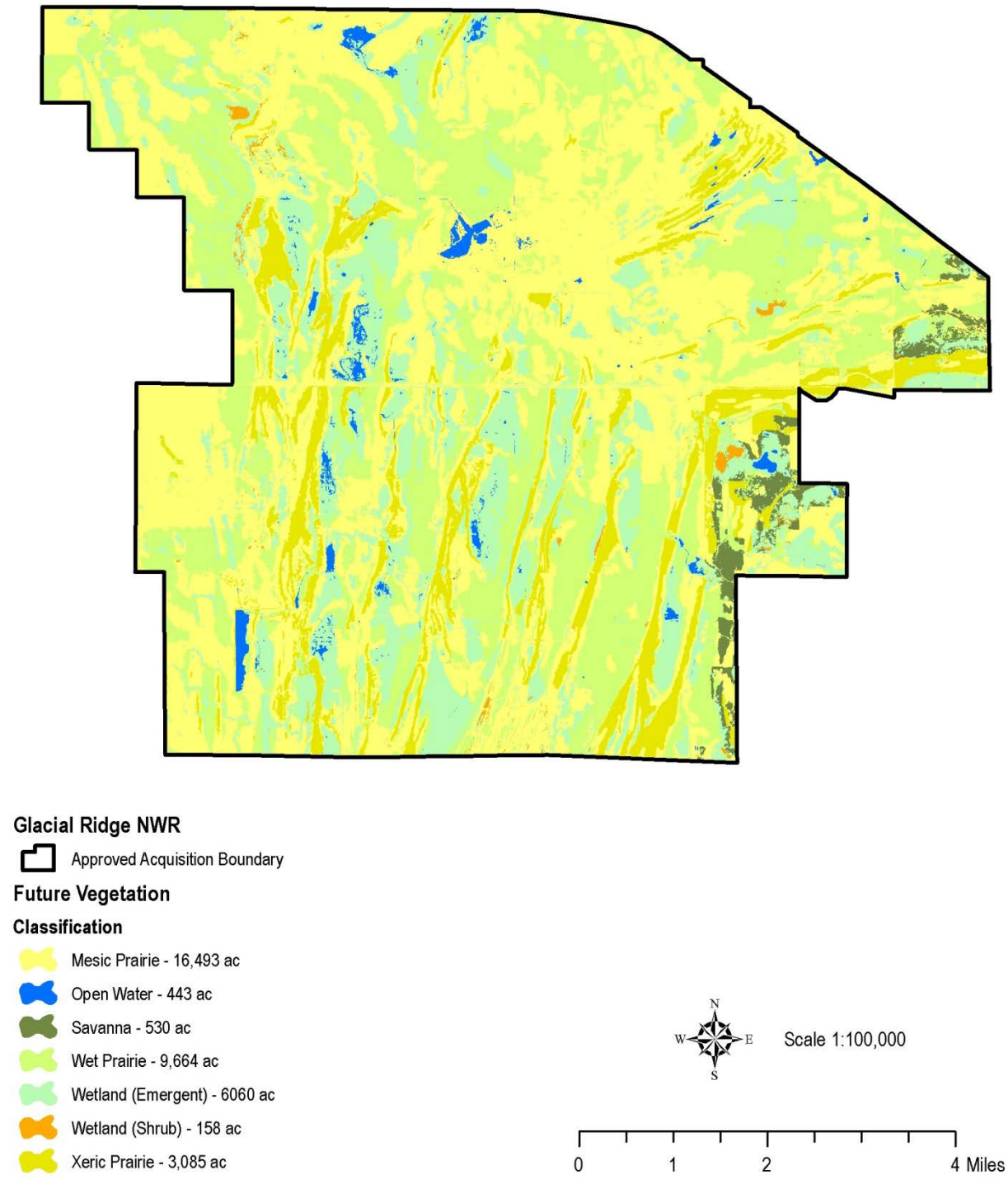
f. Improve wetland species composition and structure using a variety of disturbance regimes to benefit breeding waterfowl.

g. Monitor populations through protocols identified in the Refuge Inventory and Monitoring Plan.

Rationale

Wetland restoration within the acquisition boundary and follow-up management of all wetlands are critical for the refuge to reach its full potential as a breeding place for waterfowl. The Service will acquire land within the acquisition boundary from willing sellers and restore all wetlands within the acquired tracts through time. In addition, the Service will work with partners and private landowners to restore wetlands within the boundary on lands remaining in private ownership. Once restored, the focus will be improving the quality of wetland habitat, especially the distribution of emergent vegetation, making all wetlands more attractive to pairs (Weller and Spatcher 1965, Murkin et al. 1982). Indirect manipulation of wetland vegetation will occur using grazing, prescribed burning, or haying on associated uplands. The acquisition and restoration of all remaining wetlands within the acquisition boundary along with habitat improvements will sustain a higher number breeding pairs annually. Refuge staff aims to meet this goal in 50 percent of the years outlined in this CCP to account for climatic conditions that are beyond the control of the staff, such as prolonged drought. Implementing these strategies will also benefit many other priority wetland and grassland dependent species (Figure A-1).

Figure A-1: Future Vegetation on Glacial Ridge NWR (2100)



GOAL 2: People

Provide a safe environment for visitors of all abilities to enjoy wildlife-dependent recreation, while increasing their knowledge and appreciation of the northern tallgrass prairie ecosystem and the mission of the National Wildlife Refuge System.

Objective 2-1: Develop and provide high quality hunting opportunities for the public while creating an educational and inclusive youth hunt program within five years of CCP approval.

Strategies

a. Increase outreach efforts about hunting opportunities on public land.
b. Update the refuge Hunt Plan.
c. Clarify existing hunt boundaries and provide additional signage to minimize user group conflicts.
d. Work with partners to develop an annual youth waterfowl hunt.
e. Develop a contingency plan with a permitting system if hunter interest exceeds capacity limits.

Rationale

Hunting is one of the priority public uses of the National Wildlife Refuge System (NWRS, Refuge System) and is to be facilitated under the National Wildlife Refuge Improvement Act of 1997 when compatible. Hunting in northwestern Minnesota is a popular outdoor tradition and plays a major role in the culture of the local community. By promoting responsible hunting practices along with the mission of the Service, individuals can gain a unique understanding and appreciation for wildlife conservation and protection.

Objective 2-2: Increase the opportunities for wildlife observation and wildlife photography within five years of plan approval.

Strategies

a. Develop a self-guided auto tour using existing roads to provide wildlife viewing opportunities that will have minimal disturbance to wildlife populations.
b. Work with partners to manage greater prairie-chicken viewing blinds located on the refuge.
c. Coordinate with partners and develop a network of birding stops throughout the refuge.
d. Promote opportunities for wildlife photography and viewing through coordinated events with partners and the local communities.

Rationale

Wildlife observation and photography are two of the six priority public uses of the Refuge System under the National Wildlife Refuge Improvement Act of 1997. Both uses enable visitors to gain a better understanding and appreciation of the value of and need for the fish and wildlife

habitat conservation. Avitourism or birding-based travel is a rapidly emerging and popular sector of the tourism industry. In addition to providing greater awareness about the Refuge System; increased refuge attendance and publicity will also likely result in greater socioeconomic gains for the local communities.

Objective 2-3: Provide environmental education programs and interpretation opportunities while developing partnerships with local educational institutions within five years of plan approval.

Strategies

a. Offer simple yet high quality interpretive programs about the unique habitat and wildlife of Glacial Ridge NWR.
b. Develop a self-guided auto tour using existing roads with interpretation panels located throughout the route.
c. Maintain straightforward yet effective exhibits at the visitor contact station of Glacial Ridge NWR.
d. Partner with the Friends of Rydell and Glacial Ridge Refuges Association for environmental education and interpretation programs.
e. Work with partners to obtain sustained funding for youth to visit the refuge.
f. Provide guest lectures for community events and educational institutions.
g. Actively recruit, train, and educate youth interns on the mission of the Service and wildlife conservation principles.

Rationale

Environmental education and interpretation are priority public uses of the Refuge System under the National Wildlife Refuge Improvement Act of 1997. Interpreting the resources and challenges of wildlife management to education institutions and the general public can be an effective way to share the mission of the Service. Studies have shown that fewer Americans hunt, participate in shooting sports, or spend time outside in general (Clements 2004, Responsive Management/National Shooting Sports Foundation 2008). Through the use of interpretation, refuge staff and their partners can create a lasting connection with visitors while providing them a deeper understanding of the Refuge System and the natural world.

Objective 2-4: Increase community support and participation through a systematic outreach effort aimed to raise awareness of the mission of Glacial Ridge NWR as well as the mission of the Service and its partners.

Strategies

a. Promote community events and national initiatives at Glacial Ridge NWR.
b. Continue to gain broad support for the refuge and the Service through a variety of social media outlets.
c. Develop an efficient visitor survey tool that will provide timely feedback to refuge staff.
d. Develop a working relationship with local county tourism boards.

Rationale

Although national wildlife refuges are managed first and foremost for the conservation of fish and wildlife, it is recognized that increasing the public's awareness on purpose and programs is essential. Communities that are informed on the mission of the Service and the refuge will be able to take full advantage of the recreation opportunities allowed on the refuge in addition to influencing the future management direction.

GOAL 3: Refuge Administration

Maintain and enhance refuge infrastructure and operations responsibly and sustainably for wildlife, the American public, and employees.

Objective 3-1: Incorporate universal access, safety, and efficiency into the design, construction, and retrofitting of facilities and infrastructure while minimizing the disturbance footprint to natural resources.

Strategies

a. Ensure that all new facilities are compatible with the American Disabilities Act, and retrofit existing facilities whenever feasible.
b. Incorporate refuge facilities that double as severe weather shelters for visitors and staff.
c. Use sustainable design and source local materials whenever possible.
d. Design and construct facilities and infrastructure using methods that will require minimal maintenance and ease of repair.
e. Conduct a building energy audit.
f. Conduct a cost-benefit analysis and create a long-term maintenance schedule before the construction of new facilities.

Rationale

The Refuge System must be a leader of accessibility, efficiency, and sustainable use in their communities in order to effectively share its mission. In order to sufficiently manage and improve current facilities with a nationwide decrease in staffing, refuges will be required to analyze current operational methods and rigorously plan future expansion.

Objective 3-2: Continue to fill any vacancies and otherwise sustain current levels of staffing and volunteer program to achieve refuge purposes.

Strategies

a. Maintain current positions as outlined in the Region 3 Workforce Plan.
b. Maintain positive relationship with the Friends of Rydell and Glacial Ridge Refuges Association.
c. Continue to develop partnerships with the Student Conservation Association.
d. Continue to work with community volunteer groups.

Rationale

The Refuge System must continue to be adequately staffed in order to effectively protect wildlife and habitat while providing for public use opportunities. Current staffing throughout the Refuge System is supplemented by volunteers who donate thousands of hours of service in an effort to enhance federal lands. The continuation of successful community partnerships and offering rewarding volunteer opportunities will enable refuge staff to accomplish annually set objectives in times of budgetary setbacks.

Objective 3-3: Replace equipment that is past its service life with items that will increase staff efficiency and minimize the amount of required maintenance.

Strategies

a. Replace any facility equipment with ENERGY STAR certified or equivalent rating.
b. Investigate alternative modes of transportation on refuge.
c. Compile service records into a centralized database to aid in condition and usage reporting.
d. Consolidate under-utilized or inefficient equipment, and trade in or replace with modern and efficient models.

Annually update station equipment needs to reflect the past year's equipment malfunctions and failures.

Rationale

In many instances, equipment throughout the Refuge System is aging and is in need of replacement. Nationwide or even region-wide replacement is not feasible due to limited budgets and other priorities refuges must consider. Refuge staff must make strategic decisions to replace aging and malfunctioning equipment in a manner that will sustain or enhance current efficiency levels without exceeding regional budgets.

Appendix B: Priority Species

In this appendix:

Priority Species List

Priority resources of concern and other benefiting species on Glacial Ridge National Wildlife Refuge. The bird habitat requirements in this list are summarized from the respective species accounts in Johnson et al. (2002), Johnson et al. (2004), Poole (2005), and expert opinion (S. Lewis, R. Russell, and T. Will, U.S. Fish and Wildlife Service [FWS, Service], personal communication). Information for prairie butterflies is from FWS (2007), Selby (2010), and expert opinion (P. Delphey, FWS, personal communication). Additional resources of concern will be identified during the Habitat Management Plan process using the Rocstar method developed by the FWS and Cardno.

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
Dakota skipper Poweshiek skipperling	Dry prairie	Stubble heights ≥20 cm in tallgrass prairies; low to moderate litter	Whole life cycle	Regal fritillary, sharp-tailed grouse, dicksissel, prairie vole, plains pocketmouse, Richardson's ground squirrel, northern harrier, savannah sparrow, chestnut-collared longspur, western meadowlark
Grasshopper sparrow Greater prairie-chicken Upland sandpiper		Clumped vegetation interspersed with bare ground; moderate litter	Full season Breeding Foraging	
Upland sandpiper Greater prairie-chicken		Moderate to tall, patchy	Brood rearing and nesting	Sedge wren, savannah sparrow, clay-colored sparrow, western meadowlark
Greater prairie-chicken Western meadowlark	Mesic prairie	Short, open vegetation	Breeding Full season	Short-eared owl, plains pocketmouse, marbled godwit
Dakota skipper Poweshiek skipperling		Moderate to tall, patchy	Whole life cycle	Henslow's sparrow, regal fritillary, northern harrier

Focal Species	Habitat Type	Habitat Structure	Life History Requirement	Other Benefitting Species
Greater prairie-chicken Blue-winged teal Western meadowlark			Nesting and brood rearing Nesting Full season	
Mallard Northern harrier Sedge wren		Tall, dense	Nesting Full season Full season	Henslow's sparrow, common yellowthroat, bobolink, American bittern, badger
Marbled godwit	Wet prairie	Disturbed prairie – hayed or grazed areas with low vegetation	Breeding	Hudsonian godwit, Wilson's phalarope, LeConte's sparrow (wet years), black-crowned night heron
Mallard Sedge wren		Tall, dense	Nesting Full season	Sandhill crane, bobolink, American bittern, Henslow's sparrow
Marbled godwit	Depressional wetlands	Shallow water, short/sparse to open shoreline vegetation Short to intermediate height grassland with <40% dead vegetation and average cover height 17 cm	Foraging	Virginia rail, sora, trumpeter swan, American bittern, least bittern, black tern, black-crowned night heron, pied-billed grebe
Mallard Blue-winged teal		Hemi-marsh, interspersed vegetation and open water, shallow	Breeding, brood rearing, molting	Waterfowl
Northern harrier Sedge wren		Tall, dense	Full season	Marsh wren, greater prairie-chicken
Mallard	Shallow lakes	Hemi-marsh, submerged vegetation	Molting, staging, and migration	Waterfowl, western grebe, Forster's tern, green heron, Virginia rail, sora, trumpeter swan, least bittern, black tern, black-crowned night heron, great egret, great blue heron, marsh wren

Appendix C: Species Lists

In this appendix:

Birds

Glacial Ridge NWR Birds

SE = State endangered
ST = State Threatened
SSC = Species of special concern in the State of Minnesota
i = Irregular; annual abundance varies

C = Common
U = Uncommon
O = Occasional
R = Rare

Common Name	Scientific Name	Spring	Summer	Fall	Winter
Alder Flycatcher	*Empidonax alnorum*	U	U	U	
American Avocet	*Recurvirostra americana*	U	O	O	
American Bittern	*Botaurus lentiginosus*	C	C	U	
American Black Duck	*Anas rubripes*	O	R	O	
American Coot	*Fulica americana*	C	C	C	
American Crow	*Corvus brachyrhynchos*	C	C	C	O
American Golden-Plover	*Pluvialis dominica*	U		U	
American Goldfinch, ***i***	*Spinus tristis*	C	C	C	O
American Kestrel	*Falco sparverius*	U	C	U	R
American Pipit	*Anthus rubescens*	O		U	
American Redstart	*Setophaga ruticilla*	U	U	U	
American Robin	*Turdus migratorius*	C	C	C	
American Tree Sparrow	*Spizella arborea*	C		C	O
American White Pelican, ***SSC***	*Pelecanus erythrorhynchos*	U	O	U	
American Wigeon	*Anas americana*	C	U	C	
American Woodcock	*Scolopax minor*	O	O	O	
Baird's Sandpiper	*Calidris bairdii*	U	R	U	
Bald Eagle	*Haliaeetus leucocephalus*	C	C	C	C
Baltimore Oriole	*Icterus galbula*	U	O	U	
Bank Swallow	*Riparia riparia*	U	O	U	
Barn Swallow	*Hirundo rustica*	C	C	C	
Bay-breasted Warbler	*Setophaga castanea*	O		O	
Belted Kingfisher	*Megaceryle alcyon*	U	U	U	
Black Tern	*Chlidonias niger*	U	U	U	
Black-and-white Warbler	*Mniotilta varia*	O	R	O	
Black-backed Woodpecker	*Picoides arcticus*	R	R	R	R
Black-bellied Plover	*Pluvialis squatarola*	U		U	
Black-billed Cuckoo, ***i***	*Coccyzus erythropthalmus*	O	O	O	

Common Name	Scientific Name	Spring	Summer	Fall	Winter
Black-billed Magpie	*Pica hudsonia*	U	U	U	U
Blackburnian Warbler	*Setophaga fusca*	U	R	U	
Black-capped Chickadee	*Poecile atricapillus*	C	C	C	C
Black-crowned Night-Heron	*Nycticorax nycticorax*	U	U	U	
Blackpoll Warbler	*Setophaga striata*	O		O	
Black-throated Blue Warbler	*Setophaga caerulescens*	R		R	
Black-throated Green Warbler	*Setophaga virens*	U	R	U	
Blue Jay	*Cyanocitta cristata*	U	U	U	U
Blue-headed Vireo	*Vireo solitarius*	O		O	
Blue-winged Teal	*Anas discors*	C	C	C	
Bobolink	*Dolichonyx oryzivorus*	C	C	C	
Bohemian Waxwing, ***i***	*Bombycilla garrulus*	O		O	O
Bonaparte's Gull	*Chroicocephalus philadelphia*	R		R	
Boreal Owl, ***i, SSC***	*Aegolius funereus*				R
Brewer's Blackbird	*Euphagus cyanocephalus*	C	C	U	
Broad-winged Hawk	*Buteo platypterus*	O		O	
Brown Creeper	*Certhia americana*	O	O	O	R
Brown Thrasher	*Toxostoma rufum*	U	U	U	
Brown-headed Cowbird	*Molothrus ater*	C	C	C	
Buff-breasted Sandpiper	*Calidris subruficollis*	R		O	
Bufflehead	*Bucephala albeola*	U	R	U	
Burrowing Owl, ***SE***	*Athene cunicularia*	R	R	R	
Cackling Goose	*Branta hutchinsii*	U		U	
California Gull	*Larus californicus*	R			
Canada Goose	*Branta canadensis*	C	C	C	O
Canada Warbler	*Cardellina canadensis*	U		U	
Canvasback	*Aythya valisineria*	U	O	U	
Cape May Warbler	*Setophaga tigrina*	U		U	
Caspian Tern	*Hydroprogne caspia*	R		R	
Cattle Egret	*Bubulcus ibis*	R		R	
Cedar Waxwing, ***i***	*Bombycilla cedrorum*	U	U	U	U
Chestnut-sided Warbler	*Setophaga pensylvanica*	U	O	U	
Chimney Swift	*Chaetura pelagica*	R	R	R	
Chipping Sparrow	*Spizella passerina*	U	U	U	
Clay-colored Sparrow	*Spizella pallida*	C	C	C	
Cliff Swallow	*Petrochelidon pyrrhonota*	U	U	U	
Common Goldeneye	*Bucephala clangula*	U		U	R
Common Grackle	*Quiscalus quiscula*	C	U	C	
Common Loon	*Gavia immer*	O	O	O	
Common Merganser	*Mergus merganser*	U		U	R
Common Nighthawk	*Chordeiles minor*	U	U	U	
Common Raven	*Corvus corax*				O
Common Redpoll, ***i***	*Acanthis flammea*	U		U	C
Common Tern, ***ST***	*Sterna hirundo*	R		R	
Common Yellowthroat	*Geothlypis trichas*	C	C	C	
Connecticut Warbler	*Oporornis agilis*	R		R	
Cooper's Hawk	*Accipiter cooperii*	O	O	O	R
Dark-eyed Junco	*Junco hyemalis*	C		C	O
Dickcissel	*Spiza americana*	O	O	O	

