# Sherburne

*National Wildlife Refuge*

## Comprehensive Conservation Plan Approval

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# Sherburne National Wildlife Refuge
## Comprehensive Conservation Plan

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# Chapter 1: Introduction and Background

*Gary Moss*

Imagine a place where migrating birds flock to rest and build energy on their flights north and south. Imagine a natural setting nearly 50 square miles in size next door to 3 million people. Imagine a place discovered anew by black bears and gray wolves after a long absence. Now, imagine a place where wildlife comes first, but the need for people to interact with nature is not forgotten. Perhaps the place you have imagined is the Sherburne National Wildlife Refuge, a wild remnant at the meeting of the western prairies and the northern woods.

Sandhill Cranes nest and roost in numbers here, Bald Eagles sit on bulky nests, and tall wading birds stand poised at the edge of the water waiting for the glint of an unlucky fish. Grassland birds have a home here, beavers build their lodges, and foxes den close to their human neighbors.

The Refuge is truly a special place appreciated by many people. However, the nature of the surrounding countryside is changing as rural farms give way to suburban homes and businesses. Can wildlife and natural things be sustained as the Refuge becomes more isolated in a developed landscape? Can we manage Refuge lands to stimulate the best fish and wildlife habitat possible? What is the balance between the needs of wildlife and the increasing number of people who will discover this wild place? The comprehensive conservation planning process explores these questions with involvement by neighbors, outdoor sports enthusiasts, local communities, non-government organizations, state wildlife agencies and other federal agencies. Ultimately, this document will provide direction toward the answers.

The 30,575-acre Refuge was established in 1965 at the urging of local conservationists and sportsmen interested in restoring the wildlife values of the St. Francis River Basin, which had been altered by a series of drainage ditches and agricultural production. The land was purchased under the authority of the Migratory Bird Conservation Act of 1929 and is now part of the National Wildlife Refuge System (Figure 1 and Figure 2).

With evolving science and social priorities, the Refuge has seen many changes in management techniques and emphasis during the past 40 years. However, the greatest changes may be those happening outside its boundary. According to the 2000 Census, Sherburne County is the second most rapidly developing county in the State of Minnesota, recording a growth of 54 percent from 1990 to

**Figure 1: Location of Sherburne NWR in Region 3 of the U.S. Fish & Wildlife Service**

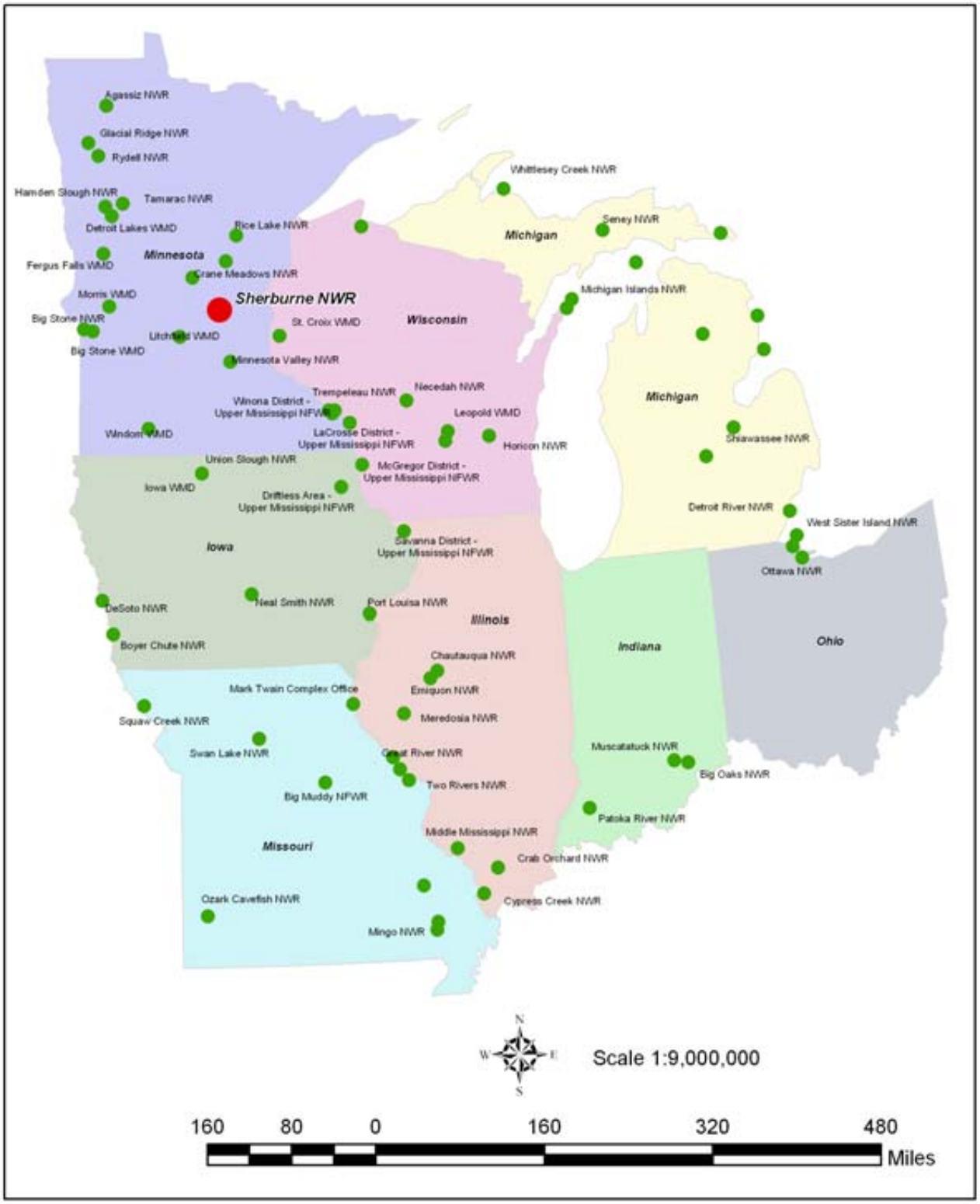
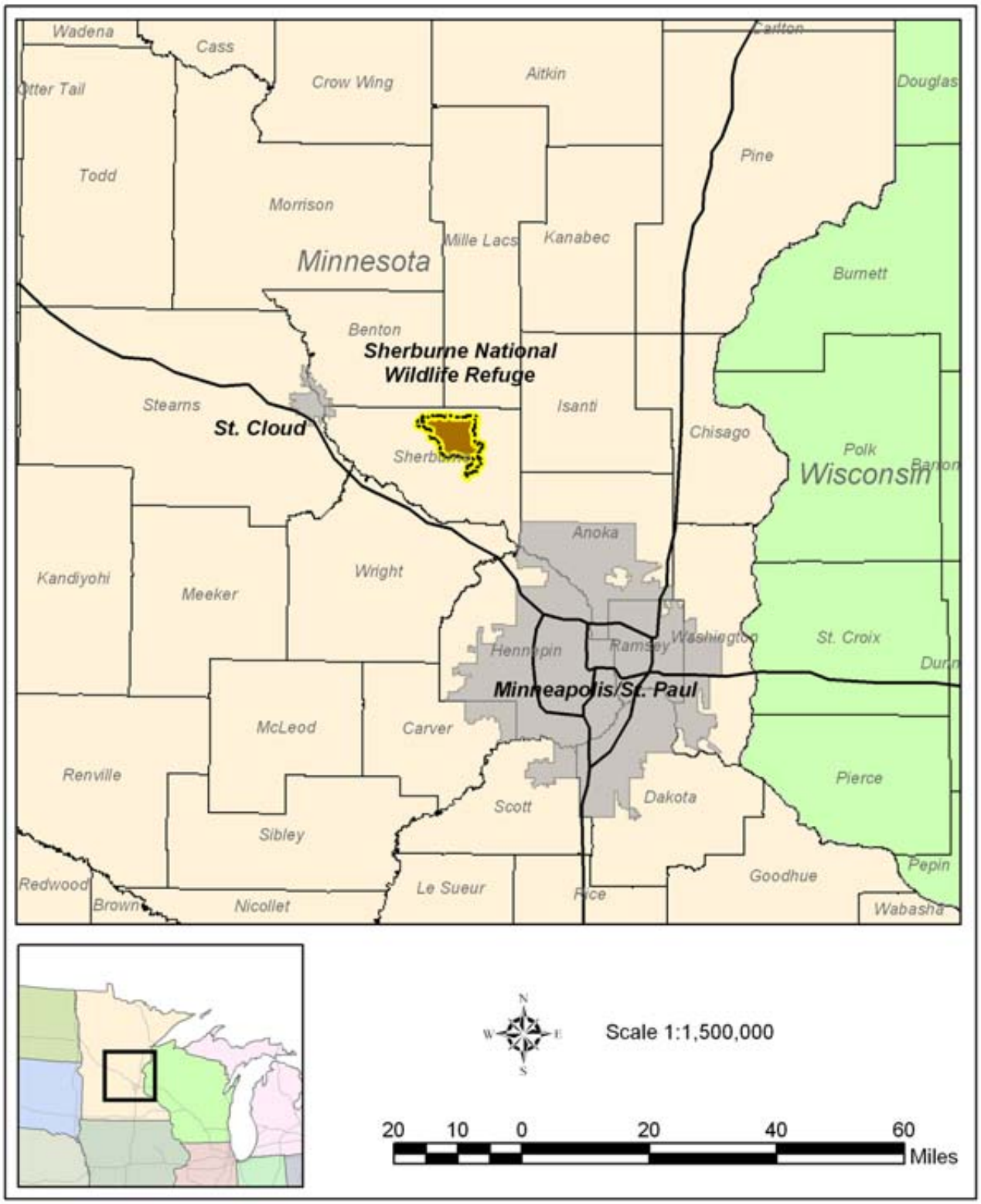