Common Name	Scientific Name	Spring	Summer	Fall	Winter
Double-crested Cormorant	*Phalacrocorax auritus*	O	O	O	
Downy Woodpecker	*Picoides pubescens*	U	U	U	U
Dunlin	*Calidris alpina*	O		O	
Eared Grebe	*Podiceps nigricollis*	O	O	O	
Eastern Bluebird	*Sialia sialis*	U	O	U	
Eastern Kingbird	*Tyrannus tyrannus*	C	C	C	
Eastern Meadowlark	*Sturnella magna*	O	O		
Eastern Phoebe	*Sayornis phoebe*	U	U	U	
Eastern Screech-Owl	*Megascops asio*	R	R	R	R
Eastern Towhee	*Pipilo erythrophthalmus*	R	R	R	
Eastern Wood-Pewee	*Contopus virens*	U	U	U	
European Starling	*Sturnus vulgaris*	O	O	O	O
Evening Grosbeak	*Coccothraustes vespertinus*				O
Ferruginous Hawk	*Buteo regalis*	R			
Field Sparrow	*Spizella pusilla*	R	R	R	
Forster's Tern, ***SSC***	*Sterna forsteri*	U	R	U	
Fox Sparrow	*Passerella iliaca*	O		O	
Franklin's Gull, ***SSC***	*Leucophaeus pipixcan*	C		C	
Gadwall	*Anas strepera*	C	C	C	
Golden Eagle	*Aquila chrysaetos*			R	R
Golden-crowned Kinglet	*Regulus satrapa*	R		R	
Golden-winged Warbler	*Vermivora chrysoptera*	R	R	R	
Grasshopper Sparrow	*Ammodramus savannarum*	C	C	O	
Gray Catbird	*Dumetella carolinensis*	U	U	U	
Gray Partridge	*Perdix perdix*	O	O	O	O
Gray-cheeked Thrush	*Catharus minimus*	O		O	
Great Blue Heron	*Ardea herodias*	C	C	U	
Great Crested Flycatcher	*Myiarchus crinitus*	U	U	U	
Great Egret	*Ardea alba*	O		U	
Great Gray Owl, ***i***	*Strix nebulosa*				R
Great Horned Owl	*Bubo virginianus*	C	C	C	C
Greater Prairie-Chicken, ***SSC***	*Tympanuchus cupido*	C	C	C	C
Greater Scaup	*Aythya marila*	R		R	
Greater White-fronted Goose	*Anser albifrons*	U		O	
Greater Yellowlegs	*Tringa melanoleuca*	C	U	C	
Green Heron	*Butorides virescens*	O	O	O	
Green-winged Teal	*Anas crecca*	C	U	C	
Hairy Woodpecker	*Picoides villosus*	U	U	U	U
Harris's Sparrow	*Zonotrichia querula*	O		O	O
Henslow's Sparrow, ***SE***	*Ammodramus henslowii*	O	O	O	
Hermit Thrush	*Catharus guttatus*	O		O	
Herring Gull	*Larus argentatus*	U		U	
Hoary Redpoll, ***i***	*Acanthis hornemanni*				O
Hooded Merganser	*Lophodytes cucullatus*	C	U	U	
Horned Grebe, ***SE***	*Podiceps auritus*	R	R	R	
Horned Lark, ***i***	*Eremophila alpestris*	U	U	U	O
House Finch	*Haemorhous mexicanus*	O	O	O	O
House Sparrow	*Passer domesticus*	U	U	U	U
House Wren	*Troglodytes aedon*	U	U	U	

Common Name	Scientific Name	Spring	Summer	Fall	Winter
Hudsonian Godwit	*Limosa haemastica*	O			
Indigo Bunting	*Passerina cyanea*	O	O	O	
Killdeer	*Charadrius vociferus*	C	C	C	
Lapland Longspur, ***i***	*Calcarius lapponicus*				O
Lark Bunting, ***i***	*Calamospiza melanocorys*	R	R	R	
Lark Sparrow, **SSC**	*Chondestes grammacus*	R	R	R	
Le Conte's Sparrow, ***i***	*Ammodramus leconteii*	C	C	C	
Least Bittern	*Ixobrychus exilis*	O	O	O	
Least Flycatcher	*Empidonax minimus*	U	U	U	
Least Sandpiper	*Calidris minutilla*	C		C	
Lesser Scaup	*Aythya affinis*	U	O	U	
Lesser Yellowlegs	*Tringa flavipes*	C	O	C	
Lincoln's Sparrow	*Melospiza lincolnii*	U		U	
Loggerhead Shrike, **SE**	*Lanius ludovicianus*	R	R	R	
Long-billed Dowitcher	*Limnodromus scolopaceus*	U		U	
Long-eared Owl	*Asio otus*	R	R	R	
Magnolia Warbler	*Setophaga magnolia*	U		U	
Mallard	*Anas platyrhynchos*	C	C	C	R
Marbled Godwit, **SSC**	*Limosa fedoa*	U	U	U	
Marsh Wren	*Cistothorus palustris*	C	C	C	
Merlin	*Falco columbarius*	O		O	O
Mourning Dove	*Zenaida macroura*	C	C	C	
Mourning Warbler	*Geothlypis philadelphia*	U		U	
Nashville Warbler	*Oreothlypis ruficapilla*	U	R	U	
Nelson's Sharp-tailed Sparrow, ***SSC***	*Ammodramus nelsoni*	O	O	O	
Northern Cardinal	*Cardinalis cardinalis*				R
Northern Flicker	*Colaptes auratus*	U	U	U	
Northern Goshawk, ***SSC***	*Accipiter gentilis*				R
Northern Harrier	*Circus cyaneus*	C	C	C	
Northern Hawk Owl, ***i***	*Surnia ulula*				R
Northern Parula	*Setophaga americana*	O		O	
Northern Pintail	*Anas acuta*	U	O	U	
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	U	O	U	
Northern Shoveler	*Anas clypeata*	C	U	C	
Northern Shrike, ***i***	*Lanius excubitor*	O		O	U
Northern Waterthrush	*Parkesia noveboracensis*	U		U	
Olive-sided Flycatcher	*Contopus cooperi*	O		O	
Orange-crowned Warbler	*Oreothlypis celata*	O		O	
Orchard Oriole	*Icterus spurius*	R	R	R	
Osprey	*Pandion haliaetus*	O		O	
Ovenbird	*Seiurus aurocapilla*	U	U	U	
Palm Warbler	*Setophaga palmarum*	U		U	
Pectoral Sandpiper	*Calidris melanotos*	U		U	
Peregrine Falcon, ***SSC***	*Falco peregrinus*	O		O	
Philadelphia Vireo	*Vireo philadelphicus*	R		R	
Pied-billed Grebe	*Podilymbus podiceps*	C	C	C	
Pileated Woodpecker	*Dryocopus pileatus*	O	O	O	O
Pine Grosbeak, ***i***	*Pinicola enucleator*				U
Pine Siskin, ***i***	*Spinus pinus*			U	C

Common Name	Scientific Name	Spring	Summer	Fall	Winter
Pine Warbler	*Setophaga pinus*	R		R	
Prairie Falcon	*Falco mexicanus*	R		R	R
Purple Finch	*Haemorhous purpureus*	O		O	O
Purple Martin, ***SSC***	*Progne subis*	R	R	R	
Red Crossbill	*Loxia curvirostra*				R
Red-bellied Woodpecker	*Melanerpes carolinus*	R	R	R	R
Red-breasted Merganser	*Mergus serrator*	R		R	
Red-breasted Nuthatch	*Sitta canadensis*				R
Red-eyed Vireo	*Vireo olivaceus*	O	O	O	
Redhead	*Aythya americana*	U	U	U	
Red-headed Woodpecker	*Melanerpes erythrocephalus*	O	O	O	
Red-necked Grebe	*Podiceps grisegena*	U	U	U	
Red-necked Phalarope	*Phalaropus lobatus*	O		O	
Red-tailed Hawk	*Buteo jamaicensis*	C	C	C	R
Red-winged Blackbird	*Agelaius phoeniceus*	C	C	C	R
Ring-billed Gull	*Larus delawarensis*	U	U	U	
Ring-necked Duck	*Aythya collaris*	U	U	U	
Ring-necked Pheasant	*Phasianus colchicus*	R	R	R	R
Rock Pigeon	*Columba livia*	O	O	O	O
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	R	R	R	
Ross's Goose	*Chen rossii*	R		R	
Rough-legged Hawk	*Buteo lagopus*	R		O	U
Ruby-crowned Kinglet	*Regulus calendula*	O		O	
Ruby-throated Hummingbird	*Archilochus colubris*	U	U	U	
Ruddy Duck	*Oxyura jamaicensis*	U	U	U	
Ruddy Turnstone	*Arenaria interpres*	O		O	
Ruffed Grouse	*Bonasa umbellus*	O	O	O	O
Rusty Blackbird	*Euphagus carolinus*	U		U	
Sanderling	*Calidris alba*	O		O	
Sandhill Crane	*Grus canadensis*	C	C	C	
Savannah Sparrow	*Passerculus sandwichensis*	C	C	C	
Say's Phoebe	*Sayornis saya*	O	O		
Scarlet Tanager	*Piranga olivacea*	O	R	O	
Sedge Wren	*Cistothorus platensis*	C	C	C	
Semipalmated Plover	*Charadrius semipalmatus*	U		U	
Semipalmated Sandpiper	*Calidris pusilla*	C		C	
Sharp-shinned Hawk	*Accipiter striatus*	U	O	U	
Sharp-tailed Grouse	*Tympanuchus phasianellus*	C	C	C	C
Short-billed Dowitcher	*Limnodromus griseus*	U		U	
Short-eared Owl, ***i, SSC***	*Asio flammeus*	U	U	U	O
Smith's Longspur	*Calcarius pictus*	O		O	O
Snow Bunting, ***i***	*Plectrophenax nivalis*	U		U	U
Snow Goose	*Chen caerulescens*	R		R	
Snowy Egret	*Egretta thula*	R		R	
Snowy Owl, ***i***	*Bubo scandiacus*	R		O	O
Solitary Sandpiper	*Tringa solitaria*	U		U	
Song Sparrow	*Melospiza melodia*	C	C	C	
Sora	*Porzana carolina*	C	C	C	
Spotted Sandpiper	*Actitis macularius*	O	O	O	

Common Name	Scientific Name	Spring	Summer	Fall	Winter
Sprague's Pipit	*Anthus spragueii*	R	R	R	
Stilt Sandpiper	*Calidris himantopus*	O		O	
Swainson's Hawk	*Buteo swainsoni*	O	R	O	
Swainson's Thrush	*Catharus ustulatus*	O		O	
Swamp Sparrow	*Melospiza georgiana*	C	C	C	
Tennessee Warbler	*Oreothlypis peregrina*	U		U	
Tree Swallow	*Tachycineta bicolor*	C	C	C	
Trumpeter Swan, ***SSC***	*Cygnus buccinator*	C	U	U	
Tundra Swan	*Cygnus columbianus*	O		O	
Turkey Vulture	*Cathartes aura*	R	R	R	
Upland Sandpiper	*Bartramia longicauda*	C	C	U	
Veery	*Catharus fuscescens*	R	R	R	
Vesper Sparrow	*Pooecetes gramineus*	C	C	C	
Virginia Rail	*Rallus limicola*	U	U	U	
Warbling Vireo	*Vireo gilvus*	U	U	U	
Western Grebe	*Aechmophorus occidentalis*	O	O	O	
Western Kingbird	*Tyrannus verticalis*	R	R	R	
Western Meadowlark	*Sturnella neglecta*	C	C	C	
Whip-poor-will	*Caprimulgus vociferus*	O	O	O	
White-breasted Nuthatch	*Sitta carolinensis*	U	U	U	U
White-crowned Sparrow	*Zonotrichia leucophrys*	O		O	
White-faced Ibis, ***i***	*Plegadis chihi*	R		R	
White-rumped Sandpiper	*Calidris fuscicollis*	C			
White-throated Sparrow	*Zonotrichia albicollis*	U		U	
White-winged Crossbill	*Loxia leucoptera*				R
Wild Turkey	*Meleagris gallopavo*	O	O	O	O
Willet	*Tringa semipalmata*	U		U	
Willow Flycatcher	*Empidonax traillii*	O	O	O	
Wilson's Phalarope, ***ST***	*Phalaropus tricolor*	U		U	
Wilson's Snipe	*Gallinago delicata*	C	C	C	
Wilson's Warbler	*Cardellina pusilla*	U		U	
Winter Wren	*Troglodytes hiemalis*	R		R	
Wood Duck	*Aix sponsa*	U	O	U	
Yellow Rail, ***SSC***	*Coturnicops noveboracensis*	U	U	U	
Yellow Warbler	*Setophaga petechia*	C	C	C	
Yellow-bellied Flycatcher	*Empidonax flaviventris*	O		O	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	O	O	O	
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	C	C	C	
Yellow-rumped Warbler	*Setophaga coronata*	U		U	
Yellow-throated Vireo	*Vireo flavifrons*	U	U	U	

Mammals

Mammals of Glacial Ridge NWR

Scientific Name	Common Name	State Status	Federal Status
Sorex arcticus	Arctic shrew		
Sorex cinereus	Masked shrew		
Sorex palustris	American water shrew		
Microsorex hoyi	Pygmy shrew		
Blarina brevicauda	Northern short-tailed shrew		
Condylura cristata	Star-nosed mole		
Myotis lucifugus	Little brown bat (myotis)	Special Concern	
Eptesicus fuscus	Big brown bat	Special Concern	
Sylvilagus floridanus	Eastern cottontail		
Lepus townsendii	White-tailed jackrabbit		
Marmota monax	Woodchuck		
Spermophilus franklini	Franklin's ground squirrel		
Urocitellus richardsonii	Richardson's ground squirrel	Special Concern	
Spermophilus tridecemlineatus	Thirteen-lined ground squirrel		
Sciurus carolinensis	Eastern gray squirrel		
Sciurus niger	Eastern fox squirrel		
Geomys bursarius	Plains pocket gopher		
Castor canadensis	American Beaver		
Peromyscus leucopus	White-footed mouse		
Peromyscus maniculatus	Deer mouse		
Mus musculus	House mouse		
Microtus pennsylvanicus	Meadow vole		
Ondatra zibethicus	Common muskrat		
Zapus hudsonius	Meadow jumping mouse		
Erethizon dorsatum	North American porcupine		
Canis latrans	Coyote		
Canis lupus	Gray wolf		
Vulpes vulpes	Red fox		
Ursus americanus	American black bear		
Procyon lotor	Northern raccoon		
Ermine; Mustela erminea	Short-tailed weasel		
Mustela frenata	Long-tailed weasel		
Mustela nivalis	Least weasel	Special Concern	
Mustela vison	American mink		

Scientific Name	Common Name	State Status	Federal Status
Taxidea taxus	American badger		
Mephitis mephitis	Striped skunk		
Lynx rufus	Bobcat		
Odocoileus virginianus	White-tailed deer		
Alces alces	Moose	Special Concern	

Plants

Essential Plant Species Lists of Glacial Ridge NWR*

*Essential species lists were developed by The Nature Conservancy for restoration and monitoring purposes.

Scientific Name	Common Name	Dry Prairie	Mesic Prairie	Wet Prairie
Achillea millefolium	Yarrow	X	X	
Agoseris glauca	Glaucous false dandelion	X		
Agropyron trachycaulum var. *unilaterale*	Slender wheatgrass	X	X	
Agrostis scabra	Rough bentgrass	X		
Allium stellatum	Prairie wild onion	X	X	
Amorpha canescens	Leadplant	X	X	
Amorpha nana	Fragrant false indigo		X	
Andropogon gerardii	Big bluestem	X	X	X
Antennaria plantaginifolia	Plantain-leaved pussytoes	X		
Apocynum sibiricum	Clasping dogbane		X	X
Artemisia dracunculus	Tarragon	X		
Artemisia frigida	Sage wormwood	X		
Asclepias incarnata	Swamp milkweed			X
Aster ericoides	Heath aster	X	X	X
Aster laevis	Smooth blue aster		X	
Aster lanceolatus	Eastern panicled aster			X
Aster novae-angliae	New England aster			X
Aster sericeus	Silky aster	X		
Aster umbellatus	Flat-topped aster			X
Astragalus adsurgens var. *robustior*	Prairie milk vetch	X		
Astragalus crassicarpus	Ground plum	X		
Betula glandulifera	Bog birch			X
Bouteloua curtipendula	Side-oats grama	X		
Bouteloua gracilis	Blue grama	X		
Bromus kalmii	Kalm's brome		X	
Calamagrostis inexpansa var. *brevior*	Northern reedgrass			X
Calamovilfa longifolia	Sand reedgrass	X		
Calylophus serrulatus	Toothed evening primrose	X		

Scientific Name	Common Name	Dry Prairie	Mesic Prairie	Wet Prairie
Campanula rotundifolia	Harebell	X	X	
Carex buxbaumii	Buxbaum's sedge			X
Carex filifolia	Thread-leaved sedge	X		
Carex heliophila	Sun-loving sedge	X		
Carex tetanica	Rigid sedge			X
Castilleja coccinea	Indian paintbrush		X	
Castilleja sessiliflora	Downy paintbrush	X		
Cerastium arvense	Field chickweed	X		
Cicuta maculata	Spotted water hemlock			X
Cirsium flodmanii	Flodman's thistle	X	X	
Comandra umbellata	Bastard toadflax	X	X	
Dalea candida	White prairie clover	X	X	
Dalea purpurea	Purple prairie clover	X	X	
Deschampsia cespitosa var. *glauca*	Tufted hair grass		X	X
Echinacea angustifolia	Narrow-leaved purple coneflower	X		
Eleocharis compressa	Flattened spikerush			X
Erigeron strigosus var. *strigosus*	Daisy fleabane	X		
Euthamia graminifolia	Grass-leaved goldenrod			X
Fragaria virginiana	Common strawberry		X	X
Gaillardia aristata	Blanketflower	X		
Galium boreale ssp. *septentrionale*	Northern bedstraw	X	X	X
Geum triflorum	Prairie smoke	X	X	
Glycyrrhiza lepidota	Wild licorice		X	
Helenium autumnale	Autumn sneezeweed			X
Helianthus giganteus	Giant sunflower			X
Helianthus maximiliani	Maximilian's sunflower		X	X
Helianthus rigidus	Stiff sunflower		X	
Helictotrichon hookeri	Spike oat	X		
Heliopsis helianthoides	Ox-eye		X	
Heterotheca villosa	Hairy golden aster	X		
Heuchera richardsonii	Alumroot	X		
Juncus balticus var. *littoralis*	Baltic rush			X
Koeleria macrantha	Junegrass	X	X	
Lathyrus palustris	Marsh vetchling			X
Liatris aspera	Rough blazing star	X		

Scientific Name	Common Name	Dry Prairie	Mesic Prairie	Wet Prairie
Liatris ligulistylis	Northern plains blazing star		X	
Liatris punctata	Dotted blazing star	X		
Liatris pycnostachya	Great blazing star		X	X
Lilium philadelphicum var. *andinum*	Wood lily		X	
Linum sulcatum	Grooved yellow flax	X		
Lithospermum canescens	Hoary puccoon	X	X	
Lysimachia quadriflora	Prairie loosestrife		X	X
Muhlenbergia cuspidata	Plains muhly	X		
Muhlenbergia richardsonis	Mat muhly grass		X	X
Panicum leibergii	Leiberg's panic grass		X	
Panicum virgatum	Switchgrass		X	
Panicum wilcoxianum	Wilcox's panic grass	X		
Pedicularis canadensis	Wood betony		X	
Pedicularis lanceolata	Swamp lousewort			X
Penstemon gracilis	Slender beard tongue	X		
Physalis virginiana	Virginia ground cherry	X		
Poa palustris	Fowl bluegrass			X
Potentilla arguta	Tall cinquefoil	X	X	
Potentilla pensylvanica	Pennsylvania cinquefoil	X		
Prenanthes racemosa	Smooth rattlesnakeroot		X	
Prunus pumila	Sand cherry	X		
Psoralea argophylla	Silverleaf scurfpea		X	
Psoralea esculenta	Prairie turnip	X		
Puccinellia nuttalliana	Nuttall's alkali grass	X		
Pulsatilla nuttalliana	Pasque flower	X		
Pycnanthemum virginianum	Virginia mountain mint		X	X
Rosa arkansana	Prairie rose		X	
Rosa woodsii	Western wild rose			X
Rudbeckia hirta var. *pulcherrima*	Black-eyed Susan		X	
Salix bebbiana	Bebb's willow			X
Salix discolor	Pussy willow			X
Salix gracilis	Slender willow			X
Schizachyrium scoparium	Little bluestem	X	X	
Senecio plattensis	Prairie ragwort	X		

Scientific Name	Common Name	Dry Prairie	Mesic Prairie	Wet Prairie
Senecio pseudaureus var. *semicordatus*	Western heart-leaved groundsel			X
Solidago canadensis	Canada goldenrod		X	X
Solidago missouriensis	Missouri goldenrod	X		
Solidago nemoralis	Gray goldenrod	X	X	
Solidago ptarmicoides	Upland white aster		X	
Solidago riddellii	Riddell's goldenrod			X
Solidago rigida	Stiff goldenrod	X	X	
Sorghastrum nutans	Indian grass		X	
Spartina pectinata	Prairie cordgrass		X	X
Sporobolus heterolepis	Prairie dropseed	X	X	
Stipa comata	Needle-and-thread grass	X		
Stipa spartea	Porcupine grass	X	X	
Thalictrum dasycarpum	Tall meadow-rue		X	X
Triglochin maritima	Seaside arrowgrass			X
Viola nephrophylla	Northern bog violet			X
Viola pedatifida	Bearded birdfoot violet	X		
Zigadenus elegans	White camass		X	
Zizia aptera	Heart-leaved Alexander		X	
Zizia aurea	Golden Alexander		X	X