**Figure 2: Location of Sherburne NWR in Minnesota**



2000. It has also been included in the newly expanded nine-county metropolitan area of the Twin Cities. Rapid population growth is projected to continue in the region and will greatly influence the future of the Refuge and its programs.

Sherburne National Wildlife Refuge is the largest public land holding in Sherburne County. Most of the Refuge is located within the St. Francis River Watershed, which extends northward into Benton County. The St. Francis River begins about 18 miles from where it enters the northwest corner of the Refuge. After traveling through the Refuge, the St. Francis River drains into the Elk River, which in turn drains into the Mississippi River at the City of Elk River, Minnesota. A small portion of the Refuge lies within the Snake River Watershed, including Johnson Slough and Orrock Lake.

# The U.S. Fish and Wildlife Service

The Refuge is administered by the U.S. Fish and Wildlife Service (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, and the restoration of wildlife habitat such as wetlands. The Service also manages the National Wildlife Refuge System.

## Mission of the U.S. Fish and Wildlife Service

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

## Goals of the U.S. Fish and Wildlife Service

- *Sustainability of Fish and Wildlife Populations:* Migratory birds, endangered fish and wildlife species, interjurisdictional fish, and marine mammals are conserved, protected, enhanced, or restored. The Service is participating in conservation of other species when its expertise, facilities, or land can enhance state, tribal, or local efforts.
- *Habitat Conservation – Network of Lands and Waters:* An ecologically diverse network of lands and waters, of various ownerships, is conserved to provide habitats for marine mammals and migratory, interjurisdictional, endangered, and other species associated with ecosystems conserved in cooperation with others.
- *Connecting Americans to Wildlife:* The American public understands and participates in the conservation and use of fish and wildlife resources.
- *Workforce Excellence:* The Service's workforce, scientific capability, and business practices – in cooperation with the Department of Interior's scientific expertise – fully support achievement of the Service mission.

# The National Wildlife Refuge System

Refuge lands are part of the National Wildlife Refuge System, which was founded in 1903 when President Theodore Roosevelt designated Pelican Island in Florida as a sanctuary for Brown Pelicans. Today, the System is a network of more than 540 refuges covering more than 93 million acres of public lands and waters. Most of these lands (82 percent) are in Alaska, with approximately 16 million acres located in the lower 48 states and several island territories. The National Wildlife Refuge System is the world=s largest collection of lands specifically managed for fish and wildlife. Overall, it provides habitat for more than 5,000 species of birds, mammals, fish, and insects. As a result of

international treaties for migratory bird conservation as well as other legislation, such as the Migratory Bird Conservation Act of 1929, many refuges have been established to conserve migratory waterfowl and their migratory flyways from their northern nesting grounds to southern wintering areas. Refuges also play a vital role in preserving endangered and threatened species. Among the most notable is Aransas National Wildlife Refuge in Texas, which provides winter habitat for the Whooping Crane. Likewise, the Florida Panther Refuge protects one of the nation=s most endangered predators.

Refuges also provide unique opportunities for people. They are places where people can enjoy wildlife-dependent recreation such as hunting, fishing, wildlife observation, photography, environmental education, and environmental interpretation. Many refuges have visitor centers, wildlife trails, automobile tours, and environmental education programs. Nationwide, approximately 40 million people visited national wildlife refuges in 2004.

The National Wildlife Refuge System Improvement Act of 1997 established several important mandates aimed at making the management of national wildlife refuges more cohesive. The preparation of a comprehensive conservation plan (CCP) is one of those mandates. The legislation directs the Secretary of the Interior to ensure that the mission of the National Wildlife Refuge System and purposes of the individual refuges are carried out. It also requires the Secretary to maintain the biological integrity, diversity, and environmental health of the National Wildlife Refuge System.

## Mission of the National Wildlife Refuge System

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 fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

## Goals of the National Wildlife Refuge System

The administration, management, and growth of the System are guided by the following goals:

- # To fulfill our statutory duty to achieve refuge purpose(s) and further the System mission.
- # To conserve, restore where appropriate, and enhance all species of fish, wildlife, and plants that are endangered or threatened with becoming endangered.
- # To perpetuate migratory bird, interjurisdictional fish, and marine mammal populations.
- # To conserve a diversity of fish, wildlife, and plants.
- # To conserve and restore where appropriate representative ecosystems of the United States, including the ecological processes characteristic of those ecosystems.
- # To foster understanding and instill appreciation of native fish, wildlife, and plants, and their conservation, by providing the public with safe, high-quality, and compatible wildlife-dependent public use. Such use includes hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

# The Mississippi Headwaters/Tallgrass Prairie Ecosystem

The Refuge is located in the Mississippi Headwaters/Tallgrass Prairie Ecosystem of the U.S. Fish and Wildlife Service. This ecosystem is primarily located in Minnesota and North Dakota with small sections extending into Wisconsin and Iowa.

Historically, this portion of North America was subject to periodic glaciation and consequently, glacial meltwaters were instrumental in forming the five major river systems located or partly located within this ecosystem. These river systems are the Mississippi River, St. Croix River, Red River, Missouri River, and the Minnesota River. Likewise, glacial moraines and other deposits resulted in a myriad of lakes and wetlands that are common throughout this area. Significant variation in the topography and soils of the area attest to its dynamic glacial history.

The three major ecological communities within this ecosystem are the tallgrass prairie, the northern boreal forest, and the eastern deciduous forest. Vegetation common to the tallgrass prairie includes big bluestem, little bluestem, Indian grass, sideoats grama, and switch grass. Native prairie also supports numerous ecologically important forbs such as prairie coneflower, purple prairie clover, and blazing star. The northern boreal forest is primarily comprised of a variety of coniferous species such as jack pine, balsam fir, and spruce. Common tree species in the eastern deciduous forest include maple, basswood, red oak, white oak, and ash. Current land uses range from tourism and timber industries in the northern forests to intensive agriculture in the historic tallgrass prairie. Oak savanna and tallgrass prairie are by far the most threatened landscapes in the Midwest, with more than 99 percent having been converted for agricultural or residential purposes.

Due to its ecological and vegetative diversity, this ecosystem supports at least 121 species of neotropical migrants and other migratory birds. It provides breeding and migration habitat for significant populations of waterfowl plus a variety of other water birds. The ecosystem supports several species of candidate and federally-listed threatened and endangered species including the Bald Eagle, Piping Plover, Higgins eye pearly mussel, Karner blue butterfly, prairie bush clover, Leedy's roseroot, dwarf trout lily, and the western prairie fringed orchid. The increasingly rare paddlefish and lake sturgeon are also found in portions of this ecosystem.

# Refuge Purpose

Interpretation of the migratory bird purpose of the Refuge was the first step in determining management actions in this CCP. However, development of the CCP also considered the full diversity of native species that make up and depend upon healthy ecosystems. This is in accordance with the National Wildlife Refuge System Improvement Act of 1997 and the Service Policy on Maintaining the Biological Integrity, Diversity, and Environmental Health of the National Wildlife Refuge System; Notice (Federal Register 66 (10): 3810-3823).

Sherburne National Wildlife Refuge was established in 1965 under the general authority of the Migratory Bird Conservation Act of 1929 (16 U.S.C. 715d). That Act states that lands may be acquired "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." The term "inviolate sanctuary", as interpreted by the Service, means that the Refuge will be managed to

promote the health and well-being of migratory birds and their habitats. Other activities may also be accommodated, provided they are compatible with the Refuge purpose (as per Service Compatibility Policy, Federal Register 65 (202): 62484-62496).

It appears the intention of the Migratory Bird Conservation Commission in establishing the Refuge was primarily to provide habitat for migratory waterfowl. Considering the wording of the establishing legislation, along with recent policy and legislation, the Refuge purpose is interpreted to include all migratory birds as identified in the Code of Federal Regulations (50 CFR 10.13).

# Refuge Vision

The following vision statement was developed early in the CCP process. The vision paints a picture of how Sherburne NWR could look in the future:

> In a region where citizens treasure natural areas managed by national, state, and local governments, the Refuge is celebrated for its wildlife and the extraordinary opportunities it provides for visitors. The Refuge conserves a diverse mosaic of restored, quality, native Anoka Sandplain communities and protected cultural resources. The upland habitats are dynamic, ranging from grasslands to oak savanna to forest. These are interspersed with a variety of wetland and riverine habitats ranging from sedge meadow to deep water marsh. The Refuge's hydrologic regime includes a functional St. Francis River riparian system, with clean water flowing into and out of the Refuge. Wildlife and habitat are in balance, and management reflects an adaptive response to climatic change and other changing conditions, using pre-European settlement vegetation as a guide.
>
> Visitors have quality experiences that provide personal and societal benefits, including heightened awareness and support of a strong conservation ethic. Refuge staff, visitors, and the community understand and value the cultural history of the area. Visitor use and management activities are consistent with the maintenance of sustainable populations of wildlife and their associated habitats. The Refuge is part of the community and the community claims ownership of, actively supports, and advocates for the Refuge mission, purpose, and programs. The surrounding lands are recognized as valuable to the integrity of the Refuge by providing green corridors and habitat continuity to adjacent natural areas.

# Purpose and Need for Plan

This CCP articulates the management direction for the Refuge for the next 15 years. Through the development of goals, objectives, and strategies, this CCP describes how the Refuge also contributes to the overall mission of the National Wildlife Refuge System. Legislative and other policies, including the National Wildlife Refuge System Improvement Act of 1997, have guided the development of this plan. These mandates include:

- Wildlife has first priority in the management of refuges.
- Wildlife-dependent recreation activities, namely hunting, fishing, wildlife observation, wildlife photography, environmental education and interpretation are priority public uses of refuges. We will facilitate these activities when they do not interfere with our ability to fulfill the Refuge=s purpose or the mission of the Refuge System.
- Other uses of the Refuge will only be allowed when determined appropriate and compatible with Refuge purposes and mission of the Refuge System.

The plan will guide the management of Sherburne National Wildlife Refuge by:

- # Addressing Refuge critical needs.
- # Providing a clear statement of direction for the future management of the Refuge.
- # Making a strong connection between Refuge activities and off-Refuge activities.
- # Providing Refuge neighbors, users, and the general public with an understanding of the Service's management actions on and around the Refuge.
- # Ensuring that Refuge management actions and programs are consistent with the mandates of the National Wildlife Refuge System.
- # Ensuring that Refuge management considers federal, state, and county plans.
- # Establishing long-term continuity in Refuge management.
- # Providing a basis for the development of budget requests on the Refuge-s operational, maintenance, and capital improvement needs.

# History and Establishment

Native Americans have lived in the area of Sherburne National Wildlife Refuge for over 10,000 years and American Indian village sites discovered on the Refuge date back to 1300 A.D. Tremendous numbers of ducks, muskrats, beaver and mink were supported on small lakes, and marshes near the river which were abundant with wild rice and other wetland plants. The surrounding upland was primarily oak savanna, which provided habitat for elk, bison, and wolves.