Lowland Essential Species

Scientific Name	Common Name	Wet Prairie	Wet Meadow	Fen
Amorpha nana[w]	Fragrant false indigo			
Andropogon gerardii	Big bluestem	X		
Apocynum sibiricum	Clasping dogbane	X	X	X
Asclepias incarnata	Swamp milkweed	X	X	X
Aster borealis	Bog aster			X
Aster ericoides	Heath aster	X		
Aster lanceolatus	Eastern panicled aster	X	X	
Aster novae-angliae	New England aster	X		
Aster umbellatus	Flat-topped aster	X		X
Betula glandulifera	Bog birch	X		X
Bromus ciliatus	Fringed brome		X	
Calamagrostis canadensis	Bluejoint		X	

Scientific Name	Common Name	Wet Prairie	Wet Meadow	Fen
Calamagrostis inexpansa var. *brevior*	Northern reedgrass	X	X	X
Caltha palustris	Common marsh marigold		X	
Campanula aparinoides	Marsh bellflower		X	
Carex aquatilis	Aquatic sedge			X
Carex atherodes	Slough sedge		X	
Carex buxbaumii	Buxbaum's sedge	X	X	X
Carex lanuginosa	Woolly sedge		X	X
Carex lasiocarpa var. *americana*	Wiregrass sedge			X
Carex praegracilis	Very slender sedge			X
Carex prairea	Prairie sedge			
Carex rostrata	Beaked sedge		X	
Carex sartwellii	Sartwell's sedge		X	X
Carex sterilis	Sterile sedge			
Carex tetanica	Rigid sedge	X		X
Cicuta maculata	Spotted water hemlock	X	X	X
Cornus stolonifera	Red-osier dogwood		X	X
Deschampsia cespitosa var. *glauca*	Tufted hair grass	X		X
Eleocharis compressa	Flattened spikerush	X		X
Eleocharis erythropoda	Red-stalked spikerush			X
Epilobium leptophyllum	Linear-leaved willow herb		X	X
Eriophorum angustifolium	Tall cottongrass			X
Eupatorium maculatum	Spotted Joe pye weed			X
Euthamia graminifolia	Grass-leaved goldenrod	X		X
Fragaria virginiana	Common strawberry	X		X
Galium boreale ssp. *septentrionale*	Northern bedstraw	X		
Glyceria striata	Fowl manna grass		X	X
Helenium autumnale	Autumn sneezeweed	X		
Helianthus giganteus	Giant sunflower	X	X	
Helianthus maximiliani	Maximilian's sunflower	X		

Scientific Name	Common Name	Wet Prairie	Wet Meadow	Fen
Juncus alpino-articulatus	Alpine rush			X
Juncus balticus var. *littoralis*	Baltic rush	X	X	X
Lathyrus palustris	Marsh vetchling	X	X	
Liatris pycnostachya	Great blazing star	X		
Lobelia kalmii	Kalm's lobelia			X
Lycopus americanus	Cut-leaved bugleweed		X	X
Lycopus asper	Rough bugleweed		X	X
Lycopus uniflorus	Northern bugleweed			X
Lysimachia quadriflora	Prairie loosestrife	X		
Mentha arvensis var. *glabrata*	Common mint		X	X
Muhlenbergia glomerata	Clustered muhly grass			X
Muhlenbergia richardsonis	Mat muhly grass	X		X
Parnassia glauca	American grass-of-Parnassus			
Parnassia palustris var. *neogaea*	Marsh grass-of-Parnassus			X
Pedicularis lanceolata	Swamp lousewort	X		X
Poa palustris	Fowl bluegrass	X		
Polygonum amphibium var. *stipulaceum*	Water smartweed			X
Polygonum coccineum	Swamp smartweed		X	
Potentilla fruticosa	Shrubby cinquefoil			X
Pycnanthemum virginianum	Virginia mountain mint	X		
Rhynchospora capillacea	Hair-like beak rush			
Rosa woodsii	Western wild rose	X		
Salix bebbiana	Bebb's willow	X		
Salix candida	Sage-leaved willow			X
Salix discolor	Pussy willow	X	X	X
Salix gracilis	Slender willow	X	X	X
Salix serissima	Autumn willow			X
Scirpus acutus	Hardstem bulrush			X
Scirpus cespitosus var. *callosus*	Tufted bulrush			
Scolochloa festucacea	Whitetop		X	

Scientific Name	Common Name	Wet Prairie	Wet Meadow	Fen
Senecio pseudaureus var. *semicordatus*	Western heart-leaved groundsel	X		
Solidago canadensis	Canada goldenrod	X		
Solidago riddellii	Riddell's goldenrod	X		
Spartina pectinata	Prairie cordgrass	X	X	
Stachys palustris	Woundwort		X	X
Thalictrum dasycarpum	Tall meadow-rue	X		
Triadenum fraseri	Marsh St. John's wort			X
Triglochin maritima	Seaside arrowgrass	X		X
Triglochin palustris	Marsh arrowgrass			
Typha latifolia	Broad-leaved cattail		X	X
Viola nephrophylla	Northern bog violet	X		X
Zizia aurea	Golden alexanders	X		

Invertebrates of Glacial Ridge NWR

Scientific Name	Common Name
Fire-colored Beetles (Hanley et al. 2006)	
Pedilus elegans	A pedilid beetle
Schizotus cervicalis	A fire-colored beetle
Denroides Canadensis	A fire-colored beetle
Beetles of Glacial Ridge NWR (Hanley et al. 2008)	
Acupalus carus (LeConte)	
Acupalus nanellus Casey	
Acupalus pumilus Lindroth	
Acupalus canadensis Casey	
Agonum covus LeConte	
Agonum harrisii LeConte	
Agonum mutatum Gemminger and Harold	
Agonum trigenimum Lindroth	
Agonum gratiosum (Mannerheim)	
Agonum propinquum Gemminger and Harold	
Agonum thoreyi Dejean	
Agonum errans (Say)	
Agonum anchomenoides Randall	
Agonum cupreum Dejean	
Agonum lutulentum (LeConte)	
Agonum placidum (Say)	
Amara musculis (Say)	
Amara convexa LeConte	
Amara littoralis Mannerheim	
Amara obesa (Say)	
Amara pallipes Kirby	
Anisodactylus discoideus Dejean	
Anisodactylus harrisii LeConte	
Anisodactylus kirbyi	
Anisodactylus nigrita Dejean	
Badister neopulchellus Lindroth	
Badister transversus LeConte	
Badister grandiceps Casey	
Bembidion mimus Hayward	
Bembidion muscicola Hayward	

Scientific Name	Common Name
Bembidion patruele Dejean	
Bembidion patricola	
Bembidion timidum (LeConte)	
Bembidion castor Lindroth	
Bembidion concretum Casey	
Bembidion fortestriatum Motschulsky	
Bembidion versicolor (LeConte)	
Bembidion bifossulatum (LeConte)	
Bembidion nigriceps (Kirby)	
Bembidion rapidum LeConte	
Bembidion trasparens (Gebler)	
Bembidion nitidum Kirby	
Bembidion quadrimaculatum oppositium	
Blethisa quadricollis Haldeman	
Brachinus cyanochroaticus Erwin	
Brachinus cyanipennis Say	
Bradycellus lecontei Csiki	
Bradycellus nigriceps LeConte	
Bradycellus congener (LeConte)	
Bradycellus semipubescens	
Calleida punctata LeConte	
Calosoma calidum (Fabricius)	
Carabus meander Fischer von Waldheim	
Carabus serratus Say	
Chlaenius niger Randall	
Chlaenius alternatus G.H. Horn	
Chlaenius impunctifrons Say	
Chlaenius pennsylvanicus Say	
Chlaenius platyderus Chaudoir	
Chlaenius sericeus Forster	
Chlaenius sericeus sericeus LeConte	
Cicindela duodecimguttata Dejean	
Cicindela tranquebarica Herbst	
Diplocheila striatopunctata (LeConte)	
Diplocheila undulata Carr	
Dyschirius integer LeConte	
Dyschirius setosus LeConte	
Elaphropus incurvus Say	
Elaphrus clairvillei Kirby	
Elaphrus californicus Mannerheim	

Scientific Name	Common Name
Harpalus compar LeConte	
Harpalus eraticus Say	
Harpalus herbivagus Say	
Harpalus opacipennis (Haldeman)	
Harpalus reversus Casey	
Lebia moesta LeConte	
Lebia viridis Say	
Lebia atriventris Say	
Lebia solea Hentz	
Lebia pumila Dejean	
Loricera pilicornia (Fabricius)	
Omophron americanum Dejean	
Oxypselaphus pusillus (LeConte)	
Pasimachus elongatus LeConte	
Patrobus longicornis (Say)	
Poecilus lucublandus (Say)	
Pterostichus corvinus (Dejean)	
Pterostichus luctuosus (Dejean)	
Pterostichus patruelis (Dejean)	
Pterostichus melanarius Illiger	
Pterostichus novus Staneo	
Pterostuchus commutabilis (Motschulsky)	
Stenolophus fuliginosus Dejean	
Stenolophus comma (Fabricius)	
Stenolophus ochropezus (Say)	
Stenolophus conjunctus (Say)	
Syntomus americanus (Dejean)	
Bees of Glacial Ridge NWR	
Agapostemon texanus	
Agapostemon virescens	
Apis mellifera	
Andrena sigmundi	
Augochlorella aurata	
Bombus fervidus	
Bombus griseocollis	
Bombus ternarius	
Ceratina mikmaqi	
Ceratina spp.	

Scientific Name	Common Name
Colletes americanus	
Halictus confusus	
Halictus rubicundus	
Hoplitis pilosifrons	
Hoplitis product	
Hoplitis spoliata	
Hylaeus mesillae group	
Lasioglossum coriaceum	
Lasioglossum leucozonium	
Lasioglossum paraforbesii	
Lasioglossum pectoral	
Lasioglossum quebecense	
Lasioglossum semicaeruleum	
Lasioglossum succinipenne	
Lasioglossum zonulum	
Melissodes agilis	
Melissodes trinodis	
Megachili latimanus	
Osmia simillima	
Odonata of Glacial Ridge NWR (Zygoptera) (Hanley et al. 2006)	
Amphiagrion saucium	Eastern Red Damsel
Calopteryx aequabilis	River Jewelwing
Coenagrion angulatum	Prairie Bluet
Coenagrion resolutum	Taiga Bluet
Enallagma boreale	Boreal Bluet
Enallagma carunculatum	Tule Bluet
Enallagma civile	Familiar Bluet
Enallagma clausum	Alkalai Bluet
Enallagma cyathigerum	Northern Bluet
Enallagma ebrium	Marsh Bluet
Enallagma hageni	Hagen's Bluet
Hetaerina americana (observed)	American Rubyspot
Ischnura verticalis	Eastern Forktail
Lestes disjunctus	Northern Spreadwing
Lestes dryas	Emerald Spreadwing
Lestes eurinus (vigilax)	Amber-winged Spreadwing
Lestes unguiculatus	Lyre-Tipped Spreadwing
Nehalennia irene	Sedge Sprite

Scientific Name	Common Name
Unidentified Coenagrion/Enallagma	
Unidentified Lestes	
Odonata of Glacial Ridge NWR (Anisoptera) (Hanley et al. 2006)	
Aeshna canadensis	Canada Darner
Aeshna constricta	Lance-tipped Darner
Aeshna interrupta	Variable Darner
Aeshna umbrosa	Shadow Darner
Anax junius	Common Green Darner
Dorocordulia libera	Racket-tailed Emerald
Ladona julia	Chalk-fronted Corporal
Leucorrhinia frigida	Frosted Whiteface
Leucorrhinia hudsonica	Hudsonian Whiteface
Leucorrhinia intacta	Dot-tailed Whiteface
Leucorrhinia proxima	Red-waisted Whiteface
Libellula pulchella	Twelve-spotted Skimmer
Libellula quadrimaculata	Four-spotted Skimmer
Sympetrum corruptum	Varigated Meadowhawk
Sympetrum costiferum	Saffron-winged Meadowhawk
Sympetrum danae	Black Meadowhawk
Sympetrum internum	Cherry-faced Meadowhawk
Sympetrum madidum	Red-veined Meadowhawk
Sympetrum obtrusum	White-faced Meadowhawk
Sympetrum rubicundulum	Ruby Meadowhawk
Sympetrum semicinctum	Band-winged Meadowhawk
Sympetrum vicinum	Yellow-legged Meadowhawk
Tetragoneuria spinigera	Spiny Baskettail

Appendix D: Abbreviations and Glossary

Abbreviations

The following is a quicklist of the most frequently used abbreviations in this document. More detail on some of them is in the Glossary that follows.

NOTE: "Abbreviations" is used generically to refer to abbreviations (shortened version of a term or series of words), acronyms (word formed from letters or parts of a series of words), and initialisms (initial letters pronounced separately).

BCA: Bird Conservation Areas
BCC: Birds of Conservation Concern
BCR: Bird Conservation Region
CCP: Comprehensive Conservation Plan (also plan)
CD: Compatibility Determination
CFR: Code of Federal Regulations
CRP: U.S. Department of Agriculture's Conservation Reserve Program
DNR: Department of Natural Resources (usually preceded by state abbreviation)
DOI: U.S. Department of the Interior
DU: Ducks Unlimited
EA: Environmental Assessment
EAS: Environmental Action Statement
EE: Environmental Education
EIS: Environmental Impact Statement
EO: Executive Order
EPA: U.S. Environmental Protection Agency
ESA: Endangered Species Act
FONSI: Finding of No Significant Impact
FR: Federal Register
FTE: Full-time equivalent
FWS: U.S. Fish and Wildlife Service (also USFWS and Service)
FY: Fiscal Year
GAP: Gap Analysis Program
GIS: Geographic Information System
HAPET: U.S. Fish and Wildlife Service's Habitat and Population Evaluation Team
IBA: Audubon Society's Important Bird Area
IPCC: Intergovernmental Panel on Climate Change
LCC: Landscape Conservation Cooperative
MOA: Memorandum of Agreement
MOU: Memorandum of Understanding
NABCI: North American Bird Conservation Initiative
NAI: Natural Areas Inventory
NEPA: National Environmental Policy Act
NRHP: National Register of Historic Places
NWR: National Wildlife Refuge (also Refuge)
NWRS: National Wildlife Refuge System (also Refuge System)
PFT: Permanent full-time
PPJV: Prairie Pothole Joint Venture

PPR: Prairie Pothole Region
R3: Region 3 (Midwest) of the U.S. Fish and Wildlife Service (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin)
ROD: Record of Decision
SGCN: Species of (in) Greatest Conservation Need
SHC: Strategic Habitat Conservation
TFT: Temporary full-time
UMR/GLR JV: Upper Mississippi River & Great Lakes Region Joint Venture
USC: United States Code
USDA: U.S. Department of Agriculture
USGS: U.S. Geologic Survey
WMA: Wildlife Management Area (usually State owned)
WMD: Wetland Management District (also District)
WPA: Waterfowl Production Area
WRP: U.S. Department of Agriculture's Wetland Reserve Program
WSA: Wilderness Study Areas

Glossary

Adaptation: Adjustment in natural or human systems to a new or changing environment. Adaptation to climate change refers to adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.

Adaptive Management: The rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities. A process that uses feedback from refuge research and monitoring and evaluation of management actions to support or modify objectives and strategies at all planning levels (FWS, 602 FW1 1.6).

Alternatives: Different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the National Wildlife Refuge System mission, and resolving issues (FWS, 602 FW1 1.6).

Appropriate Use: A proposed or existing use on a refuge that meets at least one of the following four conditions (FWS, 603 FW1 1.6):

- The use is a wildlife-dependent recreational use as identified in the Fish and Wildlife Improvement Act of 1978.
- The use contributes to fulfilling the refuge purpose(s), the National Wildlife Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the National Wildlife Refuge System Improvement Act of 1997 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.

Approved Acquisition Boundary: A project boundary that the Director of the U.S. Fish and Wildlife Service approves upon completion of the planning and environmental compliance process. An approved acquisition boundary only designates those lands that the Service has authority to acquire and/or manage through various agreements. Approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary, and it does not make lands within the refuge boundary part of the National Wildlife Refuge System. Lands do not become part of the Refuge System until they are purchased or are placed under an agreement that provides for management as part of the Refuge System.

Biological Control: The use of organisms or viruses to control weeds or other pests.

Biological Diversity: The variety of life, including the variety of living organisms, the genetic differences among them, and the communities in which they occur (FWS, 602 FW1 1.6).

Biological Integrity: Biotic composition, structure, and functioning at the genetic, organism, and community levels consistent with natural conditions, including the natural biological processes that shape genomes, organisms, and communities (FWS, 602 FW1 1.6).

Candidate Species: Plants and animals for which the U.S. Fish and Wildlife Service has sufficient information on their biological status and threats to propose them as endangered or threatened under the Endangered Species Act, but for which development of a proposed listing regulation is precluded by other higher priority listing activities.

Carbon Sequestration: The uptake and storage of carbon. Trees and plants, for example, absorb carbon dioxide, release the oxygen, and store the carbon. Fossil fuels were at one time biomass and continue to store the carbon until burned.

Climate Change: Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from 1) natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun; 2) natural processes within the climate system (e.g., changes in ocean circulation); 3) human activities that change the atmosphere's composition (e.g., through burning fossil fuels) and the land surface (e.g., deforestation, reforestation, urbanization, desertification, etc.).

Code of Federal Regulations (CFR): The codification of the general and permanent rules published in the *Federal Register* by the departments and agencies of the federal government. It is divided into 50 titles that represent broad areas subject to federal regulation. The 50 subject matter titles contain one or more individual volumes, which are updated once each calendar year, on a staggered basis.

Council on Environmental Quality (CEQ): An Executive Office of the President whose members are appointed by the President. CEQ recommends national policies to promote the improvement of the quality of the environment.

Compatible Use: A proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge (FWS, 603 FW 2 2.6).

Compatibility Determination (CD): A written determination signed and dated by the refuge manager and the U.S. Fish and Wildlife Service regional chief signifying that a proposed or existing use of a national wildlife refuge is a compatible use or is not a compatible use. The director of the Service makes this delegation through the regional director (FWS, 603 FW 2 2.6).

Comprehensive Conservation Plan (CCP): A document that describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the National Wildlife Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates (FWS, 602 FW1 1.6).

Consumptive Use: Use of a refuge resource that removes the resource from the refuge (e.g., killing an animal to eat, catching and keeping fish, harvesting berries or plants, or removal of mineral or other specimens).

Cultural Resource Inventory: A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register of Historic Places follows the criteria found in 36 CFR 60.4.

Cultural Resources: "Those parts of the physical environment—natural and built—that have cultural value to some kind of sociocultural group . . . [and] those non-material human social institutions . . . ." Cultural resources include historic sites, archeological sites and associated artifacts, sacred sites, traditional cultural properties, cultural items (human remains, funerary objects, sacred objects, and objects of cultural patrimony), and buildings and structures.

Easement: A privilege or right that is held by one person or other entity in land owned by another.

Ecological Integrity: The integration of biological integrity, natural biological diversity, and environmental health; the replication of natural conditions (FWS, 602 FW1 1.6).

Ecosystem: A biological community together with its environment, functioning as a unit. For administrative purposes, 53 ecosystems covering the United States and its possessions have been designated. These ecosystems generally correspond with watershed boundaries, and their sizes and ecological complexity vary (FWS, 602 FW1 1.6).

Effects (Impacts): Effects include:

- Direct effects, which are caused by the action and occur at the same time and place.
- Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

- Cumulative effects, which result from past, present, and reasonably foreseeable future actions that, collectively, become significant over time.

Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial (40 CFR 1508.8).

Endangered Species: Any species of plant or animal defined through the Endangered Species Act as being in danger of extinction throughout all or a significant portion of its range and published in the *Federal Register*.

Endangered Species Act (ESA): Through federal action and by encouraging the establishment of state programs, the Endangered Species Act of 1973 provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. The act authorizes the determination and listing of species as endangered and threatened; prohibits unauthorized taking, possession, sale, and transport of endangered species; provides authority to acquire land for the conservation of listed species, using land and water conservation funds; authorizes establishment of cooperative agreements and grants-in-aid to states that establish and maintain active and adequate programs for endangered and threatened wildlife and plants; authorizes the assessment of civil and criminal penalties for violating the act or regulations; and authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the act or any regulation issued thereunder.

Section 7 of the Endangered Species Act requires federal agencies to insure that any action authorized, funded, or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat.

Environmental Action Statement (EAS): The decision document for an environmental assessment for the U.S. Fish and Wildlife Service. The EAS will consist of a one-page document indicating the proposal, the Service decision, references to supporting documents (if any), and a signature block. The purposes of the EAS are to establish a process for internal review of National Environmental Policy Act-related decision documents and to provide an appropriate administrative record of NEPA-related decisions at all management levels of the Service (FWS, 550 FW3 3.3 C).

Environmental Analysis: The process associated with preparing documents such as environmental assessments and environmental impact statements and the decision whether to prepare an environmental impact statement. It is an analysis of alternative actions and their predictable short-term and long-term effects, which include physical, biological, economic, and social factors and their interactions.

Environmental Assessment (EA): A systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment.

Environmental Consequences: The scientific and analytic basis for the comparison of alternatives. The environmental impacts of the alternatives including the proposed action, any

adverse environmental effects that cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources that would be involved in the proposal should it be implemented (40 CFR 1502.16).

Environmental Health: Abiotic composition, structure, and functioning of the environment consistent with natural conditions, including the natural abiotic processes that shape the environment (FWS, 602 FW1 1.6).

Environmental Impact Statement (EIS): A detailed written statement, required by section 102(2)(C) of the National Environmental Policy Act, analyzing the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (40 CFR 1508.11).

Environmental Justice: The fair treatment and meaningful involvement of all people in the development, implementation, and enforcement of environmental laws regardless of race, color, national origin, or income.

Extirpation: The local extinction of a species that is no longer found in a locality or country but exists elsewhere in the world.

Finding of No Significant Impact (FONSI): A document prepared in compliance with the National Environmental Policy Act and supported by an environmental assessment that briefly presents why a federal action will have no significant effects on the human environment and for which an Environmental Impact Statement will not be prepared (40 CFR 1508.13).

Global Warming: Global warming is an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, "global warming" often refers to the warming that can occur as a result of increased emissions of greenhouse gases from human activities.

Goal: A descriptive, open-ended, and often broad statement of desired future conditions that conveys purposes but does not define measurable units (FWS, 602 FW1 1.6).

Greenhouse Gas (GHG): Any gas that absorbs infrared radiation in the atmosphere. Greenhouse gases include, but are not limited to, water vapor, carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), ozone (O3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6).

Habitat: The physical and biological resources required by an organism for its survival and reproduction; these requirements are species-specific. Food and cover are major components of habitat and must extend beyond the requirements of the individual to include a sufficient area capable of supporting a viable population.

Incompatible: Any use (recreational or nonrecreational) of a refuge that, in the sound professional judgment of the Director of the U.S. Fish and Wildlife Service, will materially

interfere with or detract from the fulfillment of the mission of the National Wildlife Refuge System or the purposes of the refuge. Incompatible uses are not allowed to occur on Service areas.

Indicator: In effects analysis, a way for measuring effects from management alternatives on a particular resource or issue.

Interjurisdictional Fish: Fish that occur in waters under the jurisdiction of one or more states, for which there is an interstate fishery management plan or which migrates between the waters under the jurisdiction of two or more states bordering on the Great Lakes.

Invasive Species: Invasive species are organisms that are introduced into a non-native ecosystem and that cause, or are likely to cause, harm to the economy, environment, or human health.

Inventory: Accepted biological methods to determine the presence, relative abundance, and/or distribution of species (FWS, 702 FW2 2.6).

Issue: Any unsettled matter that requires a management decision—that is, a U.S. Fish and Wildlife Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition (FWS, 602 FW1 1.6).

Major Federal Action: Includes action with effects that may be major and that are potentially subject to federal control and responsibility. “Major” reinforces but does not have a meaning independent of significantly. “Actions” include new and continuing activities. Federal actions include adoption of official policy, formal plans, programs, and approval of specific projects (40 CFR 1508.18).

Memorandum of Understanding or Agreement (MOU or MOA): A legal document outlining the terms and details of an agreement between parties (often U.S. Fish and Wildlife Service and a state natural resource agency), including each party’s requirements and responsibilities. It sets forth the basic principles and guidelines under which the parties will work together to accomplish their goals. A memorandum of understanding or agreement are generally recognized as binding, even if no legal claim could be based on the rights and obligations laid down in them.

Migratory Birds: Birds that follow a seasonal movement from their breeding grounds to their wintering grounds. Waterfowl, shorebirds, raptors, and songbirds are all migratory birds.

Monitoring: Accepted biological methods to determine the status and/or demographics of species over time (FWS, 702 FW2 2.6).

National Environmental Policy Act (NEPA): This act, promulgated in 1969, requires all federal agencies to disclose the environmental effects of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements and must prepare appropriate NEPA documents to facilitate better environmental decisionmaking (40 CFR 1500). The law also established the Council on Environmental Quality to implement the law and to monitor compliance with the law.

National Wilderness Preservation System: A network of federally owned areas designated by Congress as wilderness and managed by one of four federal agencies: the U.S. Fish and Wildlife Service, Bureau of Land Management, National Park Service, or the U.S. Forest Service. Includes over 600 areas and more than 105 million acres. The National Wildlife Refuge System includes over 20 million acres of wilderness in more than 60 refuges (FWS, 610 FW1 1.9).

National Wildlife Refuge (NWR, Refuge): A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System, but does not include Coordination Areas. A complete listing of all units of the Refuge System is located in the current Report of Lands Under Control of the U.S. Fish and Wildlife Service (FWS, 602 FW1 1.6).

National Wildlife Refuge System (NWRS, Refuge System): All lands, waters, and interests therein administered by the U.S. Fish and Wildlife Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish, wildlife, and plant resources.

National Wildlife Refuge System Improvement Act of 1997 (improvement act): Sets the mission and administrative policy for all refuges in the National Wildlife Refuge System. Clearly defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation); establishes a formal process for determining compatibility; establishes the responsibilities of the Secretary of the Interior for managing and protecting the Refuge System; and requires a Comprehensive Conservation Plan for each refuge by the year 2012. This act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

Native Species: A species, subspecies, or distinct population that occurs within its natural range or natural zone of potential dispersal (i.e., the geographic area the species occupies naturally or would occupy in the absence of direct or indirect human activity or an environmental catastrophe).

No Action Alternative: In the context of a Comprehensive Conservation Plan, this refers to the current management direction. With this alternative, no change from the current CCP would be implemented.

Non-consumptive Uses: Recreational activities (e.g., hiking, photography, and wildlife observation) that do not involve the taking or catching of fish, wildlife, or other natural resources.

Non-native Species: A species, subspecies, or distinct population that has been introduced by humans (intentionally or unintentionally) outside its natural range or natural zone of potential dispersal.

Objective: A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Objectives are to be attainable, time-specific, and measurable (FWS, 602 FW1 1.6).

Ozone (O3): Ozone, the triatomic form of oxygen (O3), is a gaseous atmospheric constituent. In the troposphere, it is created both naturally and by photochemical reactions involving gases

resulting from human activities (photochemical smog). In high concentrations, tropospheric ozone can be harmful to a wide range of living organisms. Tropospheric ozone acts as a greenhouse gas. In the stratosphere, ozone is created by the interaction between solar ultraviolet radiation and molecular oxygen (O2). Stratospheric ozone plays a decisive role in the stratospheric radiative balance. Depletion of stratospheric ozone, due to chemical reactions that may be enhanced by climate change, results in an increased ground-level flux of ultraviolet (UV) B radiation.

Planning Area: The area upon which the planning effort will focus. A planning area may include lands outside existing planning unit boundaries currently studied for inclusion in the National Wildlife Refuge System and/or partnership planning efforts. It also may include watersheds or ecosystems outside of our jurisdiction that affect the planning unit. At a minimum, the planning area includes all lands within the authorized boundary of the refuge (FWS, 602 FW1 1.6).

Planning Team: A planning team is interdisciplinary in membership and function. A team generally consist of a planning team leader, refuge manager, staff biologists, a state natural resource agency representative, and other appropriate program specialists (e.g., social scientist, ecologist, recreation specialist). Other federal and tribal natural resource agencies may also be asked to provide team members, as appropriate. The planning team prepares the Comprehensive Conservation Plan and appropriate National Environmental Policy Act documentation (FWS, 602 FW1 1.6).

Prescribed Burning: Controlled application of fire to the landscape that allows the fire to be confined to a predetermined area while producing the intensity of heat and rate of spread required to achieve planned management objectives.

Preferred Alternative: A proposed action in the National Environmental Policy Act document for the Comprehensive Conservation Plan identifying the alternative that the U.S. Fish and Wildlife Service believes best achieves planning unit purposes, vision, and goals; helps fulfill the National Wildlife Refuge System mission; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; addresses the significant issues and mandates; and is consistent with principles of sound fish and wildlife management.

Priority Public Uses: Six uses authorized by the National Wildlife Refuge System Improvement Act of 1997 to have priority and are found to be compatible with the refuge purposes. This includes hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Proposed Action: In the context of a Comprehensive Conservation Plan, this is the same as the Preferred Alternative.

Public Involvement: A process that offers affected and interested individuals and organizations opportunities to become informed about, and to express their opinions on, U.S. Fish and Wildlife Service actions and policies. In the process, these public views are studied thoroughly and are thoughtfully considered in shaping decisions for refuge management.

Purposes of the Refuge: The purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit. For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge (FWS, 602 FW1 1.6).

Record of Decision (ROD): A concise public record of a decision prepared by the federal agency, pursuant to National Environmental Policy Act, that contains a statement of the decision, identification of all alternatives considered, identification of the environmentally preferable alternative, a statement whether all practical means to avoid or minimize environmental harm from the alternative selected have been adopted (and if not, why they were not), and a summary of monitoring and enforcement where applicable for any mitigation (40 CFR 1505.2).

Resident Species: A nonmigratory species inhabiting a given locality throughout the year. Examples include white-tailed deer, muskrat, raccoon, mink, and fox.

Scoping: A process for determining the scope of issues to be addressed by a Comprehensive Conservation Plan and for identifying the significant issues. Involved in the scoping process are federal, state, and local agencies; private organizations; and individuals.

Shorebird: Long-legged birds, also known as waders, belonging to the order Charadriiformes that use shallow wetlands and mud flats for foraging and nesting.

Significant Issue: A significant issue is typically: within Service jurisdiction, suggests different actions or alternatives, and will influence the decision (FWS, 602 FW3 3.4 3b).

Species: A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification.

Sound Professional Judgment: A finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of the National Wildlife Refuge System Administration Act and other applicable laws.

Stakeholder: A person or group who has an interest in activities within the Planning Area.

Step-down Management Plan: A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting Comprehensive Conservation Plan goals and objectives (FWS, 602 FW1 1.6).

Strategic Habitat Conservation (SHC): A structured, science-driven approach for making efficient, transparent decisions about where and how to expend Service resources for species, or groups of species, that are limited by the amount or quality of habitat. It is an adaptive management framework integrating planning, design, delivery, and evaluation.

Strategy: A specific action, tool or technique, or combination of actions, tools, and techniques used to meet unit objectives (FWS, 602 FW 1.6).

Threatened Species: Those plant or animal species likely to become endangered species throughout all of or a significant portion of their range within the foreseeable future. A plant or animal identified and defined in accordance with the Endangered Species Act of 1973 and published in the *Federal Register*.

Vision Statement: A concise statement of what the planning unit should be or hope to do, based primarily upon the National Wildlife Refuge System mission, specific refuge purposes, and other mandates. The vision statement for the refuge should be tied to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates (FWS, 602 FW1 1.6).

Waterfowl: A group of birds that include ducks, geese, and swans (belonging to the order Anseriformes).

Waterfowl Production Area (WPA): Prairie wetlands with associated uplands managed to provide nesting areas for waterfowl and owned in fee title by the U.S. Fish and Wildlife Service. These lands are purchased from willing sellers with funds from federal Duck Stamp sales. They are open to public hunting, fishing, and trapping according to state and federal regulations.

Watershed: The entire land area that collects and drains water into a river/stream or river/stream system.

Wetland: A wetland is land transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For the purposes of this classification a wetland must have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes; 2) the substrate is predominantly undrained hydric soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin et al., 1979).

Wetland Management District (WMD): An area covering several counties that acquires (with federal Duck Stamp funds), restores, and manages prairie wetland habitat critical to waterfowl and other wetland birds.

Wildlife-Dependent Recreational Use: A use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. These are the six priority public uses of the National Wildlife Refuge System as established in the National Wildlife Refuge System Administration Act, as amended. Wildlife-dependent recreational uses, other than the six priority public uses, are those that depend on the presence of wildlife. These other uses will also be considered in the preparation of refuge Comprehensive Conservation Plans; however, the six priority public uses always will take precedence (FWS, 602 FW1 1.6).

Wildlife Diversity: A measure of the number of wildlife species in an area and their relative abundance.

Waterbirds: This general category includes all birds that inhabit lakes, marshes, streams and other wetlands at some point during the year. The group includes all waterfowl, such as ducks, geese, and swans and other birds such as loons, rails, cranes, herons, egrets, ibis, cormorants, pelicans, shorebirds, and passerines that nest and rely on wetland vegetation.

Appendix E: Legal and Policy Guidance

Administrative Procedures Act of 1946
Outlines administrative procedures to be followed by federal agencies with respect to identification of information to be made public; publication of material in the *Federal Register*; maintenance of records; attendance and notification requirements for specific meetings and hearings; issuance of licenses; and review of agency actions.

American Indian Religious Freedom Act of 1978
Establishes as policy of the United States the protection and preservation for American Indians of their inherent right to freedom to believe, express, and practice their traditional religions. The act directs federal agencies to evaluate their policies and procedures, in consultation with native traditional religious leaders, in order to determine changes required to protect and preserve Native American religious cultural rights and practices.

Americans with Disabilities Act of 1990, as amended by the ADA Amendments Act of 2008
Prohibits discrimination of individuals based on disability. It requires that public transportation services be accessible to individuals with disabilities and prohibits discrimination in employment of qualified individuals with disabilities. It requires the Equal Employment Opportunity Commission to issue regulations relating to discrimination of disabled individuals, and requires the National Council on Disability to conduct a study of areas designated as wilderness to determine the effect of the designation on the ability of individuals to enjoy such areas. The ADA Amendments Act of 2008 restored the intent and protections of the original act.

Antiquities Act of 1906
Authorizes the President to designate as National Monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. The act requires that a permit be obtained for examination of ruins, excavation of archaeological sites, and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army; and provides penalties for violations.

Archaeological Resources Protection Act of 1979
Largely supplanted the resource protection provisions of the Antiquities Act for archaeological items. This act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from federal or Indian lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from federal or Indian land in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any state or local law. This act also required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the Nation.

Archeological and Historic Preservation Act of 1960, as amended
This act carries out the policy established by the Historic Sites, Buildings and Antiquities Act of 1935 (known as the Historic Sites Act). It directs federal agencies to notify the Secretary of the Interior whenever they find a federal or federally assisted, licensed, or permitted project may cause loss or destruction of significant scientific, prehistoric, or archaeological data. The act authorizes use of appropriated, donated, and/or transferred funds for the recovery, protection, and preservation of such data.

Archeological and Historic Preservation Act of 1974
Directs the preservation of historic and archaeological data in federal construction projects.

Architectural Barriers Act of 1969
Ensures that certain buildings financed or leased by federal agencies are constructed (or renovated) so that they will be accessible to the physically handicapped.

Bald and Golden Eagle Protection Act of 1940, as amended
Prohibits the possession, sale, or transport of any bald or golden eagle, alive or dead, or part, nest, or egg except as permitted by the Secretary of the Interior for scientific or exhibition purposes or for the religious purposes of Indians.

Bankhead-Jones Farm Tenant Act of 1937
Directs the Secretary of Agriculture to develop a program of land conservation and utilization in order to correct maladjustments in land use and thus assist in such things as control of soil erosion, reforestation, preservation of natural resources, and protection of fish and wildlife. Some early refuges and hatcheries were established under authority of this act.

Clean Air Act of 1970
Regulates air emissions from area, stationary, and mobile sources. The act and its amendments charge federal land managers with direct responsibility to protect the “air quality and related values” of land under their control. These values include fish, wildlife, and their habitats.

Emergency Wetlands Resources Act of 1986
Authorized the purchase of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. Requires the Secretary of the Interior to establish a National Wetlands Priority Conservation Plan, requires the states to include wetlands in their comprehensive outdoor recreation plans, and transfers to the Migratory Bird Conservation Fund amounts equal to import duties on arms and ammunition. It established entrance fees at national wildlife refuges. It also extended the Wetlands Loan Act authorization through 1988 and required the Secretary to report to Congress on wetlands loss.
In addition, it directed the Secretary, through the U.S. Fish and Wildlife Service, to continue the National Wetlands Inventory; to complete mapping of the contiguous United States; and to produce at ten-year intervals reports to update and improve in the September 1982 "Status and Trends of Wetlands and Deepwater Habitat in the Coterminous United States, 1950s to 1970s." This act also increased the price of Duck Stamps.

Endangered Species Act of 1973, as amended
Directs federal agencies to take actions that would further the purposes of the act and to ensure that actions they carry out, authorize, or fund do not jeopardize endangered species or their critical habitat. The act also provides authority for land acquisition. Conservation of threatened and endangered species has become a major objective of both land acquisition and refuge management programs.

Endangered Species Conservation Act of 1969
This act expanded the provisions of the Endangered Species Preservation Act of 1966 to include the listing of species in danger world-wide and added mollusks and crustaceans to the animals that could be listed.

Endangered Species Preservation Act of 1966

This act was the predecessor to the Endangered Species Act of 1973 and directed the Secretary of the Interior to produce a list of native U.S. vertebrate species in danger of extinction for the limited protection of those animals.

Environmental Education Act of 1990
Established the Office of Environmental Education within the Environmental Protection Agency to develop and administer a federal environmental education program in consultation with other federal natural resource management agencies, including the U.S. Fish and Wildlife Service.

Executive Order 11593: Protection and Enhancement of the Cultural Environment (1971)
States that if the U.S. Fish and Wildlife Service proposes any development activities that may affect the archaeological or historic sites, the Service will consult with federal and state Historic Preservation Officers to comply with section 106 of the National Historic Preservation Act of 1966, as amended.

Executive Order 11644: Use of Off-road Vehicles on the Public Lands (1972)
Established policies and procedures to ensure that the use of off-road vehicles on public lands will be controlled and directed to protect the resources of those lands, to promote the safety of all users of those lands, and minimize conflicts among the various uses of those lands. EO 11989 (1977) amends section 2 of EO 11644 and directs agencies to close areas negatively impacted by off-road vehicles.

Executive Order 11988: Floodplain Management (1977)
Prevents federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." In the course of fulfilling their respective authorities, federal agencies "shall take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values served by floodplains.

Executive Order 11990: Protection of Wetlands (1977)
Directs federal agencies to: (1) minimize destruction, loss, or degradation of wetlands; and (2) preserve and enhance the natural and beneficial values of wetlands when a practical alternative exists.

Executive Order 12372: Intergovernmental Review of Federal Programs (1982)
Seeks to foster intergovernmental partnerships by requiring federal agencies to use the state process to determine and address concerns of state and local elected officials with proposed federal assistance and development programs.

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (1994)
Mandates that each federal agency shall make achieving environmental justice part of its mission by identifying and addressing disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. This order also creates an Interagency Working Group on Environmental Justice to provide guidance to federal agencies in overcoming these issues.

Executive Order 12906: Coordinating Geographical Data Acquisition and Access: The National Spatial Data Infrastructure (1994), as amended by Executive Order 13286: Amendment of Executive Orders, and Other Actions, in Connection With the Transfer of Certain Functions to the Secretary of Homeland Security (2003)

Recommended that the executive branch develop, in cooperation with state, local, and tribal governments, and the private sector, a coordinated National Spatial Data Infrastructure to support public and private sector applications of geospatial data. Of particular importance to Comprehensive Conservation Plans is the National Vegetation Classification System (NVCS), which is the adopted standard for vegetation mapping. Using NVCS facilitates the compilation of regional and national summaries, which, in turn, can provide an ecosystem context for individual refuges.

Executive Order 12962: Recreational Fisheries (1995)
Directs federal agencies to improve the quantity, function, sustainable productivity, and distribution of United States aquatic resources for increased recreational fishing opportunities in cooperation with states and tribes.

Executive Order 12996: Management and General Public Use of the National Wildlife Refuge System (1996)
Defines a conservation mission for the National Wildlife Refuge System, six compatible wildlife-dependent recreational activities, and four guiding principles for management of the Refuge System. Directs the Secretary of the Interior to undertake several actions in support of management and public use and to ensure the maintenance of the biological integrity and environmental health of the Refuge System. It also provides for the identification of existing wildlife-dependent uses that will continue to occur as lands are added to the Refuge System.

Executive Order 13007: Indian Sacred Sites (1996)
Directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain the confidentiality of sacred sites.

Executive Order 13061: Federal Support of Community Efforts Along American Heritage Rivers (1997)
Established the American Heritage Rivers initiative for the purpose of natural resource and environmental protection, economic revitalization, and historic and cultural preservation. The act directs federal agencies to preserve, protect, and restore rivers and their associated resources important to our history, culture, and natural heritage.

Executive Order 13084: Consultation and Coordination With Indian Tribal Governments (2000)
Provides a mechanism for establishing regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications.

Executive Order 13112: Invasive Species (1999)
Directs federal agencies to prevent the introduction of invasive species, detect and respond rapidly to and control populations of such species in a cost effective and environmentally sound manner, accurately monitor invasive species, provide for restoration of native species and habitat conditions, conduct research to prevent introductions, to control invasive species, and to promote public education on invasive species and the means to address them. This EO replaces and rescinds EO 11987: Exotic Organisms (1977).

Executive Order 13186: Responsibilities of Federal Agencies to Protect Migratory Birds (2001)
Instructs federal agencies to conserve migratory birds by several means, including the incorporation of strategies and recommendations found in Partners in Flight Bird Conservation

plans, the North American Waterfowl Plan, the North American Waterbird Conservation Plan, and the United States Shorebird Conservation Plan, into agency management plans and guidance documents.

Executive Order 13443: Facilitation of Hunting Heritage and Wildlife Conservation (2007)
Directs federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management, including the Department of the Interior and the Department of Agriculture, to facilitate the expansion and enhancement of hunting opportunities and the management of game species and their habitat.

Farmland Protection Policy Act of 1981, as amended
Minimizes the extent to which federal programs contribute to the unnecessary conversion of farmland to nonagricultural uses. Federal programs include construction projects and the management of federal lands.