The St. Francis River Valley was settled by people of European descent in the 1870s under the Homestead Act. In the early 1900s, when lakes and marshes were still in prime condition throughout Minnesota, the St. Francis River basin was regarded as one of the finest wildlife areas in the state. This condition prevailed until the late 1930s. There was an abundance of wild rice in the area, which the old timers associated with abundant wildlife. The last rice harvest by the Native Americans in the area was made in the 1930s.

The early European immigrants attempted to farm the sandy uplands by cutting oak savanna and draining the marshy bottoms. A ditch system was built to increase agricultural land and at first it was successful, but the drought years in the early 1930s were particularly hard on these early farms. Many pine plantations were started to hold the dry, sandy upland soils and create barriers to the wind.

The river was also impacted in the early 1940s when carp invaded the lakes and streams through open ditches. Submerged vegetation important to aquatic wildlife was uprooted and destroyed by the new invaders. In addition, as the years past, partially drained wetlands became overgrown with brush and the remaining native oak savanna, once maintained by regular burning, transformed to dense woodlands.

Soon after World War II, local conservationists and sportsmen became interested in the possibility of restoring the former wildlife values of the St. Francis River Basin. The Minnesota Conservation Department (now the Department of Natural Resources) conducted studies with the intention of managing the area as a state wildlife area. By the early 1960s it had become apparent that the magnitude of the project was beyond the funding capabilities of the Minnesota Conservation Department, as over 300 individual land holdings, comprising over 30,000 acres, would need to be purchased. Therefore, the State of Minnesota formally requested the U.S. Bureau of Sport Fisheries and Wildlife, now known as the U.S. Fish and Wildlife Service, to consider the area for a national wildlife refuge.

The Bureau took on the task and began seeking approval for the Refuge from various local, state and federal authorities. The intention of the Migratory Bird Conservation Commission in establishing the Refuge was primarily to provide habitat for migratory waterfowl. The early documentation justifying the Refuge reads:

> "Restoration of these drained wetlands will provide a waterfowl production, feeding, and resting area equal to any in the Lake States region. Annual production should exceed an estimated 10,000 birds, the majority being mallards, wood-ducks, and blue-winged teal. Redheads, ring-necked ducks, and Canada geese can also be well represented under proper management. The peak fall concentration is estimated at 100,000 ducks and coots and 30,000 Canada Geese."

*Jim Mattsson*

Final approval of the Refuge was received from Migratory Bird Conservation Commission on May 18, 1965, and land was purchased with Federal Migratory Bird Hunting Stamp (Duck Stamp) funds.

## Legal Context

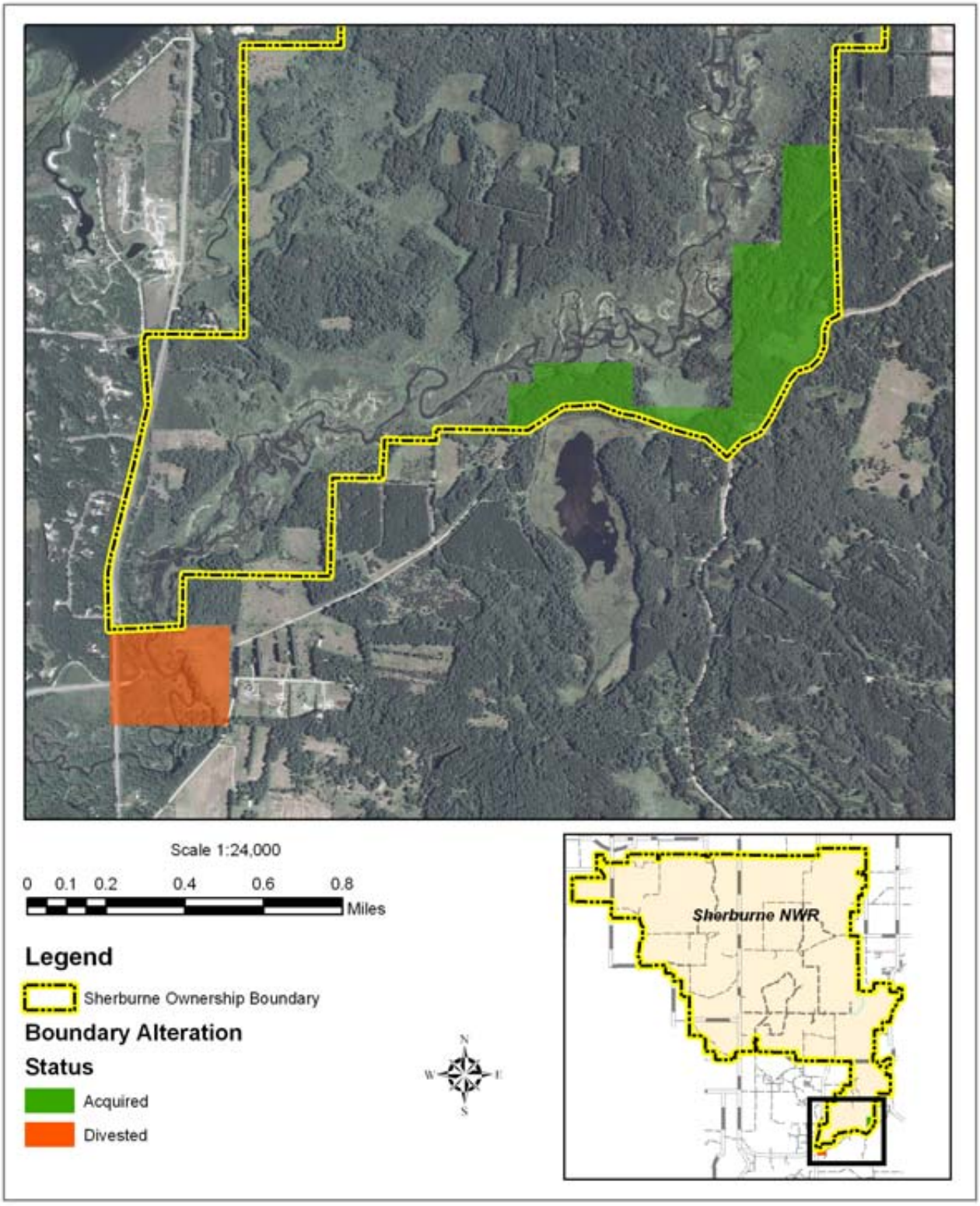
In addition to the Refuge=s establishing legislation and the National Wildlife Refuge System Improvement Act of 1997, several Federal laws, executive orders, and regulations govern administration of the Refuge. Appendix E contains a partial list of the legal mandates that guided the preparation of this plan and those that pertain to Refuge management activities.