Federal Advisory Committee Act of 1972, as amended
Governs the establishment of and procedures for committees that provide advice to the federal government. Advisory committees may be established only if they will serve a necessary, nonduplicative function. Committees must be strictly advisory unless otherwise specified and meetings must be open to the public.

Federal-Aid Highways Act of 1968
Establishes requirements for approval of federal highways through wildlife refuges and other designated areas to preserve the natural beauty of such areas. The Secretary of Transportation is directed to consult with the Secretary of the Interior and other federal agencies before approving any program or project requiring the use of land under their jurisdiction.

Federal Aid in Sport Fish Restoration Act (Dingell-Johnson Act) of 1950
Authorizes the Secretary of the Interior to provide financial assistance for state fish restoration and management plans and projects. It is financed by excise taxes paid by manufacturers of rods, reels, and other fishing tackle.

Federal Aid in Wildlife Restoration Act (Pittman-Robertson Act) of 1937
Taxes the purchase of ammunition and firearms and earmarks the proceeds to be distributed to the states for wildlife restoration.

Federal Cave Resources Protection Act of 1988
Established requirements for the management and protection of caves and their resources on federal lands, including allowing the land managing agencies to withhold the location of caves from the public and requiring permits for any removal or collecting activities in caves on federal lands.

Federal Lands Recreation Enhancement Act (REA) of 2004
Allows the government to charge a fee for recreational use of public lands managed by the U.S. Fish and Wildlife Service and other agencies. The recreation fee program is a program by which fees paid by visitors to certain federal recreation sites are retained by the collecting site and used to improve the quality of the visitor experiences at those sites.

Federal Noxious Weed Act of 1975, as amended
The Secretary of Agriculture was given the authority to designate plants as noxious weeds and to cooperate with other federal, state, and local agencies; farmers associations, and private

individuals in measures to control, eradicate, prevent, or retard the spread of such weeds. The act requires each federal land-managing agency, including the U.S. Fish and Wildlife Service, to designate an office or person to coordinate a program to control such plants on the agency's land and implement cooperative agreements with the states, including integrated management systems to control undesirable plants.

Federal Records Act of 1950
Directs the preservation of evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Federal Water Pollution Control Act of 1948, as frequently amended particularly by the Clean Water Act of 1977
This act and its amendments have as their objectives the restoration and maintenance of the chemical, physical, and biological integrity of the Nation's waters and, therefore, regulates the discharge of pollutants into waters of the United States. The act protects fish and wildlife, establishes operation permits for all major sources of water pollution, limits the discharge of pollutants or toxins into water, and makes it unlawful for any person to discharge any pollutant from a point source into navigable waters unless a permit is obtained under the Clean Water Act. Section 404 charges the U.S. Army Corps of Engineers with regulating discharge of dredge or fill materials into waters of the United States, including wetlands. The "Clean Water Act" became the common name with amendments in 1977.

Federal Water Project Recreation Act of 1965, as amended
Declares the intent of Congress that recreation and fish and wildlife enhancement be given full consideration as purposes of federal water development projects. The act also authorizes the use of federal water project funds for land acquisition in order to establish refuges for migratory waterfowl when recommended by the Secretary of the Interior, and authorizes the Secretary to provide facilities for outdoor recreation and fish and wildlife at all reservoirs under his control, except those within national wildlife refuges.

Fish and Wildlife Act of 1956, as frequently amended
Establishes a comprehensive national fish, shellfish, and wildlife resources policy with emphasis on the commercial fishing industry but also with a direction to administer the act with regard to the inherent right of every citizen and resident to fish for pleasure, enjoyment, and betterment and to maintain and increase public opportunities for recreational use of fish and wildlife resources. The 1998 amendments to the act modified the powers of the Secretary of the Interior in regard to volunteer service, community partnerships, and education programs.

Fish and Wildlife Conservation Act of 1980, as amended
Requires the Service to monitor non-gamebird species, identify species of management concern, and implement conservation measures to preclude the need for listing under the Endangered Species Act.

Fish and Wildlife Coordination Act of 1934
Promotes equal consideration and coordination of wildlife conservation with other water resource development programs by requiring consultation with the U.S. Fish and Wildlife Service and the state fish and wildlife agencies where the "waters of a stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under federal permit or license. This act also authorized use of surplus federal property for wildlife conservation purposes and authorized the Secretary of the Interior to provide public fishing areas and accept donations of lands and funds.

Fish and Wildlife Improvement Act of 1978
Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary of the Interior to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on Service projects and appropriations to carry out a volunteer program.

Food Security Act of 1985 (Farm Bill), as amended
Known as the Farm Bill, this act contains several provisions that contribute to wetland conservation. The Swampbuster provisions state that farmers who convert wetlands for the purpose of planting after enactment of the law are ineligible for most farm program subsidies. The act also established the Wetlands Reserve Program to restore and protect wetlands through easements and restoration of the functions and values of wetlands on such easement areas.

Freedom of Information Act of 1966
Requires all federal agencies to make available to the public for inspection and copying administrative staff manuals and staff instructions; official, published and unpublished policy statements; final orders deciding case adjudication; and other documents. Special exemptions have been reserved for nine categories of privileged material. The act requires the party seeking the information to pay reasonable search and duplication costs.

Geothermal Steam Act of 1970, as amended
Authorizes and governs the lease of geothermal steam and related resources on public lands. Section 15(c) of the act prohibits issuing geothermal leases on virtually all U.S. Fish and Wildlife Service-administered lands.

Historic Sites, Buildings and Antiquities Act of 1935
Popularly known as the Historic Sites Act, as amended in 1965, declared it a national policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration, and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this act.

Lacey Act of 1900, as amended
Originally designed to help states protect their native game animals and to safeguard U.S. crop production from harmful foreign species. The act prohibits interstate and international transport and commerce of fish, wildlife, or plants taken in violation of domestic or foreign laws. It regulates the introduction to the United States of foreign species into new locations.

Land and Water Conservation Fund Act of 1965
Provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies including the Fish and Wildlife Service.

Migratory Bird Conservation Act of 1929
Establishes a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds. Authorizes the

Secretary of the Interior to cooperate with local authorities in wildlife conservation and to conduct investigations, to publish documents related to North American birds, and to maintain and develop refuges. The act provides for cooperation with states in enforcement. It establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Commission for migratory birds. This act includes acquisition authority for purchase or rental of a partial interest in land or waters and requires the Secretary of the Interior to consult with the appropriate units of local government and with the governor of the state concerned, or the appropriate state agency, before recommending an area for purchase or rental. This provision was subsequently amended in 1983, 1984, and 1986 to require that either the governor or the state agency approve each proposed acquisition. The role of the Commission was expanded by the North American Wetland Conservation Act to include approving wetlands acquisition, restoration, and enhancement proposals recommended by the North American Wetlands Conservation Council.

Migratory Bird Hunting and Conservation Stamp Act (Duck Stamp Act) of 1934
Known as the Duck Stamp Act, this act requires every waterfowl hunter 16 years of age or older to carry a stamp, and earmarks proceeds of Duck Stamps to buy or lease waterfowl habitat. A 1958 amendment authorizes the acquisition of small wetland and pothole areas to be designated as "Waterfowl Production Areas," which may be acquired without the limitations and requirements of the Migratory Bird Conservation Act.

Migratory Bird Treaty Act of 1918
Implements various treaties and conventions between the United States and Canada, Japan, Mexico, and the former Soviet Union for the protection of migratory birds. Except as allowed by special regulations, the act makes it unlawful to pursue, hunt, kill, capture, possess, buy, sell, purchase, barter, export, or import any migratory bird, part, nest, egg, or product.

Mineral Leasing Act for Acquired Lands of 1947, as amended
Authorizes and governs mineral leasing on acquired public lands.

Minerals Leasing Act of 1920, as amended
Authorizes and governs leasing of public lands for development of deposits of coal, oil, gas, and other hydrocarbons, sulphur, phosphate, potassium, and sodium. Section 185 of this act contains provisions relating to granting rights-of-way over federal lands for pipelines.

Mining Act of 1872, as amended
Authorizes and governs prospecting and mining for the so-called "hardrock" minerals (such as gold and silver) on public lands.

National and Community Service Act of 1990
Authorizes several programs to engage citizens of the United States in full and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Among other things, this law established the American Conservation and Youth Service Corps to engage young adults in approved human and natural resource projects, which will benefit the public or are carried out on federal or tribal lands.

National Environmental Policy Act of 1969 (NEPA), as amended
This act and the implementing regulations developed by the Council on Environmental Quality (40 CFR 1500–1508) require federal agencies to integrate the National Environmental Policy Act (NEPA) process with other planning at the earliest possible time to provide a systematic interdisciplinary approach to decisionmaking; to identify and analyze the environmental effects of their actions; to describe appropriate alternatives to the proposed actions; and to involve the

affected state and federal agencies, tribal governments, and public in the planning and decisionmaking process. This act requires the disclosure of the environmental impacts of any major federal action significantly affecting the quality of the human environment.

National Historic Preservation Act of 1966
Repeatedly amended, the act provides for preservation of significant historical features (buildings, objects, and sites) through a grant-in-aid program to the states. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468–468d). The act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in 1976 (90 Stat. 1319). That act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register. Section 110 requires federal agencies to manage historic properties, e.g., to document historic properties prior to destruction or damage; section 101 requires federal agencies consider Indian tribal values in historic preservation programs and requires each federal agency to establish a program leading to inventory of all historic properties on its land.

National Trails System Act of 1968
Established the National Trails System to protect the recreational, scenic, and historic values of some important trails. National Recreation Trails may be established by the Secretaries of the Interior or Agriculture on land wholly or partly within their jurisdiction, with the consent of the involved state(s) and other land managing agencies, if any. National scenic and national historic trails may only be designated by an act of Congress. Several national trails cross units of the National Wildlife Refuge System.

National Wildlife Refuge System Administration Act of 1966 (amended by the National Wildlife Refuge System Improvement Act of 1997)
This act consolidates the authorities relating to the various categories of lands for the conservation of fish and wildlife administered by the Secretary of the Interior through the U.S Fish and Wildlife Service by designating all such areas part of a single National Wildlife Refuge System. Areas include wildlife refuges, areas for the protection and conservation of fish and wildlife threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. The law also prohibits knowingly disturbing any area within the system or the take of Refuge System wildlife without a permit. The act addresses the growing need for recreational opportunities by providing a decision framework for allowing appropriate and compatible uses of the Refuge System.

National Wildlife Refuge System Centennial Act of 2000
Establishes a commission to promote awareness by the public to develop a long-term plan to meet priority needs of the National Wildlife Refuge System, require an annual report on the needs, and improve public use programs and facilities.

National Wildlife Refuge System Improvement Act of 1997
This act, which amends the National Wildlife Refuge System Administration Act of 1966, serves as the "organic act" for the National Wildlife Refuge System. The act states first and foremost that the mission of the National Wildlife Refuge System is focused singularly on wildlife conservation. It establishes a unifying mission for the Refuge System, reinforces the importance of refuge purposes to guide management direction, articulates a process for determining compatible uses of refuges, identifies six priority wildlife-dependent recreation uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation),

and adds a requirement for preparing comprehensive conservation plans through a public planning process. The act requires the Secretary of the Interior to maintain the biological integrity, diversity, and environmental health of the Refuge System.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1998
Amends the Fish and Wildlife Act of 1956 to encourage the use of volunteers to help in the management of refuges within the National Wildlife Refuge System; facilitates partnerships between the Refuge System and nonfederal entities to promote public awareness of the resources of the Refuge System and public participation in the conservation of the resources; and encourages donations and other contributions.

National Wildlife Refuge Volunteer Improvement Act of 2010
Maintains the current funding authorization level for the U.S. Fish and Wildlife Service's volunteer and community partnerships programs that are vital to national wildlife refuges but makes a number of important amendments. The law amends the National Wildlife Refuge Volunteer and Community Partnership Enhancement Act of 1998 to direct the Service to carry out a National Volunteer Coordination Program within the National Wildlife Refuge System. It also requires the Director of the Service to publish a national strategy for the coordination and utilization of volunteers within the Refuge System and provide at least one regional volunteer coordinator for each Service region to implement the strategy.

Native American Graves Protection and Repatriation Act (NAGPRA) of 1990
Requires federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession. This act imposes serious delays on a project when human remains or other cultural items are encountered in the absence of a plan.

Neotropical Migratory Bird Conservation Act of 2000
Establishes a matching grants program to fund projects that promote the conservation of neotropical migratory birds in the United States, Latin America, and the Caribbean.

North American Wetlands Conservation Act of 1989
Provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between the United States, Canada, and Mexico. North American Wetlands Conservation Council is created to recommend projects to be funded under the act to the Migratory Bird Conservation Commission. Available funds may be expended for up to 50 percent of the United States' share cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on federal lands).

Partnerships for Wildlife Act of 1992
Established a Wildlife Conservation and Appreciation Fund to receive appropriated funds and donations from the National Fish and Wildlife Foundation and other private sources to assist the state fish and game agencies in carrying out their responsibilities for conservation of non-game species. The funding formula is no more than 1/3 federal funds, at least 1/3 foundation funds, and at least 1/3 state funds.

Refuge Recreation Act of 1962, as amended
Requires that any recreational use on areas of the National Wildlife Refuge System be "compatible" with the primary purpose(s) for which the area was acquired or established. This

act also requires that sufficient funding be available for the development, operation and maintenance of recreational uses that are not directly related to the area's primary purpose(s).

Refuge Revenue Sharing Act of 1935
Provides for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges. A major revision in 1964 requires all revenues received from refuge products be distributed to counties for public schools and roads (this stipulation later removed). Another revision in 1974 requires that any remaining funds be transferred to the Migratory Bird Conservation Fund for land acquisition. A 1978 amendment stated payments to counties were established as:

- on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land, and
- on land withdrawn from the public domain, 25 percent of net receipts and basic payments.

This amendment also required counties to pass payments along to other units of local government within the county that suffer losses in revenues due to the establishment of U.S. Fish and Wildlife Service areas.

Rehabilitation Act of 1973, as amended
Prohibits discrimination on the basis of disability under any program or activity receiving federal financial assistance.

Rivers and Harbors Appropriations Act of 1899, as amended
Requires the authorization by the Chief of Engineers prior to any work in, on, over, or under navigable waters of the United States. The Fish and Wildlife Coordination Act provides authority for the U.S. Fish and Wildlife Service to review and comment on the effects on fish and wildlife activities proposed to be undertaken or permitted by the COE. Service concerns include contaminated sediments associated with dredge or fill projects in navigable waters.

Secretarial Order 3289 Amendment 1: Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources (2010)
Secretarial Order 3285, issued in March 2009, made production and transmission of renewable energy on public lands a priority for the Department of the Interior. This Secretarial Order, 3289A1, issued in February 2010 establishes a Department-wide approach for applying scientific tools to increase understanding of climate change and to coordinate an effective response to its impacts on tribes and on the land, water, ocean, fish and wildlife, and cultural resources that the Department manages.

Sikes Act of 1960, as amended
Provides for the cooperation by the U.S. Departments of the Interior and Defense with state agencies in planning, development, and maintenance of fish and wildlife resources and outdoor recreation facilities on military reservations throughout the United States. It requires the Secretary of each military department to use trained professionals to manage the wildlife and fishery resource under his jurisdiction and requires federal and state fish and wildlife agencies be given priority in management of fish and wildlife activities on military reservations.

Surface Mining Control and Reclamation Act of 1977

Regulates surface mining activities and reclamation of coal-mined lands. Further regulates the coal industry by designating certain areas as unsuitable for coal mining operations.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948
Provides that upon a determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred without reimbursement to the Secretary of the Interior if the land has particular value for migratory birds or to a state agency for other wildlife conservation purposes.

Transportation Equity Act for the 21st Century of 1998
Established the Refuge Roads Program, requires transportation planning that includes public involvement, and provides funding for approved public use roads and trails and associated parking lots, comfort stations, and bicycle/pedestrian facilities.

Treasury and General Government Appropriations Act of 2000
In December 2002, Congress required federal agencies to publish their own guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information that they disseminate to the public (44 U.S.C. 3502). The amended language is included in section 515(a). The Office of Budget and Management directed agencies to develop their own guidelines to address the requirements of the law. The Department of the Interior instructed bureaus to prepare separate guidelines on how they would apply the act. The U.S. Fish and Wildlife Service has developed “Information Quality Guidelines” to address the law.

Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970
Provides for uniform and equitable treatment of persons who sell their homes, businesses, or farms to the U.S. Fish and Wildlife Service. The act requires that any purchase offer be no less than the fair market value of the property.

Water Resources Planning Act of 1965
Established the Water Resources Council to be composed of Cabinet representatives, including the Secretary of the Interior. The Council reviews river basin plans with respect to agricultural, urban, energy, industrial, recreational, and fish and wildlife needs. The act also established a grant program to assist states in participating in the development of related comprehensive water and land use plans.

Wild and Scenic Rivers Act of 1968
Established a National Wild and Scenic Rivers System and prescribes the methods and standards through which additional rivers may be identified and added to the system. Section 5(d)(1) requires that in all planning by federal agencies for the use and development of water and related land resources, consideration be given to potential wild, scenic, and recreation rivers. Rivers are added to the national system based on their free-flowing character and their outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, ecological, or other values. Rivers in the system are managed to maintain and protect these outstandingly remarkable values for present and future generations.

Wilderness Act of 1964
Defined the Wilderness resource and established the National Wilderness Preservation System. It directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within National Wildlife Refuge and National Park Systems and to recommend to the President the suitability of each such area or island for inclusion in the National Wilderness Preservation System, with final decisions made

by Congress. The Secretary of Agriculture was directed to study and recommend suitable areas in the National Forest System. This act also prescribes the management of new inclusions as wilderness.

Youth Conservation Corps Act of 1970
Established a permanent Youth Conservation Corps program within the Departments of the Interior and Agriculture. Within the U.S. Fish and Wildlife Service, YCC participants perform many tasks on refuges, fish hatcheries, and research stations.

Appendix F: Literature Cited

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Appendix G: Appropriate Use Designations

In this appendix:

Introduction

National wildlife refuge managers decide if a new or existing use is an appropriate refuge use. This appendix provides copies of the appropriate use designations for Glacial Ridge National Wildlife Refuge (NWR, refuge).

The U.S. Fish and Wildlife Service (FWS, Service) appropriate use policy (FWS, 603 FW 1) explains the decision process the refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must first find a use to be appropriate before undertaking a compatibility review of the use and outlining the stipulations of the use.

The appropriate use policy clarifies and expands on the compatibility policy (FWS, 603 FW 2 2.10D(1)), which describes when the refuge manager should deny a proposed use without determining compatibility. If a proposed use is found “not appropriate,” the use will not be allowed and a compatibility determination will not be prepared. By screening out proposed uses not appropriate to the refuge, the refuge manager avoids unnecessary compatibility reviews. Although a use may be both appropriate and compatible, the refuge manager retains the authority to not allow the use or modify the use.

This policy does not generally apply to proposed public use of wetland and grassland easement areas of the National Wildlife Refuge System (NWRS, Refuge System). The rights we have acquired on these areas generally do not extend to control over such public uses except where those uses would conflict with the conditions of the easement (FWS, 603 FW 1 1.2A).

Background for this policy as it applies to Glacial Ridge NWR is found in the following statutory authorities:

- *National Wildlife Refuge System Administration Act of 1966 (administration act), as amended by the National Wildlife Refuge System Improvement Act of 1997 (improvement act) (16 U.S.C. § 668dd–668ee)*. This law provides the authority for establishing policies and regulations governing refuge uses, including the authority to prohibit certain harmful activities. The administration act does not authorize any particular use, but rather authorizes the Secretary of the Interior to allow uses only when they are deemed compatible. The improvement act provides the Refuge System mission and includes specific directives and identifies six wildlife-dependent uses as priorities for the Refuge System.

- *Refuge Recreation Act of 1962, (16 U.S.C. § 460k).* This law authorizes the Secretary of the Interior to allow public recreation in areas of the Refuge System when the use is an "appropriate incidental or secondary use."

Refuge or uses must meet at least one of the following four conditions to be deemed appropriate:

1. It is a wildlife-dependent recreational use as identified in the improvement act.
2. It contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after the improvement act was signed into law.
3. The use involves the take of fish and wildlife under state regulations.
4. The refuge or has evaluated the use following the guidelines in this policy and found that it is appropriate. The criteria used by the manager to evaluate appropriateness can be found on each of the appropriate use forms included in this appendix.

Uses that have been administratively determined to be appropriate but still require compatibility determinations are:

- six wildlife-dependent recreational uses as defined by the improvement act as hunting, fishing, wildlife observation and photography, and environmental education and interpretation; and
- take of fish and wildlife under state regulations including hunting, fishing, and trapping.

Also covered under this policy are "specialized uses," or uses that require specific authorization from the Refuge System, often in the form of a special use permit, letter of authorization, or other permit document. These uses do not include uses already granted by a prior existing right. Appropriateness findings for specialized uses are made on a case-by-case basis.

This policy does NOT apply to:

- situations where reserved rights or legal mandates provide certain uses must be allowed; and
- refuge management activities conducted by the Refuge System or a Refuge System-authorized agent designed to conserve fish, wildlife, and plants and their habitats. These activities fulfill refuge or district purpose(s) or the Refuge System mission and are based on sound professional judgment.