## Refuge Boundary

Since its establishment, there have been many minor changes to the Refuge boundaries as roads have been rerouted and management concerns realized. One of the largest boundary changes occurred after this CCP process was under way and impacts the maps within this document. It was a land exchange initiated by the Minnesota Department of Natural Resources based on safety concerns for recreational users of the South Sand Dunes State Forest. This exchange was completed in 2002 on the area adjacent to the Sand Dunes State Forest, south of Sherburne County Road 4. The exchange was undertaken on a equal dollar value basis. Based on the market value of the lands, one parcel of Service-owned land (about 44 acres) on Sherburne NWR was exchanged for two parcels owned by the State of Minnesota totalling about 114 acres. The benefits of this exchange included expanding the native vegetation and quality wildlife habitat acreage on the Refuge, a larger upland buffer to the river corridor in this area, more manageable Refuge and state forest boundaries, and improved safety for state recreational trail users.

The original GIS work performed in preparation for the CCP mapping current and historic conditions, such as soils, vegetation covertypes, management changes and management units was done before the exchange was proposed. In addition, the exchange boundaries were changing throughout the CCP process. It was based on this knowledge that we decided to use the boundary in existence when the CCP began to show current and historic conditions and to analyze and compare proposed alternatives for management of the Refuge over the next 15 years. To recreate this analysis based on the new

**Figure 3: New Refuge Boundaries Resulting From a Land Exchange (2003), Sherburne NWR**



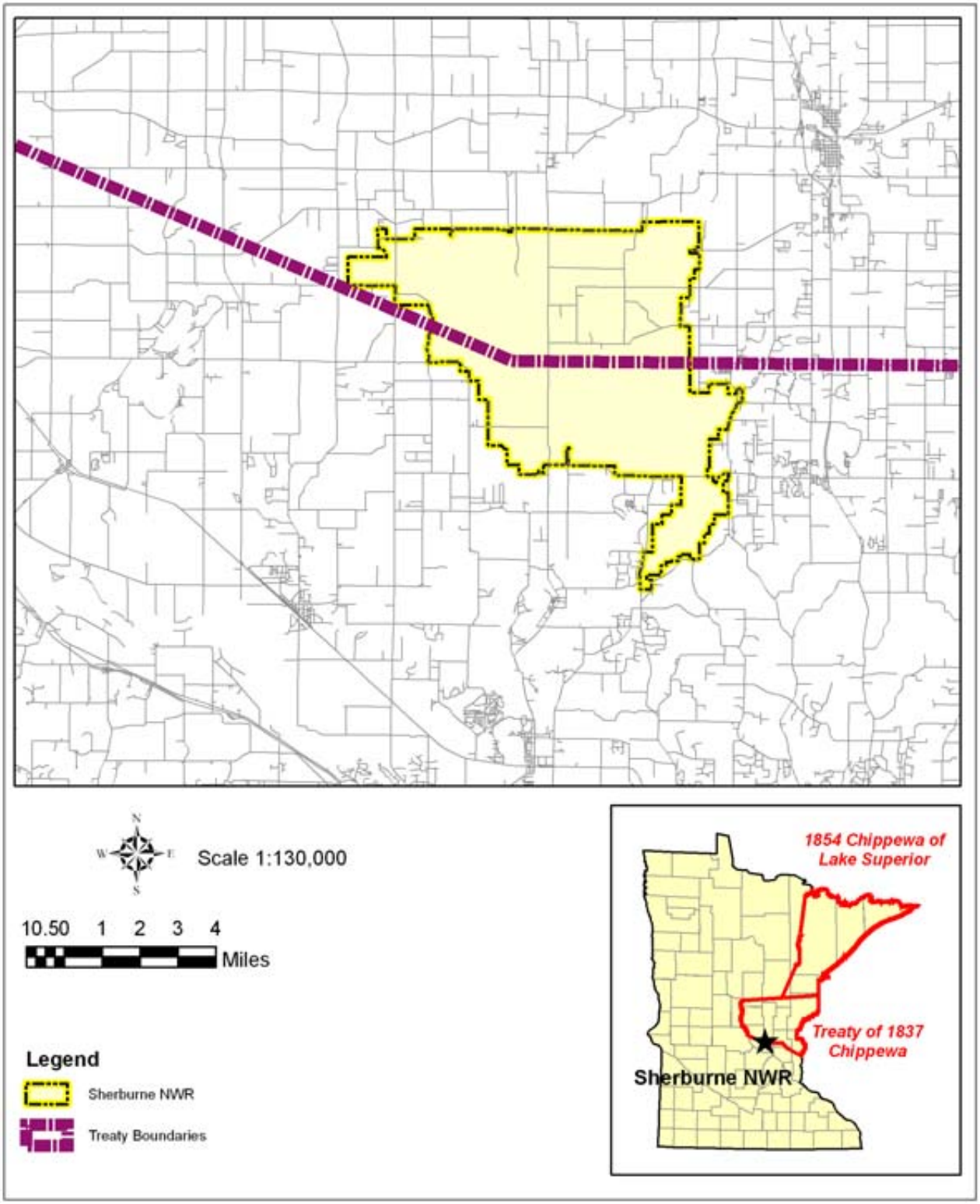
boundary would not show significant differences. A comparison of the new and old boundaries is shown here (Figure 3). However, the majority of the maps within this document will show the old boundary.

## 1837 Treaty

In 1837, before Minnesota was a state, the United States signed a treaty with the Chippewa Indians including the Mille Lacs Band of Ojibwe and several other tribes. The tribes that signed this treaty sold, or ceded, land to the United States government on the condition that they would still have the right to hunt, fish and gather in the ceded territory. Today, Mille Lacs Band members and members of the other tribes that signed the treaty can still exercise their treaty rights to hunt, fish and gather on public lands within the ceded territories under tribal regulations. Treaty rights are exercised on the ceded portion of the Refuge during established seasons, following State and Refuge specific regulations.

The 1837 ceded territory boundary crosses through a portion of the Refuge on a trajectory designated by the Treaty of 1837 (Figure 4).

**Figure 4: Portion of Sherburne NWR Within the Treaty of 1837 Ceded Lands**



# Chapter 2: The Planning Process

*USFWS*

This CCP and associated Environmental Assessment (EA) were prepared in compliance with the National Wildlife Refuge System Improvement Act of 1997, the National Environmental Policy Act of 1969, and Service policy set forth in the Departmental Manual on National Wildlife Refuge System Planning (part 602 FW 1).

## Meetings and Public Involvement

Public involvement is a key element of comprehensive conservation planning, and throughout this planning process we strive to provide as many opportunities for public participation as possible. A Notice of Intent to prepare a comprehensive conservation plan for Sherburne NWR was published in the Federal Register on May 4, 2001. Subsequently, articles in local newspapers notified citizens and a web page was developed. In addition, over 5,000 letters were sent to surrounding residents inviting them to participate. Seven public meetings were conducted between May 29, 2001, and September 13, 2002. Invitees and participants included members of the public, Ojibway and Dakota Tribes, Sherburne NWR Friends Group, Minnesota Department of Natural Resources, private conservation groups (NGOs), university faculty and government scientists. The planning effort benefited from the creative involvement of the public, tribal, state, university and federal participants.