Appropriate use findings are made without public review and comment. However, if a proposed use is found to be appropriate, we must still determine that the use is compatible. The compatibility determination includes an opportunity for public involvement (FWS, 603 FW 1 1.9B).

The following uses are deemed appropriate:

Cooperative Farming
Environmental Education, Interpretation, and Special Events, and Other Programs
Fish Rearing
Haying and Grazing
Hunting
Research, Scientific Collecting, and Surveys by Third Parties
Wildlife Observation and Photography
Wood Cutting and Timber Removal

Refuges are national treasures for the conservation of wildlife. Through careful planning, consistent application of regulations and policies, diligent monitoring of the impacts of uses on wildlife resources, and preventing or eliminating uses not appropriate, the Refuge System conservation mission can be achieved while also providing the public with lasting opportunities to enjoy quality, compatible, wildlife-dependent recreation.

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Use: Cooperative Farming

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ___ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ **Appropriate** ✓

Refuge Manager: _____ Date: 5-29-15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: James T. Tack Date: 6-1-15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Use: Environmental Education, Interpretation, Special Events, and other programs

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ___ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ___ Appropriate ✓

Acting
Refuge Manager: [signature] Date: 8/28/14

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Richard T. Sparrow (Acting) Date: 9/9/14

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Use: Fish Rearing

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ **Appropriate** ✓

Refuge Manager: _____ Date: 5-29-15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: James T. Tarch Date: 6-1-15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Use: Haying and Grazing

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ___ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ___ Appropriate ✓

Acting Refuge Manager: _____ Date: 8/28/14

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Richard T. Spuer (Acting) Date: 9/9/14

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Use: Hunting

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ✓ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate____ **Appropriate** ✓

Refuge Manager: [signature] Date: 5-29-15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: James T. Leach Date: 6-1-15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Use: Research, Scientific Collecting, and Surveys by Third Parties

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ___ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ___ Appropriate ✓

Acting
Refuge Manager: _____ Date: 8/28/14

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Richard T. Spry (Acting) Date: 9/19/14

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Use: Wildlife Observation and Photography

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ___ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate ___ Appropriate ✓

Acting Refuge Manager: [signature] Date: 8/28/14

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: Richard T. Spuss (Acting) Date: 9/9/14

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

FINDING OF APPROPRIATENESS OF A REFUGE USE

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Use: Wood Cutting and Timber Removal

This form is not required for wildlife-dependent recreational uses, take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision Criteria:	YES	NO
(a) Do we have jurisdiction over the use?	✓	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	✓	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	✓	
(d) Is the use consistent with public safety?	✓	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	✓	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	✓	
(g) Is the use manageable within available budget and staff?	✓	
(h) Will this be manageable in the future within existing resources?	✓	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	✓	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D, 603 FW 1, for description), compatible, wildlife-dependent recreation into the future?	✓	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will **generally** not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes ___ No ___

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate_____ **Appropriate** ✓

Refuge Manager: _____ Date: 5-29-15

If found to be **Not Appropriate**, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found **Not Appropriate** outside the CCP process, the refuge supervisor must sign concurrence.

If found to be **Appropriate**, the refuge supervisor must sign concurrence.

Refuge Supervisor: James T. Stack Date: 6-1-15

A compatibility determination is required before the use may be allowed.

FWS Form 3-2319
02/06

Appendix H: Compatibility Determinations

In this appendix:

Introduction

Compatibility determinations are documents written, signed, and dated by the refuge manager and the regional chief of refuges that signify whether proposed or existing uses of the National Wildlife Refuge (NWR, refuge) or Wetland Management District (WMD, district) are compatible with its establishing purposes and the mission of the National Wildlife Refuge System (NWRS, Refuge System). This appendix provides copies of the compatibility determinations for Glacial Ridge NWR.

Before undertaking a compatibility review of a use, the refuge manager must first determine that the use is appropriate. A compatible use is any proposed or existing wildlife-dependent recreational use or other use of a refuge by the public or entity other than the U.S. Fish and Wildlife Service (FWS, Service) that, based on sound professional judgment, will not materially interfere with or detract from fulfilling the mission of the Refuge System or the purposes of the refuge. The final policy and regulations required by the National Wildlife Refuge System Improvement Act of 1997 provide guidance for determining compatibility.

If a proposed use is not appropriate, the use will not be allowed, and a compatibility determination will not be prepared.

A compatibility determination is required for activities on a refuge by the public or entity other than the Service including:

- all refuge or district recreational and educational programs;
- construction or expansion of recreational and educational facilities such as boardwalks and boat ramps;
- management activities performed by private parties in return for a market commodity, such as cooperative farming to provide food for wildlife; and
- granting or modifying rights-of-way through refuges for pipelines, roads, or electrical transmission lines.

Activities when a compatible determination is NOT required include:

- refuge management activities such as prescribed burning, managing water levels, and controlling invasive species;
- routine scientific monitoring, studies, surveys, and censuses;
- conducting historic preservation;
- law enforcement activities; and
- maintaining refuge or facilities, structures, or improvements.

Although a refuge use may be both appropriate and compatible, the refuge manager retains the authority to not allow the use or modify the use.

COMPATIBILITY DETERMINATION

Use: Cooperative farming as a habitat management tool to enhance and restore refuge grasslands

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

Glacial Ridge NWR was established in 2004 under the Migratory Bird Conservation Act (16 U.S.C. § 715-715r, as amended) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645).

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

The primary purpose for which Glacial Ridge NWR was established was, under the Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Description of Use: Cooperative farming is the term used for cropping activities done by a third party on land which is owned or controlled by the U.S. Fish and Wildlife Service (Service) through a restrictive easement. This type of activity is usually done on a short-term basis (five years or less) to prepare an optimum seed bed for the establishment of native prairie species.

The cropping is done under the terms and conditions of a Special Use Permit issued by the Refuge Manager. The term of the Permit ensure that all current Service and refuge guidelines and restrictions are followed. Permittee selection and associated determination of cost will follow relevant Refuge Manual guidance (5 RM 17 and 6 RM9.11) and Region 3-specific guidance for farming.

Cooperative farming activities are only compatible on previously disturbed areas which have unacceptable levels of chemical residue, noxious weeds, or non-native plant species or ecotypes or to honor the land use clauses of a purchase agreement. To ensure that all Service policies are met, all such land use clauses must be approved by the Refuge Manager prior to Service acceptance of the purchase agreement.

Recent refuge parcel acquisitions in Minnesota average less than 200 acres in size and are often intermingled with private and other public lands. Although the specific acreage of fields to be cooperatively farmed will vary by unit, they will typically range from a few acres to 200 acres.

Contracts are typically written for 3-5 years. In many cases the Service acquires new land that

is currently being cropped. The cropland needs to be restored to native habitat once the land is purchased. When converting poor quality habitat to better quality habitat, the cooperator breaks up the ground the first year and then farms it for the following 2-4 years. The last year of the agreement, in both cases requires the cooperator to seed the field to soybeans. Soybean stubble is the preferred substrate to seed native grasses and forbs into the soil.

Farming entails the use of mechanical equipment such as tractors, disks, and seeders. Each site is tilled prior to spring planting. Tilling requires 1-2 days per site. Some sites may also be treated with herbicide prior to planting. Crops such as corn and soybeans are planted. Typically, planting is completed in one day or less on any individual site and planting on all sites usually begins as early as late April and is completed as late as mid-June, depending on soil conditions and type of crop planted. Cooperators are limited to using only FWS approved herbicides. The use of Genetically Modified Crops (GMO crops), specifically Glyphosate-tolerant corn and soybeans, will be authorized on refuge lands consistent with current Regional policy. The use of genetically modified, Glyphosate-tolerant corn and soybeans will be used only for the purpose of habitat restoration.

As of 2016, the use of neonicotinoid treated seeds is not allowed in farming programs within Region 3 of the Service.

Harvest techniques are the same for both no-till and traditional farming practices. Harvest begins in the fall, using a self-propelled harvesting implement such as a combine, and usually takes about one day per site and is complete on all sites by late October.

Availability of Resources: The needed staff time for development and administration of cooperative farming programs is already committed and available. Most of the needed work to prepare for this use would be done as part of routine grassland management duties. The decision to use a cooperative farmer would occur as part of strategies developed under grassland development and management discussions. The additional time needed to coordinate issuance and oversight of the needed Special Use Permit is relatively minor and within existing station resources.

The cooperative farming of Service land will in most cases generate income for the Service. In accordance with Service policy, some of the farming income may be reduced to achieve the ultimate purpose of the agreement (grassland cover) by having the cooperator purchase seed or apply herbicide for the grassland restoration as the final step of the farming agreement. All farming income received will be submitted for deposit in the Refuge Revenue Sharing Account and is not available at the Refuge level to offset station costs incurred in administration of this use. All Service employees involved in the administration of the program must however be sensitive to the primary purpose of cooperative farming; providing an optimum seed bed for native prairie plant species. The Service should receive a fair market value from cooperative farmers, but generation of income is a secondary consideration when developing the terms and conditions of a cooperative farming agreement.

To lessen any appearance of favoritism or impropriety Refuge Managers should document how cooperators were selected and how rental rates were derived (see Refuge Manual).

Anticipated Impacts of the Use:

How does farming affect Refuge purposes and the NWRS mission? The use of farming provides Refuge staff with a management tool that allows them to meet their goals and objectives. Service policy calls for maintaining or restoring refuge habitats to historic conditions if doing so does not conflict with refuge purposes (U.S. Fish and Wildlife Service 2001).

How does farming affect fish, wildlife, plants, and their habitats; and the biological integrity, diversity, and environmental health of the refuge/NWRS? Cooperative farming to prepare suitable seed beds for native prairie plantings will result in short-term disturbances and long-term benefits to both resident and migratory wildlife using refuges. Short-term impacts will include disturbance and displacement typical of any noisy heavy equipment operation. Cropping activities in old fields or abandoned croplands will also result in short-term loss of habitat for any animal or insect species using those areas for nesting, feeding, or perching. Long-term benefits are extremely positive due to establishment of diverse nesting cover, including native tallgrass species. The resulting habitat will greatly improve conditions for most of the same species affected by the short-term impacts. Strict time constraints placed on this use will limit anticipated impacts to these relatively minor areas.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the CDs. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:
1. Cooperative farming agreements will be limited to five years or less.
2. Farming activity will only take place on previously altered tracts of land within the refuge and must meet specific habitat and related wildlife objectives and contribute to the purposes of the Refuge.
3. Cooperative farmers will be subject to Service policy and regulation regarding use of chemicals. Herbicide and pesticide use is restricted by type and to the minimum necessary amount applied.
4. Special conditions of Special Use Permits will address unique local conditions as applicable.
5. Planting and harvest activities are restricted to minimize disturbance of wildlife species.
6. The use of GMO crops is limited to Glyphosate-tolerant corn and soybeans.
7. The use of genetically modified, Glyphosate-tolerant corn and soybeans will be used only for the purpose of habitat restoration.
8. Adhere to the Region 3 Farming Program Guidelines, including the prohibited use of neonicotinoid treated crop seeds.

Justification: Farming, both conventional and with the use of Glyphosate-tolerant corn and soybeans, contributes to the achievement of the station's purposes and the NWRS mission because it helps enhance and restore grassland habitat for migratory birds and resident wildlife. The cooperative farming of previously disturbed areas which are owned or under easement by the Service and have acceptable levels of chemical residue, noxious weeds, or non-native plant species or ecotypes or are being farmed to honor the land use clauses of a purchase agreement to prepare an optimum seed bed

for the establishment of native prairie species, will not materially interfere with or detract from the fulfillment of the NWRS mission or the purposes of Rydell or Glacial Ridge NWRs for the following reasons:

1) Only areas that have already been significantly manipulated or altered by cropping activates will be affected. These areas contain few if any native plants and offer extremely limited value to the ecological integrity of the unit or landscape.

2) Cooperative farming activities, in most cases, provide the fastest, most cost-effective way to establish native prairie species on areas that have unacceptable levels of chemical residue, noxious weeds, or non-native species or ecotypes. Refuge staff could complete all work, but for many refuges that would require additional equipment and/or staff to efficiently break up non-native brome sod, or to cultivate and control weeds on small tracts of land. Hiring contractors to do this work at rates which can approach $100/acre is a possibility, but would require additional funds in years when farming acres are high. By using local farmers to conduct these farming activities, refuge budgets and staff time can be better allocated to completing the needed restoration (seeding native grasses and forbs) on lands which have completed the farming cycle and are in good condition for seeding.

3) Short-term impacts of farming small tracts of land are minor. No wildlife or habitat losses occur when land purchased in row crop is farmed for an additional period of 2-5 years. Low quality grassland which is farmed as a first step to conversion to higher-value native grasslands will result in habitat loss for trust resources during the farming period. However, the long-term benefits to the ecological integrity of the refuge and the landscape by restoring these degraded or row-cropped areas to native prairie plant species are significant and exceed the short-term losses incurred through the cropping process.

Signature: Refuge Manager: Gregory A. Knutsen 1/4/2016
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2026

COMPATIBILITY DETERMINATION

Use: Environmental Education, Interpretation, and Special Events

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

Glacial Ridge NWR was established in 2004 under the Migratory Bird Conservation Act (16 U.S.C. § 715-715r, as amended) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645).

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

The primary purpose for which Glacial Ridge NWR was established was, under the Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Description of Use: Presently, environmental education and interpretation activities contribute nearly 850 visitors each year to the Rydell NWR alone. Typically, use occurs between September and June, by both individual school classes and large groups during educational field days (e.g., Envirathon). Environmental education and interpretation programs focus on prairie and wetland habitat including, but not limited to, wildlife, history, archaeology, and culture. Wildlife ecology programs address a number of wildlife conservation issues including wetland and prairie conservation, migratory bird management, and endangered species conservation. Programs also relate to the development of outdoor skills, which enhance appreciation of wildlife and the habitats they live in. Over the last 10 years, Rydell NWR has become increasingly popular as an outdoor classroom. Non-staffed activities include bird watching, and plant and animal observation. The Refuge provides public facilities which support environmental education and interpretation, including a visitor center, observation decks, and hiking trails. Students and teachers may also choose to participate in coordinated restoration, and monitoring programs through educational long-term monitoring studies. Special events may include, but are not limited to refuge "open houses" that allow for educational opportunities to the general public on a variety of topics, hunting and/or fishing workshops for area youth, and Citizen Science events, such as the Audubon Christmas Bird Count.

Availability of Resources: The current staffing level allows for the current level of environmental education, interpretation, and special events, if permanent refuge staff are supplanted with support from Agassiz NWR's Visitor Service Specialist, and seasonal employees. Expansion (e.g., depth and

number of programs) of the above services are limited by the current staff level. Maintaining the public use facilities which support environmental education is part of routine management duties and staff and funding is available. In an effort to maintain environmental education, interpretation, and special event programs, refuge staff may work with partners to identify training opportunities for volunteers to help maintain or broaden wildlife- and habitat-based programing.

Anticipated Impacts of the Use: There is some temporary disturbance to wildlife due to environmental education activities, interpretation, and special events. However, the disturbance is local, temporary, and not thought to be detrimental to individual animals or wildlife populations. Minimal habitat is disturbed during activities and the impacts are short-term. Future increases in facilities and participants would cause some displacement of habitat and increase in disturbance, but this is negligible given the controlled nature of environmental education programs and the large size of the NWR landbase. Control of the areas used by groups would avoid or minimize intrusion into sensitive habitats or wildlife areas.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the compatibility determinations. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Environmental education/interpretation activities not lead by Refuge staff will require, at a minimum, verbal approval by the Refuge Manager to minimize conflicts with other groups, safeguard students and resources, and to allow tracking of use levels. A special use permit may be utilized by the Refuge Manager, at his/her discretion.
2. Students and teachers will continue to be instructed on the best methods to view wildlife with minimal disturbance.
3. Youth educational groups are required to have a sufficient number of adults to supervise their groups.
4. Increased communication with teachers who conduct their own activities on the Refuge will help to educate them about minimizing wildlife disturbance.

Justification: Most environmental education will occur at, or be directed to, existing and future facilities in strategic locations providing quality opportunities, while limiting wildlife and habitat disturbance. Disturbance to wildlife is also limited by the size and remote nature of the refuges. Many species have also grown tolerant of human presence, due to railroads and right-of-ways. Disturbance is also generally short-term and only temporarily displaces wildlife, and adequate adjacent habitat is usually available for them. The approval process for groups will limit disturbance to wildlife and ensure avoidance of sensitive areas. Numerous other stipulations will be in place to facilitate these uses, while reducing direct and indirect impacts.

As one of the six Priority Public Uses of the Refuge System, this use is to be encouraged when compatible with the purposes of Rydell and Glacial Ridge NWRs. The refuges provide outstanding environmental education opportunities and interpretation opportunities, due to the diversity of wildlife and habitat that exist, as well as the number of natural resource "issues" refuge staff face. For example, increasing concerns with invasive species provides a subject for environmental education exploration. The extensive educational community which borders the refuges desires more opportunities for hands-on experimental learning. Educating students of all ages about the refuges' natural resources and related challenges is an important way to influence the future well-being of priority habitats. Only through understanding and appreciation will people be moved to personal and collective action to ensure healthy public lands for the future.

Signature: Refuge Manager: Gregory A. Knutsen 12/1/15
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2030

COMPATIBILITY DETERMINATION

Use: Haying for habitat management

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

Glacial Ridge NWR was established in 2004 under the Migratory Bird Conservation Act (16 U.S.C. § 715-715r, as amended) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645).

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

The primary purpose for which Glacial Ridge NWR was established was, under the Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Description of Use: Glacial Ridge and Rydell NWRs will allow haying by private individuals for the purpose of habitat management on refuge land.

Is this use a priority public use? Haying is not a priority public use of the NWRS.

Where would the use be conducted? The decision to use haying as a management tool on refuge lands will occur as part of strategies developed under specific program or unit habitat management planning. The total area on which haying will be permitted during any one year will typically be less than 1,000 acres.

When would the use be conducted? Haying operations typically occur after August 1 with bales and equipment being removed no more than 7 days post-haying. In some cases where certain "weed species" (e.g., sweet clover) have invaded an area, earlier haying may be allowed.

How would the use be conducted? The station will allow haying by private individuals for the purpose of habitat management. Permittee selection and associated determination of cost will follow relevant Refuge Manual guidance (5 RM 17 and 6 RM9.11) and Region 3-specific guidance for haying and grazing. Haying is the cutting and processing (typically baling) of grass, forbs, cattails, or woody vegetation, with subsequent removal to an off-refuge location. Haying of an area is usually conducted as a single event during any one year, but may be repeated periodically to: remove undesirable grasses or forbs; remove accumulated plant biomass; remove or reduce woody vegetation; provide a desired vegetative condition

(such as short grass browse); reduce vegetation fuel levels where wildfires are a concern; prepare sites for establishment of desired vegetation, including prairie or wetland communities, reduction of dense emergent growth and invasive plant suppression in wetlands; or may be a best management option should other planned management alternatives (e.g., grazing, fire) not be available or feasible.

Haying activities will be subject to the terms and conditions of a Special Use Permit issued by the Refuge Manager. The terms of the Permit will ensure compatibility through implementation of Service policy and refuge-specific stipulations.

The haying process typically required 3-4 visits to each site with heavy equipment over a period of 7-10 days. Haying begins in late July when standing grasses and forbs are cut and gathered into windrows using a tractor, mower, and rake; or a swather – a self-propelled mowing machine. The hay cures for 3-7 days to reduce moisture content, and is occasionally turned once with a tractor-drawn rake to speed and even drying. Once cured, a tractor-drawn baler is used to package the windrows into bales of hay. A tractor-drawn wagon is typically used to collect the bales and remove them from the site.

Why is this use being proposed? Haying is a necessary management tool to maintain and restore refuge grassland and wetland habitats.

Availability of Resources:

What resources are needed to properly (considering quality and compatibility) and safely administer use? Most of the needed work to prepare for this use would be done as part of routine management duties. The decision to use haying as a management tool would occur as part of strategies developed under specific program or unit habitat management planning. The additional time needed to coordinate issuance and oversight of the needed Special Use Permit is relatively minor and within existing station resources. The need to monitor having effects will take additional time; however, it will be incorporated into the existing grassland monitoring program.

Are existing refuge resources adequate to properly and safely administer the use? No additional fiscal resources are needed to conduct this use. The needed staff time is already committed and available. Most of the needed work to prepare for this use would be done as part of routine grassland management duties. The decision to use a private operator for haying would only follow as part of the strategies developed under grassland management discussions. The additional time needed to coordinate issuance and oversight of the needed Special Use Permit for haying is relatively minor and within existing refuge resources. Monitoring haying effects will be a part of the existing grassland monitoring program.

Anticipated Impacts of the Use:

How does haying affect Refuge purposes and the NWRS mission? The use of haying provides Refuge staff with a management tool that allows them to meet their goals and objectives. Service policy calls for maintaining or restoring refuge habitats to historic conditions if doing so does not conflict with refuge purposes (U.S. Fish and Wildlife Service 2001).

How does haying affect fish, wildlife, plants, and their habitats; and the biological integrity, diversity, and environmental health of the refuge/NWRS? Haying will result in short-term disturbance and benefits as well as long-term benefits to both resident and migratory wildlife. Short-term impacts will include disturbance and displacement typical of any noisy heavy equipment operation. Cutting and

removal of standing grasses will also result in short-term loss of habitat for those species requiring tall grasses for feeding and perching , such as obligatory grassland bird species. Short-term benefits may include creating open water pockets for spring migrating waterfowl and shorebirds; setting back invasive emergent wetland vegetation, and creating short grass patches within a prairie landscape for bird species that prefer structural diversity in the landscape.

Long-term benefits will accrue due to the increased vigor of newly established grasses or the establishment of highly desirable native tallgrass prairie species, which will improve conditions for those same species affected by the short-term negative impacts. Longer-term negative impacts may occur to resident wildlife species, such as prairie grouse, which may lose over-wintering habitat in hayed areas. This is offset by the fact that the entire refuge will not be hayed, leaving unhayed blocks containing suitable winter habitat near the area that will be hayed.

Some nest destruction or nesting hen mortality may occur. Strict time constraints, such as delaying haying until after August 1 will limit the potential for these types of negative effects to occur within hayed areas. Refuges are managed first and foremost for wildlife (USFWS 2001). But, the focus is on wildlife populations, not individuals (USFWS 1992). Haying is likely to cause mortality of some individual animals, but is not expected to negatively affect the perpetuation of wildlife populations.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the CDs. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Haying must help meet specific habitat and related wildlife objectives and contribute to the purposes of Glacial Ridge and Rydell NWRs.
2. Haying will typically be initiated after August 1 to minimize disturbance to nesting birds, unless an earlier initiation date is documented by a specific management objective in a station plan or a written justification by the project leader is attached to the current CD. Haying should be delayed as late as possible to minimize negative effects to wildlife.
3. Windrowed grass left lying to dry prior to baling must be raked and moved every two days if left on newly seeded native grass and in no cases should remain on the ground more than six days prior to being baled.
4. All equipment and bales must be removed from the refuge within 7 days of baling.
5. A goal of 30-50% of similar habitat type in the management unit or adjacent areas should be left unhayed when feasible to serve as refugia for pollinators and other wildlife. Refugia locations should be planned taking foraging flight ranges of pollinators into consideration.
6. No single area should be hayed more than once per year to allow time and space for pollinator populations to recover, unless there's a specific management objective identified in a station plan or a written justification by the refuge manager is attached to the current CD.

Signature: Refuge Manager: Gregory A. Knutsen 1/4/2016
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2026

COMPATIBILITY DETERMINATION

Use: Prescribed Grazing for Habitat Management

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

Glacial Ridge NWR was established in 2004 under the Migratory Bird Conservation Act (16 U.S.C. § 715-715r, as amended) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645).

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

The primary purpose for which Glacial Ridge NWR was established was, under the Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Description of Use: Glacial Ridge and Rydell NWRs will permit prescription grazing by domestic livestock, chiefly cattle but potentially including other domestic livestock, on refuge lands to improve grassland vigor and health. The use of grazing as a management tool must include a habitat management purpose.

Is the use a priority public use? Grazing is not a public priority use as defined in the Refuge Improvement Act.

Where would the use be conducted? The decision to use grazing as a management tool on either Glacial Ridge NWR or Rydell NWR will occur as part of strategies developed under specific program or unit habitat management planning.

When would the use be conducted? Grazing may take place any time from April through November. Most commonly, we will use short duration grazing pulses lasting from four to eight weeks and then require livestock removal from a specific cell or unit. We will typically allow three different seasons of use. One season will be spring (mid-April to early June) on native prairie or seeded native grasses designed to reduce the vigor of exotic species and increase the vigor of native species. Summer grazing (July 15 – September 1) maybe used to stimulate the grassland after the peak nesting season, yet allow vegetative regrowth in the fall. Fall grazing (September 1 – October 31) will be designed to have effects similar to spring grazing, mostly on native prairie remnants of fields seeded with native tallgrass prairie species.

How would the use be conducted? The Refuge will allow grazing by private individuals for the purpose of habitat management. Permittee selection and associated determination of cost will follow relevant Refuge Manual guidance (5 RM 17 and 6 RM9.11) and Region 3-specificguidance for grazing.

Prescribed grazing is recognized as a valuable tool to stimulate forbs, suppress non-native grasses, remove standing vegetation, reduce vegetative litter, and suppress woody vegetation. The timing and duration of a grazing prescription will depend on the grassland type and condition. In native prairie, a technique referred to a "spring flash grazing" is often used, where a unit is grazed at a relatively high stocking rate for a short duration (4-6 weeks). Spring grazing is useful in a grassland system where the goal is to reduce invasive cool-season grasses and promote native warm-season plants. It has a similar effect as a spring fire, helping to reduce cool-season grasses (especially smooth brome), while promoting native warm-season plants. Typically, a grazing plan will include a flash graze in consecutive springs.

In low diversity, seeded grasslands that are dominated by either warm-season or cool-season grasses, a summer graze may be used. In these situations the intent of the graze is to stimulate the grass stand and reduce litter build-up, rather than to reduce the cover of a target species. The duration and intensity would be fairly similar to that of a spring graze (high stocking rate, 4-6 weeks).

Grazing with domestic cattle is most common; however we can use other livestock, such as sheep or goats, depending on the grazing goals for a specific unit. It is important to understand which plant species are preferred by the type of livestock being used. For example cattle will favor herbaceous species over woody vegetation, whereas goats aggressively target woody vegetation, making them an excellent option for shrub control.

Grazing activities will be subject to the terms and conditions of a Special Use Permit issued by the Refuge Manager. The terms of the Permit will ensure compatibility through implementation of Service policy and refuge-specific stipulations. Frequency of grazing on any unit will be based on site-specific evaluation of the grassland unit being managed.

Why is this use being proposed? Grazing is a necessary management tool to maintain and restore refuge grassland and wetland habitats. Some alternative grassland management is required if we do not use grazing as a tool. Typically, these other tools include prescribed burning, mowing, and haying. Haying has comparable costs to controlled grazing since it also requires administering a Special Use Permit. Mowing is often more expensive, since all costs are typically the responsibility of the agency. Prescribed burning is an effective grassland management tool, but staff limitations prevent us from burning our desired number of acres.

Availability of Resources:

What resources are needed to properly (considering quality and compatibility) and safely administer use? Most of the needed work to prepare for this use would be done as part of routine management duties. The decision to use grazing as a management tool would occur as part of strategies developed under specific program or unit habitat management planning. The additional time needed to coordinate issuance and oversight of the needed Special Use Permits is relatively minor and within existing station resources. The need to monitor grazing effects will take additional time; however, it will be incorporated into the existing grassland monitoring program at this station. Many partners are available to assist with grazing plan development, such as our local NRCS grazing specialists.

Are existing refuge resources adequate to properly and safely administer the use? Additional fiscal resources are needed in order to install much of the needed infrastructure to implement this use. Many times the cooperator is willing to commit labor to the project, thus materials for fencing are typically the greatest expense. Grans and partner funds can also assist with this need. The needed staff time is already committed and available. Most of the needed work to prepare for this use would be done as part of routine grassland management duties. The decision to use a private operator for grazing would only follow as part of strategies developed under grassland management discussions. The additional time needed to coordinate issuance and oversight of the needed Special Use Permit for grazing is relatively minor and within existing refuge resources. Monitoring grazing effects will be a part of the existing grassland monitoring program.

Anticipated Impacts of the Use:

How does grazing affect Refuge purposes and the NWRS mission? The use of grazing provides Refuge staff with a management tool that allows them to meet their goals and objectives. Service policy calls for maintaining or restoring refuge habitats to historic conditions if doing so does not conflict with refuge purposes (U.S. Fish and Wildlife Service 2001).

How does grazing affect fish, wildlife, plants, and their habitats; and the biological integrity, diversity, and environmental health of the refuge/NWRS? Grazing by domestic livestock has substantial short-term effects on grassland communities. Many of these effects are desirable and are designed to maintain and improve healthy grassland/wet meadow communities. Some of these effects include removing standing vegetation, trampling of other vegetation, and reducing populations of pioneering woody plants. Other effects, such as where livestock may frequently congregate, are more harmful but generally short-lived. Grazing in the spring can cause direct loss of grassland bird nests due to trampling and loss of standing vegetation. Grazing at any time of the year creates an aesthetic issue of concern for some people who enjoy using the Refuge; seeing public land being grazed by domestic livestock reduces the appeal of the visit for some people. Short-term benefits may include creating open water pockets for spring migrating waterfowl and shorebirds, setting back invasive emergent wetland vegetation, and creating short-grass patches within a prairie landscape for bird species that prefer the structural diversity in the landscape.

Some nest destruction may occur. Refuges are managed first and foremost for wildlife (USFWS 2001). But, the focus is on wildlife populations, not individuals (USFWS 1992). Grazing is likely to cause mortality to some individual animals, but it is not expected to negatively affect the perpetuation of wildlife populations.

Long-term benefits will accrue due to the increased vigor stimulated grasses or the establishment of highly desirable native tallgrass prairie species, which will improve conditions for those same species affected by short-term negative impacts. Prescribed grazing is recognized as a valuable tool to stimulate forbs, suppress non-native grasses, remove standing vegetation, reduce vegetative litter, and suppress woody vegetation. These are all important grassland management objectives that can be met by utilizing grazing as a habitat management tool.

Grazing livestock can create minor direct disturbance of wildlife, such as causing nearby birds to take flight. Also, there is a slight potential for conflict between members of the public and livestock or the permittee.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the CDs. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Grazing must help meet specific habitat and related wildlife objectives and contribute to the purposes of the Refuge.
2. Grazing will not occur more frequently than three out of every five years on any tract unless there is a specific management objective identified in a station plan or a written justification by the project leader is attached to the current CD.
3. Control and maintenance of the livestock will be the responsibility of the permittee.
4. All livestock grazing will be conducted under strict control of a Special Use Permit.
5. Fencing, water supply, and other livestock management infrastructure needs and costs will be outlined on a site by site basis in the Special Use Permit.
6. Any use of cattle insecticides must adhere to current Region 3 Pesticide Use Guidance.
7. No supplemental feeding will be allowed, unless specified in the Special Use Permit.
8. A goal of 30-50% of similar habitat type in the management unit or adjacent areas should be left ungrazed when feasible to serve as refugia for pollinators and other wildlife.
9. Consider the needs of pollinators and other wildlife when placing range improvements on the landscapes, such as salt/mineral blocks, watering tanks, and holding corals.

Justification: Prescribed grazing by domestic livestock will not materially interfere with or detract from the purposes for which the units were established. Limited livestock grazing creates temporary disturbances to vegetation. Many of these disturbances are desirable for grassland management. Grazing produces an undesirable short-term impact to grassland bird nesting and site aesthetics. Controlled grazing is an alternative management tool that can be used to replace or compliment prescribed burning, mowing, or haying on grasslands. Without occasional disturbance caused by mowing, haying, burning, or grazing, the health of the grassland community would decline, as would the areas' potential for waterfowl production.

Signature: Refuge Manager: Gregory A. Knutsen 1/4/2016
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2026

COMPATIBILITY DETERMINATION

Use: Recreational Fishing

Refuge Name: Rydell National Wildlife Refuge

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

Description of Use: The Refuge allows public recreational fishing in accordance with state regulations and seasons and applicable Refuge regulations. Fishing activities are restricted to access from the established accessible fishing piers on Tamarac Lake. The fishing season on the Refuge runs from May 1 to November 1 each year. The area which is open to fishing can only be accessed on foot or bicycle. Vehicle access to the fishing area is not allowed.

Availability of Resources: Anglers use the existing network hiking trails to access the piers on Tamarac Lake fishing. The Refuge provides adequate signage to assist anglers. The Refuge provides staff to maintain facilities, disseminate information to visitors, and enforce regulations. Fisheries management is conducted in cooperation with the Minnesota DNR. Adequate resources are available to manage the existing fishing program at the current level of participation.

Anticipated Impacts of the Use: Allowing this activity will not likely result in negligible environmental impact to the Refuge, its habitats or wildlife species. Concerns primarily center on the possibility of impacting non-target species through excessive disturbance. With restrictions limiting fishing access to one specific portion of the Refuge and only from designated piers, disturbance is greatly minimized. Disturbance to wildlife is limited to occasional flushing of non-target species and the harvest of individual members of the species open to the recreational fishing. Harvests during fishing activities are covered by state regulations. Restrictions to the fishing program will assure that this activity has no adverse impacts on other wildlife species and little adverse impact to other public use programs. The activities follow all applicable laws, regulations and policies; including Migratory Bird Conservation Act, 50 CFR, National Wildlife Refuge System Manual, National Wildlife Refuge System goals and objectives, and Rydell NWR goals and objectives. These activities are consistent with the purpose of the Refuge and the National Wildlife Refuge System Mission.

Fishing is a priority public use listed in the National Wildlife Refuge System Improvement Act. By facilitating fishing on the Refuge, we will increase knowledge and appreciation of fish and wildlife among program participants, which will lead to increased public stewardship of wildlife and their habitats. The

increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the CDs. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. This use must be conducted in accordance with state and federal regulations, and applicable special Refuge regulations.
2. Access by designated trails only.
3. No motorized vehicles or boats are allowed.

Justification: Fishing seasons and limits are established by the state and adopted by the Refuge. These restrictions ensure the continued well-being of overall populations of fish. Fishing does result in the taking of many individuals within the overall population, but restrictions are designed to safeguard adequate population and recruitment from year to year. Disturbance to other fish and wildlife does occur, but this disturbance is generally short-term and adequate habitat occurs in adjacent areas.

Allowing this use also furthers the mission of the National Wildlife Refuge System by providing renewable resources for the benefit of the American public while conserving fish, wildlife, and plant resources on the Refuge.

Signature: Refuge Manager: Gregory A. Knutsen 12/1/15
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2030

COMPATIBILITY DETERMINATION

Use: Recreational Hunting

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

Glacial Ridge NWR was established in 2004 under the Migratory Bird Conservation Act (16 U.S.C. § 715-715r, as amended) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645).

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

The primary purpose for which Glacial Ridge NWR was established was, under the Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Description of Use: As described in the Glacial Ridge NWR Hunt Plan, allow the hunting of white-tailed deer, waterfowl (ducks, geese and coots), other migratory birds (rails, snipe, woodcock, mourning doves) and upland game (prairie chicken and sharp-tailed grouse) as compatible with the purpose for the establishment of the Refuge and where appropriate, in concurrence with State of Minnesota regulations.

As described in the Rydell NWR Hunt Plan, allow the hunting of white-tailed deer during a special hunt for disabled persons, a special hunt for mentored youth hunters under the age of 16, and hunts during the regularly established hunting seasons as necessary, through a drawing. Numbers of hunters allowed to access Rydell NWR will depend on the estimated desired harvest of deer to maintain the herd within the carrying capacity of the Refuge. Additional special management hunts may be conducted through special drawings and permits.

The above hunting will occur on Refuge lands, specifically identified within the Congressionally approved boundary and as outlined in the Hunting Management Plans and as indicated on the Rydell and Glacial Ridge NWR hunt maps. Adding new lands, species, or hunts requires submission of an opening package through established channels, including announcement in the Federal Register.

All hunting activities follow applicable state & federal laws and seasons, except where the Refuge administers further restrictions to ensure compliance with Refuge-specific laws and compatibility issues. All hunting activities can only occur in designated areas identified in Hunting Management Plans and as indicated on the Rydell and Glacial Ridge NWR hunt maps.

Availability of Resources: The Rydell and Glacial Ridge NWRs are complexed under the Detroit Lakes Wetland Management District and Glacial Ridge NWR Complex. Funding allotted to Rydell and Glacial Ridge NWRs will be used to manage the hunt, including: coordination with Minnesota Department of Natural Resources, completion of necessary surveys, and placement of signs. Law enforcement activities would be completed through a Service Law Enforcement Officer stationed in Detroit Lakes and Minnesota DNR Conservation Officers. The availability of station resources (e.g., funding, staff) to continue to support hunting programs at their current levels on both Rydell and Glacial Ridge NWRs will be re-evaluated on an annual basis.

Anticipated Impacts of the Use: Disturbance to wildlife during the hunting season by hunters is an anticipated effect. Disturbance by vehicles will be limited, as off-road travel will not be permitted on either refuge. Special access accommodations for persons with disabilities will be minimal, utilizing existing trails.

As indicated in the Rydell and Glacial Ridge NWR Hunting Plans, adjustments to the species hunted and harvestable limits will be annually evaluated by both Minnesota DNR and Service staff, based on the best available information. For both Rydell and Glacial Ridge NWRs, a portion of each refuge is closed to hunting to provide a non-hunting sanctuary area, as well as recognize potential safety issues (e.g., hunting proximity to occupied refuge facilities). These areas are outlined in the respective Hunt Plans.

Determination:

_____ Use is not compatible

__X___ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

- Annually review all hunting activities and operations to ensure compliance with all applicable State and Federal laws, regulations, and policies.

Justification: Hunting recognized by the Service as one of the six priority public uses. As such, special consideration is used to evaluate its compatibility with the refuges. The Rydell and Glacial Ridge NWR Hunt Plans provide the management needed to ensure compatibility with the goals of the refuges and to maintain compliance with the 1997 National Wildlife Refuge System Improvement Act. Annual wildlife surveys and/or population modeling exercised conducted by the Minnesota DNR and the U.S. Fish and Wildlife Service provide the data to ensure that hunting of these species doesn't jeopardized their long- range population goals.

Signature: Refuge Manager: Gregory A. Knutsen 12/1/15
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10 or 15 year Re-evaluation Date: 2030

COMPATIBILITY DETERMINATION

Use: Research, Scientific Collecting, and Surveys by Third Parties

- Research: Planned, organized and systematic investigation of a scientific nature.
- Scientific collecting: Gathering of refuge natural resources or cultural artifacts for scientific purposes.
- Surveys: Scientific inventory or monitoring.

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

Glacial Ridge NWR was established in 2004 under the Migratory Bird Conservation Act (16 U.S.C. § 715-715r, as amended) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645).

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

The primary purpose for which Glacial Ridge NWR was established was, under the Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Description of Use: Refuge staff receive periodic requests from non-Service entities (e.g., universities, state or territorial agencies, other Federal agencies, nongovernmental organizations) to conduct research, scientific collecting, and surveys on Rydell and Glacial Ridge NWRs. Project requests can involve a wide range of natural and cultural resources, as well as public-use management issues, including basic absence/presence surveys, collection of new species for identification, habitat use and life-history requirements for specific species/species groups, practical methods for habitat restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, modeling of wildlife populations, bio-prospecting, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, refuge-specific, or evaluate the relative contribution of USFWS lands to larger landscape (e.g. northern tallgrass prairie ecoregion, Prairie Pothole Region, flyway, national, international) issues and trends.

The Service's Research and Management Studies (4 RM 6) and Appropriate Uses (603 FW1.10D(4)) policies indicate priority for scientific investigatory studies that contribute to the enhancement,

protection, use, preservation, and management of native wildlife populations and their habitats in their natural diversity. Projects that contribute to refuge-specific needs for resource and/or management goals and objectives will be given a higher priority over other requests. A signed special use permit (SUP) will be required for each of these "third-party uses".

Where would the use be conducted? Sites for this use would depend on the particular action (research, collecting, or survey) being conducted and could occur in a variety of habitat types within the Rydell or Glacial Ridge NWR boundaries. Access would be restricted by SUP to the minimum sample size or study sites needed to meet stated objectives of the research, scientific collection, or survey project.

When would the use be conducted? The timing of research, collecting and survey activities would depend on the individual project, but currently most research occurs during day-light hours in the growing season (April – August). The timing, duration, number of staff, and visits by permittees may be restricted by SUP at the discretion of the Refuge Manager.

How would the use be conducted? Projects will adhere to scientifically defensible protocols for data collection, where available and applicable. Any research study site(s), collection and sampling location(s), and transect(s) can be temporarily marked by highly visible wooden or metal posts or other pre-approved method and must be removed when the project is complete. Access to study sites is by foot, truck, all-terrain vehicle, boat, airboat, canoe, or other watercraft. Vehicle use is allowed on refuge roads, trails, and parking lots that ate normally open to the public or other locations, as specified by the SUP.

Why is this use being proposed? Research, scientific collecting, and survey activities conducted by non-Service entities that do not expand knowledge of natural systems or inform refuge management decisions are considered a "refuge use" and are therefore, subject to provisions of Appropriate Use and Compatibility policies. However, refuge staffs recognize these activities may indirectly contribute to the enhancement, protection, use, preservation, and management of refuge wildlife populations and their habitats or directly advance scientific knowledge of a particular species or species-group or otherwise provide information beneficial to conservation.

Availability of Resources: Refuge staff responsibilities for projects by non-Service entities will be primarily limited to the following: review of proposals, preparation of SUP(s) and other compliance documents (e.g., Section 7 of the Endangered Species Act of 1973, Section 106 of the National Historic Preservation Act), and monitoring of project implementation to ensure impacts and conflicts remain within acceptable levels (compatible) over time. Additional administrative support, logistical and operational support may also be provided depending on each specific request. Facilities and staff are currently available to provide access, maintain roads, parking lots, secondary access roads, as well as to issue SUPs for research, collecting, and survey projects. Staff resources are deemed adequate to manage this use at anticipated levels.

Anticipated Impacts of the Use: Impacts would be specific to the project and the site, and will vary depending upon the nature and scope of the field work. Data collection techniques will generally have minimal animal morality or disturbance, habitat destruction, no introduction of contaminants, or no introduction of non-indigenous species. In contrast, projects involving the collection of biotic samples (plants or animals) or requiring intensive ground-based data or sample collection will have short-term

impacts. To reduce impacts, the minimum number of samples (e.g., water, soils, vegetation, invertebrates, and vertebrates) will be collected for identification and/or experimentation and statistical analysis.