Our planning process follows eight basic steps described in the Service's planning policy. The steps are:

- Preplanning: Planning the Plan
- Initiate Public Involvement and Scoping
- Review Vision Statement and Goals and Determine Significant Issues
- Develop and Analyze Alternatives, Including the Proposed Action
- Prepare Draft Plan and NEPA Document
- Prepare and Adopt Final Plan
- Implement Plan, Monitor, and Evaluate
- Review and Revise Plan

The CCP planning process began in November 2000 with a team comprised of Refuge staff, regional and Washington Office planners, representatives of regional office programs, and biologists from the U.S. Geological Survey, Biological Resources Division. The team agreed to proceed through a combination of expert technical groups and workshops open to the public and facilitated by Conservation Breeding Specialist Group (CBSG), which is a Species Survival Committee (SSC) member of the International Union for the Conservation of Nature (IUCN). Three technical groups (upland, wetland, and public use) met throughout the year. Concurrently, four CBSG workshops were held. These workshops were designed to incorporate the technical group findings and the public meetings and to consolidate work to produce a mission statement, vision statement, and goals and draft objectives for the environmental assessment and comprehensive conservation plan.

This CCP incorporates the results of these meetings and workshops. In addition to the general public, we invited individuals from a diversity of groups and institutions.

Table 1 and Table 2 specify public involvement efforts leading toward a public review draft.

**Table 1: Public Meetings**

| Public Meetings | Date | Location | Participants | Results |
|---|---|---|---|---|
| Open House and Public Meeting | 5/29/01 | Sherburne NWR | 22 | Reviewed issues |
| Open House | 5/30/01 | Sherburne NWR | | Reviewed issues. |
| CBSG Workshop I | 7/16-18/01 | St. Cloud | 39 | Refuge Vision, purpose, key issues, preliminary goals |
| CBSG Workshop 2 | 10/9-12/01 | Otsego, Minn. | 21 | Refuge goals, alternative management scenarios and preliminary objectives |
| CBSG Workshop 3 | 3/12-15/02 | Otsego, Minn. | 27 | Refined purpose, defined alternatives, developed objectives |
| CBSG Workshop 4 | 9/10-13/02 | St. Cloud, Minn. | 22 | Finalized Alternatives and Objectives |

**Table 2: Technical Work Groups and Focus Group Meetings**

| Technical and Focus Group Meetings | Date | Location | Purpose |
|---|---|---|---|
| Sherburne NWR Staff Meeting | 12/14-15/00 | Sherburne NWR | Introduce staff to Comprehensive Conservation Planning and begin issue development. |
| CBSG Approach | 6/6/01 | Regional Office | First Organizing Meeting with CBSG |
| Upland Technical Group. USGS/BRD | 6/27-29/01 | Sherburne NWR | Begin Alternative and Objective setting for upland oak savanna. |
| Recreation Focus Group Meeting | 8/15/01 | Sherburne NWR | Issues development |
| Recreation Focus Group Meeting | 8/27/01 | Sherburne NWR | Review of CBSG meeting results and issues development |

## Table 2: Technical Work Groups and Focus Group Meetings (Continued)

| | | | |
|---|---|---|---|
| Migratory Bird issues related to wetland management at Sherburne NWR | 9/09/01 Conference Call | Murray Laubhan, Jim Mattsson, Steve Wilds, Tom Will, Bob Russell, and Steve Lewis. | The purpose of the call was to provide Murray with input from Regional Office biologists. The emphasis of the discussion was migratory birds, the conservation of which is the stated primary purpose of the Refuge. |
| Hunting Focus Group Meeting | 9/20/2001 | Sherburne NWR | Review hunting activities and identify issues. |
| Query Tool USGS/BRD | 1/08/02 | Regional Office | Review of the Decision Tools and matrix approach developed by Carl Korschgen, Kevin Kenow, and Jason Rohweder. |
| Ecosystem Planning The Nature Conservancy (TNC) | 1/15/02 | Sherburne NWR | Review of TNC designation of Sherburne NWR as a priority area, review of their ecosystem approach |
| Upland and Wetland Technical Group Meeting (USGS-BRD) | 1/23-25/02. | Sherburne NWR | Completed Objectives for Alternative 5. |
| Public Use and Recreation Focus Group | 2/09/02 | Sherburne NWR | Issues development and public use/recreation alternatives discussed |
| Upland Technical Group USGS/BRD | 2/15/02 | Sherburne NWR | Completed objective development for Alternative 2 |
| Query Tool Matrix Development USGS/BRD | 3/4-5/02 | Regional Office | Developed bird matrix for Sherburne NWR and mapped Alternatives |
| Query Tool Matrix USGS/BRD | 7/17/02 | Regional Office | Matrix development for breeding, brood rearing, and migratory waterfowl and wetland birds. |
| Wetland Technical Group (USGS/BRD, Gaylord Laboratory, TNC, MN DNR). | 07/18-19/02 | Sherburne NWR | Development of Biological objectives for Alternatives 2 and 4. |
| Public Use Technical Group (University of Minnesota and USGS/MN Cooperative Research Unit | 08/29/02 | Regional Office | Reviewed the public use survey results, discussed what additional work was needed. |
| Review of Alternatives and Objectives | 8/09/02 | Regional Office | Reviewed Objectives and clarified Alternatives 2 and 4. |

# Issues and Critical Needs

The following is a consolidated list of issues and the resulting critical needs that were identified during many public meetings and technical group sessions during the course of the CCP process. The critical needs statement is meant to summarize and represent a group of related issues.

## Wildlife

*Critical Need:* To restore, conserve, and enhance wildlife populations that use the Refuge.

*Issue:* How do we expand management focus to ecosystem restoration without losing the original Refuge mission as outlined in the enabling legislation? When the Refuge began, management for 'migratory birds" focused on waterfowl, now the focus has expanded to include shorebirds, neotropical migrants, grassland birds, and endangered and threatened species.

*Issue:* Change in availability of neighboring croplands used as food by cranes.

*Issue:* Which declining species will benefit from oak savanna restoration?

*Issue:* Local species/gene pool reservoir may be lost by the Refuge's isolation.

*Issue:* What is the definition of migratory birds in 2001 as opposed to 1965?

*Issue:* Local and regional concern about diminishing waterfowl populations.

*Issue:* Is the Refuge waterfowl monitoring program adequate?

*Issue:* We need more information about reptiles and amphibians on the Refuge.

*Issue:* We need to monitor human disturbance of wildlife on the Refuge.

*Issue:* Should we consider re-introduction of historic large mammals, especially elk and bison?

## Endangered and Threatened Species

*Critical Need:* To provide habitat for endangered and threatened species within the Refuge.

*Issue:* We need to consider conducting searches of the Refuge for federally listed and state-listed endangered and threatened species.