There also could be localized and temporary effects from vegetation trampling, collecting of soil and plant samples, or trapping and handling of wildlife. Impacts may also occur from infrastructure necessary to support projects (e.g., temporary transects or plot markers, exclosure devices, monitoring equipment, solar panels to power unattended monitoring equipment). Some level of disturbance is expected with these projects, especially if investigator(s) enter areas closed to the public and collect samples or handle wildlife. However, wildlife disturbance (including altered behavior) will usually be localized and temporary in nature. Where long-term or cumulative unacceptable effects cannot be avoided, the project will not be found compatible. Project proposals will be reviewed by Refuge staff and others, as needed, to assess the potential impacts (short, long-term, and cumulative) relative to benefits of the investigation to refuge management issues and understanding of natural systems.

If project methods impact or conflict with refuge-specific resources, priority wildlife-dependent public uses, other high-priority research and refuge habitat and wildlife management programs, then it must be 1) clearly demonstrated that its scientific findings will contribute to resource management and 2) that the project cannot be conducted off refuge lands, in order for the project to be compatible. The investigator(s) must identify methods/strategies in advance required to minimize or eliminate potential impact(s) and conflict(s). If unacceptable impacts cannot be avoided, then the project will not be compatible. Projects that represent public or private economic use of the natural resources of any national wildlife refuge (e.g., bio-prospecting), in accordance with 16 U.S.C. 715s, must contribute to the achievement of the national wildlife refuge purposes or the National Wildlife Refuge System mission to be compatible (50 C.F.R. 29.1). A separate compatibility determination will not be prepared for each request, but rather a project-specific SUP will outline various restrictions and requirements.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the compatibility determinations. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible, with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Prior to conducting investigations, researchers will obtain a SUP from the Refuge Manager that makes specific stipulations related to when, where, and how the research will be conducted. The Refuge Manger retains the option to prohibit research on the property which does not contribute to the purposes or the mission of the Refuge System, or causes undo resource disturbance or harm.

2. Research applicants must submit a study plan to the Refuge Manager that includes:
    a) justification and objectives of the study;

b) relevance to resource management;
c) methods, schedule, and personnel;
d) potential impacts on Refuge wildlife and/or habitat;
e) provisions to minimize disturbance, injury, or mortality and prevent the introduction of invasive or pest species;
f) compliance with established standards for proper animal care and use;
g) data standards and data management plan;
h) costs to Refuge, if any; and
i) anticipated end products (i.e., reports, publications, recommendations)

3. Research plans will be reviewed by Refuge staff. Evaluation criteria will include, but not be limited to, the following:
   a) Research that has direct relevance to management will have higher priority than other requests
   b) Research requests that conflict with higher priority research, monitoring, or management programs may not be granted.
   c) Research that causes undue disturbance or is intrusive, will likely not be granted.
   d) If staffing or logistics make it difficult for Refuge staff to monitor researcher activity in a sensitive area, this may be reason to deny the request.
   e) The length of the project will be considered and agreed upon before approval. Projects will not be open-ended and at a minimum, will be reviewed annually.

4. Researchers must possess all applicable state and federal permits for the capture and possession of protected species, for conducting regulated activities in wetlands, and for other regulated activities (e.g., banding). Researchers must demonstrate they have approval from the Animal Care and Use Committee, if such approval is required by their research institution.

5. Archeological researchers must obtain an Archeological Resource Protection Act permit from the Regional Director prior to obtaining a SUP from the Refuge Manager.

6. Sampling equipment as well as investigator(s) clothing and vehicles (e.g., ATV, boats) will be thoroughly cleaned (free of dirt and plant material) before being allowed on Refuge lands, to prevent the introduction and/or spread of pests and invasive species.

7. Researchers, scientific collectors, and surveyors will submit annual progress reports, a final report, and copies of publications resulting from the work to the Refuge Manager.

8. Researchers, scientific collectors, and surveyors will submit an electronic copy of all raw data collected on Refuge lands to the Refuge Manager with the understanding that the researcher will have the opportunity to produce publications based on the data.

9. In unacceptable impacts to natural resources or conflicts arise or are documented by the Refuge staff, the Refuge Manager can suspend, modify conditions of, or terminate an on-going project already permitted by an SUP.

Justification: Use of the Refuges to conduct research, scientific collecting, and surveys will generally provide information that would benefit fish, wildlife, plants, and their habitats because they will expand scientific information available for resource management decisions. Scientific findings gained through

these projects provide important information regarding life-history needs of species and species groups as well as identify or refine management actions to achieve resource management objectives in Refuge management plans (especially Comprehensive Conservation Plans). Reducing uncertainty regarding wildlife and habitat responses to Refuge management actions in order to achieve desired outcomes reflected in resource management objectives is essential for adaptive management in accordance with 522 DM 1.

It is anticipated that wildlife species which could be disturbed during the use would find sufficient food resources and resting places so their abundance and use of habitats will not be measurably reduced. Additionally, it is anticipated that project oversight, as needed, will prevent unacceptable or irreversible impacts to fish, wildlife, plants, and their habitats. As a result, these projects will not materially interfere with or detract from fulfilling refuge purpose(s); contributing to the Mission of the National Wildlife Refuge System; and maintaining the biological integrity, diversity, and environmental health of refuge lands.

Signature: Refuge Manager: Gregory A. Knutsen 12/1/15
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2025

COMPATIBILITY DETERMINATION

Use: Walleye Rearing in Clifford Lake

Refuge Name: Rydell National Wildlife Refuge

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

Description of Use: The use in question is raising walleye fry to fingerlings in Clifford Lake, which is located in the south part of Rydell NWR. The Service's Division of Fisheries (i.e., Midwest Regional Office, La Crosse Fishery Resource Office, Genoa National Fish Hatchery staff) will place walleye fry in Clifford Lake in the spring (typically May) of each year and will subsequently work to remove as great a percentage as possible of those walleyes at the fingerling stage during the fall (typically late September or early October) of each year. Fingerling removal is conducted using 20-25 fyke (trap) nets. Prior to fingerling removal, a sample of ~ 60 walleyes are collected using a similar netting procedure in early to mid-August and delivered "on ice" to the Regional Fish Health Center to be tested for a variety of diseases (pathogens) and must be certified "disease free" prior to the granting of the required distribution permit from the State of Minnesota. All of the above activities closely follow a Region 3 Division of Fisheries Annual Walleye Rearing Cycle protocol.

Availability of Resources: Since these activities are associated with the Service's Division of Fisheries, there are no additional expectations of Refuge staff to support the activity. If and when necessary, Refuge staff will assist from a logistical standpoint, if possible.

Anticipated Impacts of the Use: There will be a limited amount of disturbance caused by access and collection of fingerlings, because the activity is infrequent. Initially, the walleye fry may potentially have a negative impact on the spring invertebrate population in Clifford Lake before they are big enough to start eating minnows. This has the potential to consequently impact waterfowl production. However, the subsequent reduction of the minnow population in the lake, as the young walleyes eventually switch their forage base to minnows, may result in an increase in available invertebrates for diving ducks during the fall migration. The program provides approximately 8,000 to 20,000 walleye fingerlings to Service and tribal lands each year. The overall long-term impacts of this activity to the waterfowl resource are likely negligible.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the compatibility determinations. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Walleye rearing will only occur in Clifford Lake only.
2. No other species of fish will be stocked.
3. In past years, when the Service's Division of Fisheries determines that they have collected a lower than desired number of fingerlings in the fall, they have extended an invitation for the Minnesota DNR Area Fisheries Office to conduct a follow-up collection effort on Clifford Lake. The rationale for this follow-up collection effort is that it is beneficial for the future of this stocking program to remove as high a percentage of fingerlings as possible in a given year. The Minnesota DNR Area Fisheries Office will use a similar collection protocol to that of the Service's Division of Fisheries. The Rydell NWR Manager will have the final decision authority on whether to allow this follow-up collection activity to occur. If the Minnesota DNR is allowed to collect walleye fingerlings, a special use permit will be required.

Justification: Allowing walleye rearing on Rydell NWR, within the above stipulations, will have minimal impact on the wildlife resources of the Refuge. Waterfowl use of Clifford Lake has not appeared to suffer for the current ongoing use of the lake for rearing purposes. A normal complement of breeding waterfowl, equal to that found on wetlands of similar size/type on the Refuge, are observed on Clifford Lake each year and this lake is presently one of the Refuge's main staging areas for migrating diving ducks and Canada geese each spring and fall.

Additionally, this activity is part of the Service's federal-tribal trust responsibility. Tribal trust resources are those natural resources, either on or off Indian lands, retained by, or reserved by or for Indian tribes through treaties, statutes, judicial decisions, and executive orders, which are protected by a fiduciary obligation on the part of the United States. *Principle 1* – The Departments shall work directly with Indian tribes on a government-to-government basis to promote healthy ecosystems.

Signature: Refuge Manager: Gregory A. Knutsen 12/1/15
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2025

COMPATIBILITY DETERMINATION

Use: Wildlife Observation and Non-Commercial Photography (still and moving; including the means of access such as hiking, snowshoeing, and cross-country skiing)

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

Glacial Ridge NWR was established in 2004 under the Migratory Bird Conservation Act (16 U.S.C. § 715-715r, as amended) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645).

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

The primary purpose for which Glacial Ridge NWR was established was, under the Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Description of Use: Allow general public access 30 minutes before sunrise until 30 minutes after sunset for the observation and photographing of associated flora and fauna. The Refuges will be open to the public for the observation and photography of wildlife and their habitats unless specifically closed by the manager. Allowable forms of access to the Refuges include hiking, snowshoeing, cross-country skiing, canoes, and non-motorized boats. Limited access by bicycle, and motorized vehicles will be allowed on designated driving routes only. Motorized boats, including those with electric motors, will not be allowed. Entry on all or portions of individual areas may be suspended by posting during occasions of unusual or critical conditions affecting land, water, vegetation, wildlife populations, or public safety.

Access for wildlife observation and photography will provide public enjoyment of scenic views and an array of wildlife including waterfowl, other migratory birds, tallgrass prairie plants, and indigenous wildlife. The Refuges provide opportunities for wildlife enjoyment not usually available on adjacent private land.

Wildlife observation and photography will be open to the public in accordance with relevant regulations within the National Wildlife Refuge Act 50CFR 25 – 32), 43 CFR part 5 subpart A, and each Refuge's special regulations as defined within 50 CFR 32.42 or otherwise posted in accordance with 50 CFR 26.22 ("Any person entering or using any national wildlife refuge will comply with ... the provisions of any special regulation and any other official notification ..."). Under 43 CFR 5.2, still photography does not require a permit unless: (1) It uses a model, set, or prop as defined in §5.12.

Availability of Resources: Wildlife observation and non-commercial photography require minimal resources. Access trails, parking lots, signs, and other facilities as well as staff to enforce regulations and maintain these facilities have been provided by the Service.

Anticipated Impacts of the Use: Wildlife observation and photography pose minimal impacts on the purposes for which Wildlife Refuges were established. Access is typically by individuals or small groups on foot or using snowshoes or skies. Damage to habitat by walking is generally minimal and temporary. There may be minor disturbances to wildlife due to human activity on the land during these activities. The most likely impact would be during spring and early summer nesting and brood rearing but the expected sporadic and limited use by the public during this time period should not create unreasonable impacts. Winter wildlife observation and non-commercial photography pose no impacts to nesting waterfowl and little impact to dormant vegetation. Any unreasonable harassment would be grounds for the manager to close the area to these uses or restrict the uses to minimize harm.

Parking lots and access trails have also are minimally impacted by these activities because they are relatively small in size, generally have established cover on them, and typically are mowed after the nesting season is complete. They also allow for safe use of these public lands.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the CDs. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Certain modes of access such as motorized vehicle and bicycles will be limited to designated trails, public roads, and parking lots.
2. Camping, overnight use, and fires are prohibited.
3. No models, sets, props, photography equipment, recording devices, or viewing blinds may be left over night.
4. Harassment of wildlife or excessive damage to vegetation is prohibited.
5. Observing or photographing flora or fauna does not provide an individual the right to enter closed areas.
6. Any photography, filming, recording, or wildlife observation that an individual would like to do, outside of the described stipulations must first obtain a permit.
7. Commercial Photography requires a separate Compatibility Review by the Refuge Manger.

Justification: This use has been determined compatible because wildlife viewing and photography will not materially interfere with or detract from unit purposes, including waterfowl production. The level of use for wildlife observation and photography is moderate. The associated disturbance to wildlife is

temporary and minor. Wildlife observation and photography are priority public uses and inculcate visitors with the joys of abundant wildlife and wild lands. These uses also help fulfill the mission of the National Wildlife Refuge System.

Signature: Refuge Manager: Gregory A. Knutsen 12/1/15
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2030

COMPATIBILITY DETERMINATION

Use: Wood Cutting and Timber Removal

Refuge Name: Rydell and Glacial Ridge National Wildlife Refuges

Establishing and Acquisition Authorities: Rydell National Wildlife Refuge (NWR) was established in January 1992 under the authority of the Fish and Wildlife Act of 1956, as amended; and Recreational Use of Conservation Areas Act of 1962, as amended.

Glacial Ridge NWR was established in 2004 under the Migratory Bird Conservation Act (16 U.S.C. § 715-715r, as amended) and the Emergency Wetlands Resources Act of 1986 (P.L. 99-645).

National Wildlife Refuge System Mission: The Mission 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 within the United States for the benefit of present and future generations of Americans.

Refuge Purpose: Rydell NWR was established "...for the development, advancement, management, conservation and protection of fish and wildlife resources... 16 U.S.C. 742f (a) (4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..." 16 U.S.C. 742 (b) (1) (Fish and Wildlife Act of 1956, 16 U.S.C. 742 (a) – 754, as amended).

The primary purpose for which Glacial Ridge NWR was established was, under the Migratory Bird Conservation Act, "for use as an inviolate sanctuary, or for any other management purpose, for migratory birds."

Description of Use: The use is removal of standing or fallen trees by private individuals or contractors to meet management objectives. This covers all wood removal activities regardless of the ultimate use of the wood (e.g., firewood, pulp, biomass). Individuals and contractors are permitted to remove wood from there refuges in order to control trees that are invading native prairies or oak savannahs or are otherwise provide a negative impact to trust wildlife species and their habitats. This activity includes the cutting of standing trees including understory species; removal of tree piles as a result of previous tree removal projects; or removing fallen timber that is interfering in the logistics of habitat management or is causing damage to priority wildlife or habitats.

Contractors are frequently hired to conduct tree removal activities. Often the contract includes the requirement of complete removal of trees off-site. Complete removal of trees from a refuge allows for more efficient and more effective restoration of a site.

Tree removal activities of private individuals will be governed under a special use permit (SUP), which will be specific to the allowed activity.

The scope of the activity will be determined by the management objective for the area and by the quantity and quality of available wood. This activity will only occur where the Refuge Manager has determined that a management need exists to remove wood from the property consistent with the CCP,

HMP, and regional guidance documents. Harvest sites will vary in size dependent upon the site and management objectives.

Wood removal activities may be authorized throughout the year but will be implemented so as not to impact grassland-nesting birds. Most often, wood removal activities will occur during the winter months when frozen ground facilitates access and affords protection to underlying soils and vegetation from unnecessary disturbance caused by heavy equipment. Wood cutting will not be allowed during periods when the activity will cause damage to roads, grassland, and wetland habitat or disturb nesting birds. Any activities that might cause an effect to a historic property would be subject to a case-by-case Section 106 review.

This use could be allowed in any portion of Rydell or Glacial Ridge NWRs, depending upon the management objective-defined needs.

Availability of Resources: Planning, issuing SUPs, or contracts, and monitoring a wood harvest program would require a minimal commitment of staff hours. Much of this work is discussed as management decisions are made during work planning efforts. All harvest sites are mapped by refuge staff and detailed permit conditions are added to the SUP for each site, in order to protect the local identified resources. In undertaking a wood harvest project, the Refuge Manager has identified a management need and will have secured and prioritized the necessary station resources to implement the use.

Anticipated Impacts of the Use: In permitting this type of activity, the potential exists to directly impact migratory bird production through displacement of birds from localized areas due to disturbance, or crushing of nests as a result of vehicle movement for this activity. These impacts will be minimized by adjusting seasonal timing of the permitted activity in accordance with site-specific characteristics. In limited and rare instances, a small number of individuals of tree-nesting species (e.g., wood duck, hooded merganser) may be displaced from a local area when trees used for nesting are removed.

Both Rydell and Glacial Ridge NWRs lie within the white-nose syndrome buffer zone for the federally threatened northern long-eared bat. Therefore, no cutting of standing trees that are >3 inches diameter at breast height (DBH) will occur between June 1 and July 31, without conducting a previous Section 7 consultation/determination with the Service's Division of Ecological Resources. Avoiding cutting of the above trees during the specified timeframe protects potential northern long-eared bat roost trees during the pup season.

Indirect impacts to grassland-nesting bird production will occur as a result of removing woody vegetation. In nearly every instance, these impacts will be positive. The removal of woody vegetation from historic prairie habitats positively impacts waterfowl production and the System mission by facilitating the restoration of tallgrass prairie, reducing habitat fragmentation, and removing avian predator perch sites from grassland habitats.

Access for the purpose of removing wood may impact habitat by rutting soils, destroying ground cover, creating weed seed beds, and increasing sedimentation due to runoff in nearby wetlands. These impacts will be minimized by adjusting seasonal schedule for the permitted activity. Other short-term impacts include the creation of mammalian predator den sites when trees are piled instead of moved off site. Species such as raccoon and skunk often inhabit these wood piles and are primary predators for ground nesting birds. The piles are removed, often through prescribed burning after several years of curing.

Anticipated long-term impacts include the reduction of woody species in Refuge grasslands which benefits grassland-dependent birds.

Impacts to the habitat from access for wood removal purposes are potentially significant, but also easily avoided. Areas where woody species are removed for the purpose of conversion of the habitat type to prairie will likely receive follow-up treatments of burning, spraying, or farming and eventual restoration through seeding. Ground disturbance in these areas is less problematic and possibly desirable depending on the specific site. Access to and from these areas will need to be carefully controlled via a SUP to avoid impacts such as rutting and increased sedimentation into adjacent wetlands due to runoff. When existing roads are not present, access can be restricted to seasonal periods when the ground is frozen to avoid or minimize impacts to underlying vegetation and soils.

Other indirect impacts are generally considered positive and thus do not materially interfere with or detract from the purpose of migratory bird production or the System mission. The removal of trees along trails, in shelter belts, and within old home sites will benefit migratory bird production by assisting with the restoration of prairie habitat, reducing fragmentation and eliminating predator habitat and perch sites. Individuals participating in the wood harvest program will adhere to special conditions specified in a SUP to ensure resource protection and achievement of management goals. Control of woody species encroachment on prairie habitats is a necessary management activity when converting areas back to their historic habitat composition.

Public Review and Comment: A press release to the local newspapers in the area and television stations was made on June 19th, 2014. The purpose of the press release was to inform interested members of the public of the open comment period for the CDs. No comments were received.

Determination:

_____ Use is not compatible.

__X__ Use is compatible with the following stipulations.

Stipulations Necessary to Ensure Compatibility:

1. Work will be generally be restricted to areas where soil types indicate that habitat was historically comprised of native prairie vegetation, associated habitats, or in existing non-native woodlots associated with abandoned farm sites.
2. If work is in an area where grassland-dependent migratory bird nesting is likely, no cutting operations will be permitted from May 15 through July 15.
3. Vehicle access for wood removal will be limited to existing trails or restricted to seasonal periods when the ground is frozen or dry to limit rutting and damage to growing vegetation.
4. A SUP will be issued to private individuals so stipulations can be established to reduce or eliminate site-specific impacts and ensure Service management goals are met.
5. Purchase Orders/Task Orders will be issued to commercial operations to ensure site specific impacts and Service management goals are met.
6. Consultation has occurred with the Service's Region 3 Ecological Services Staff prior to implementation of a commercial cutting project to ensure the scope of the project is acceptable to local populations of T&E Species. Specifically, between June 1 and July 31, trees >3 inches in DBH will not be cut without a prior Section 7 consultation/determination.

7. Any activities that might cause an effect to a historic property would be subject to a case-by-case Section 106 review.

Justification: Direct impacts on migratory bird production (take, disturbance, etc.) can be largely avoided by timing the activity so that it does not coincide with the primary nesting season. Removal of trees in certain instances will, on occasion, eliminate cavity-nesting species habitat. This would be an irregular and occasional impact and, since most wood harvest will be associated with restoration sites, it is unlikely that these areas would have provided historic nesting sites. Due to the benefits that would be realized by other migratory bird species, and the abundance of artificial and natural nest sites for cavity-nesting species in the area, these impacts would not significantly detract from either the refuges' purpose or Service mission.

Signature: Refuge Manager: Gregory A. Knutsen 12/1/15
(Signature and Date)

Concurrence: Regional Chief: 1-11-16
(Signature and Date)

Mandatory 10- or 15-year Re-evaluation Date: 2025

Appendix I: List of Preparers and Contributors

Preparers

The following individuals were members of the core planning team, instrumental in the development of this document, and/or made major contributions throughout the planning process.

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U.S. Fish and Wildlife Service
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