*Issue:* How do we manage Refuge land to conserve and restore threatened and endangered species, rare and declining species, and address regional priority species?

*Issue:* Why are Bald Eagles not expanding off the Refuge to surrounding habitats?

*Issue:* Should artificial nesting platforms be provided for Bald Eagles to supplement loss of trees?

*Issue:* *Issue:* Under what circumstances should we reintroduce rare, native species to the Refuge?

## Upland Management

*Critical Need:* To conserve and restore native plant communities, especially oak savanna on the edge of an expanding urban population.

*Issue:* Should we return the uplands to pre-1850's habitat quality?

*Issue:* Do we have the right burning prescriptions? Have we integrated the Cedar Creek prescribed burning research into our plans?

*Issue:* Is there a net loss of "snag" trees and natural cavities due to prescribed burning. What is the impact on Bald Eagle and cavity nesters?

*Issue:* Increased urbanization has resulted in a loss of surrounding cropland for cranes, ducks and geese.

*Issue:* Is oak wilt native to the region and should it be controlled?

*Issue:* We need to address a negative public perception about prescribed burning and conifer removal.

*Issue:* How do we get Regional resource dollars for oak savanna restoration when dollars are focused on species management.

*Issue:* What species should we concentrate on in Big Woods, forested wetlands, etc.?

*Issue:* What is the historic distribution and prevalence of aspen clones within Refuge uplands?

*Issue:* How do we deal with invasive species, both exotic and native, that are negatively impacting the natural ecological balance of Refuge habitats.

*Issue:* How do we control undesirable plant species (Norway pine, purple loosestrife, leafy spurge, Siberian elm, black locust, white spruce, box elder, scotch pine, jack pine, Colorado spruce, buckthorn).

## Wetland Management: Impoundments, River Valley, and Other Wetlands

*Critical Need:* To provide habitat for migrating waterfowl and other water birds that depend on the marshes and sedge meadows of this area.

*Critical Need:* To plan for a functioning watershed and wetland diversity within the altered St. Francis River valley.

*Issue:* Is the quality of the water entering the Refuge changing due to changing land use in surrounding areas?

*Issue:* Why was the St. Francis River valley historically considered prime waterfowl habitat?

*Issue:* What is the best strategy for managing impoundments for migratory water birds?

*Issue:* Should the Refuge maintain impoundments given the concept of restoration to pre-1800's conditions?

*Issue:* What is the impact of the impoundments on the historic flooding regime? Have they inadvertently caused a decline in the quality of natural river bottom wetlands?

*Issue:* What is the effect of impoundments on water levels and vegetation on nearby uplands?

*Issue:* Is carp control possible or desirable on managed and unmanaged impoundments?

*Issue:* Does the Refuge need further protection of water rights (minimum flow?)

*Issue:* What is the original ground water state in Anoka Sand Plain? Baseline study needed.

*Issue:* Need to monitor fish populations within the impoundments.

*Issue:* Is it possible to maintain a northern pike spawning run?

## Landscape

*Critical Need:* To establish partnerships and promote public awareness of the value of oak savanna and marsh habitat for the continuing benefit of wildlife.

*Issue:* How to deal with the fact that Sherburne NWR will be an island and must become its own buffer. Specifically, management of healthy wildlife populations while at the same time dealing with increasing expectations and pressures from the public.

*Issue:* How do we deal with the loss of connectivity between the Refuge and surrounding or nearby habitat?

*Issue:* How do we increase the "effective habitat size" of the Refuge? Should we expand the Refuge boundaries?

*Issue:* Increase in complaints from neighbors about wildlife damage.

*Issue:* How can we use the partners for Fish and Wildlife Programs and USDA, DNR and private programs to further Refuge goals?

*Issue:* Urbanization/adjacent land use places constraints on management tools and movement of wildlife and plants and their gene flow.

*Issue:* Working with local planning to engender sustainable ecosystem in face of human population growth, dispersion, use and politics.

*Issue:* The Refuge lacks contingency plans relative to urban encroachment, climate change, pollution, and funding uncertainties.

## Promoting Wildlife-dependent Recreation

*Critical Need:* To provide opportunities for wildlife-dependent recreation activities, particularly hunting and fishing, environmental education and environmental interpretation, wildlife observation and wildlife photography.

### # Access and Legal Issues

*Issue:* Trash dumping, vandalism of signs, snowmobile trespass and unleashed pets may increase on the Refuge.

*Issue:* The old schoolhouse is an inadequate space for special events, schools groups.

*Issue:* The spruce plantation on Blue Hill trail: to cut or not to cut.

*Issue:* Conflicts may occur between cross-country skiers and people on snowshoes on trails.

*Issue:* Providing public education on resource issues such as prescribed burning, tree removal and exotics.

*Issue:* Safety concern over high number of deer hunters during opening weekend of firearms season.

*Issue:* Refuge lacks appropriate visitor service infrastructure to accommodate large groups which limits environmental education opportunities.

*Issue:* Zoning of all uses, including environmental education and hunting, is not formalized and needs to be reviewed during CCP process.

### # General Comments/Issues

*Issue:* What will be the impact of full use of road right-of-ways by the county and state?

*Issue:* Inviolate sanctuary versus public use: How much should be open and where?

*Issue:* Is there unequal access to the Refuge by hunters as opposed to people interested in other activities such as wildlife observation and photography?

*Issue:* Snowmobiles have access to county and state road right-of-ways. Can this be controlled within the Refuge boundaries?

*Issue:* What will the environmental impacts be of ATV access to state and county right-of-ways?

*Issue:* How do we deal with improper chemical application on road right-of-ways?

*Issue:* Does the Refuge have an adequate oil spill contingency plan for the underground pipeline?

*Issue:* We need to maintain a working relationship with the tribes.

*Issue:* Can we determine a carrying capacity for the number of people on the Refuge?

*Issue:* Recreation – Conflicted desires i.e., some people want more recreational use while others want less use of the Refuge.

### # Outreach

*Issue:* Do we want to expand our outreach? Is a staff increase needed?

### # Environmental Education and Interpretation

*Issue:* Are enough areas on the Refuge open for environmental education?

*Issue:* Need more environmental education in the context of expanded urban development.

*Issue:* The current focus is on schools, do we need new facilities to accommodate school groups?

*Issue:* Where should a possible new visitor center be located and what should it provide to the public?

*Issue:* How can we increase public understanding of the prescribed burning and conifer removal programs?

*Issue:* Space for indoor classrooms is needed to bridge the transition between the school room and the outdoors.

*Issue:* Teaching exhibits are needed with an area in front for kids to sit.

*Issue:* Marketing of the Refuge environmental education program is needed on an ongoing basis to get more teachers to "buy into" taking field trips to the Refuge and doing teacher-led activities.

*Issue:* Staff are needed for teaching students on the Refuge, for leading teacher in-service training sessions, and for doing ongoing marketing of the Refuge EE program.

*Issue:* An outdoor amphitheater is needed to provide a teaching area for large groups.

*Issue:* Funding from corporate sponsors is needed to assist schools with transportation costs for field trips to Refuge.

*Issue:* View of wetland, oak savanna, and prairie opening habitats are needed from an indoor facility to lead the students gradually into their field studies.

*Issue:* There is a need to establish the carrying capacity of the areas designated for environmental education to assure quality environmental education studies and minimal impact to habitat and wildlife. It is also important to establish the number of groups per day and the number of people in each group.

*Douglas Johannsen*

*Issue:* Oak savanna study sites are needed to provide locations for implementing the oak savanna curriculum.

*Issue:* Encourage the township park boards to fund and offer environmental education programs on the Refuge for township children.

*Issue:* Need to send introductory materials to teachers to entice them to come out to the Refuge.

*Issue:* There is a need for more trained volunteers to lead interpretive programs.

*Issue:* There is a need for Refuge-specific educational materials.

*Issue:* There is a need for display and storage space for books for sale, free brochures, etc.

*Issue:* Refuge management programs should be addressed through interpretation: prescribed burning, removal of non-native vegetation (pines), water level management, restoration to native oak savanna habitat, land use planning on private lands, cultural history, geologic history and land forms and how they shaped the present landscape.

*Issue:* Other potential themes include the National Wildlife Refuge System and how we are different from other natural resource agencies, environmental ethics and visitor etiquette.

*Issue:* Water management can be demonstrated through a video production or time series photography.

*Issue:* Environmental ethics can be demonstrated through placing a camera monitoring on an active eagle nest and letting visitors view the action from inside a visitor center.

*Issue:* Interpretive programs highlighting wildlife management and including resource issues on the Refuge can be offered to community organizations.

### # Wildlife Observation and Photography

*Issue:* There are too many people. Are restrictions needed for the number of vehicles on the tour route?

*Issue:* Does the observation drive optimize the viewing of wildlife? Should there be different drives for viewing wildlife and for scenic observation, such as flowers?

*Issue:* Are the observation decks useful? Are they in the right place?

*Issue:* People need training to see wildlife, how do we provide it?

*Issue:* Photography blinds are not being provided, should they be? Should people be able to use portable blinds?

*Issue:* The wildlife drive has too many signs, many of them are not informative.

*Issue:* Do we have adequate facilities for wildlife viewing such as observation decks, trails and auto tour routes?

*Issue:* Are there too many signs and leaflets on the Refuge?

*Issue:* People should feel like they've been in a pristine area, wild country; many say they feel that now.

*Issue:* Refuges should show management, and signs could be useful for this purpose.

*Issue:* Wildlife drive does not open until mid-April.

*Issue:* Increased visitation may reduce quality of personal experience by seeing others; perceived crowding.

*Issue:* Noise interference from other activities, e.g., hunting. Birding tours via motorcoaches (another example of noise interference).

*Issue:* Should we consider reintroduction of extirpated species as a viewing opportunity, e.g. Karner blue butterfly.

*Issue:* Fund raisers for Friends of Sherburne (e.g., bird-a-thon) to support more opportunities and action.

### # Hunting and Fishing

*Firearms Deer Hunt*

*Issue:* The antlerless deer quota does not agree with the DNR model. The scale of their model is too large for the size of our block.

*Issue:* This is the only hunt that is biologically justified.

*Issue:* Safety. Between 800 and 1000 hunters participate on the opening day of the firearms deer season. Safety among hunters and other users is perceived as a real or potential problem. The safety concern will also apply to other hunts.

*Issue:* Any future restriction on hunter numbers would be due to safety concerns. Quality of hunt is a bigger concern. The CCP should address the number on opening days.

*Issue:* Look to the future, increasing development promises problems with deer.

*Issue:* Are there ways to arrive at a more accurate deer herd size? (red oak cause a problem with aerial counts as well as pellet counts).

*Issue:* Should hunter registration for deer at the Refuge be mandatory? That would mean a commitment of staff for 9 days.

*Issue:* How can we manage a herd that moves on and off the Refuge?

*Issue:* Are there browse problems on the Refuge?

*Issue:* Should we allow a muzzle-loader season? A muzzleloader deer hunt would provide another deer hunting opportunity but may not be necessary from a population management standpoint. There are conflicts with the muzzle-loader season and other uses (example: cross country skiing).

*Issue:* Firearms season may limit access of waterfowl hunters (road to the boat landing is closed). In most years, this is not a concern as the water is frozen (but not every year).

*Issue:* Ethical versus non-ethical hunters. Examples: Leaving stands overnight, infringing on stands, etc. This is perceived as primarily a law enforcement issue.

*Issue:* Disruption of non-hunting visitor's quality of Refuge experience and safety perceptions. Some non-hunting visitors may be unaware that firearm hunters are in the field (no blaze orange required for non-hunters).

*Archery Deer Hunt*

*Issue:* Is archery hunt purely a recreational hunt and difficult to justify as population control? If so, why are bow hunters allowed greater access?

*Issue:* How do we address issue of injured deer? Are deer injury rates greater than during the firearms season?

*Issue:* Potential disturbance of migratory birds, such as roosting cranes, being pushed from preferred areas on the west side of the Refuge.

*Issue:* Consider closing the Refuge (especially the west side) once the gun season is over.

*Other Hunting*

*Issue:* Is the Refuge open too long for small game?

*Issue:* Prey base for predators may be negatively impacted by small game harvest.

*Issue:* Small game hunters and other recreational users can spoil an archer's hunt.

*Issue:* Disturbance to migratory birds, such as bowhunters walking on dikes in a closed waterfowl hunting area.

*Issue:* Potential Turkey Hunt: There is a conflict between the State spring hunt and other Refuge functions. There are also safety and zoning problems. A fall hunt may not conflict with other Refuge programs.

*Issue:* Consider a turkey hunt for hunters with disabilities.

*Issue:* All types of hunting access should be limited, not because of safety but because of the quality of the hunt.

*Issue:* Hunting during the early goose season may be viable on the Refuge if the over-water restriction is removed.

*Issue:* Disturbance of other migratory birds is a problem, especially along the river corridor.

*Issue:* Consider predator hunting and trapping consistent with state regulations.

*Fishing*

*Issue:* Could over-fishing lead to a lack of fish for eagles?

*Issue:* Limited access for anglers with disabilities.

*Issue:* We need to deal with litter, tackle left at site, trampling vegetation, monofilament line, lead sinkers.

*Issue:* Is there a possible solution to control carp.

*Issue:* Do we need to expand access to the river?

*Issue:* Do we need interpretive panels at access points?

# Preparation, Publishing, Finalization and Implementation of the CCP

The Sherburne NWR CCP was prepared by a team consisting of Refuge and Regional Office staff. The CCP was published in two phases and in accordance with the National Environmental Policy Act (NEPA). The Draft Environmental Assessment, published as Appendix A in the Draft CCP, presented a range of alternatives for future management and identified the preferred alternative. The alternative that was selected has become the basis of the Final CCP. This document then, becomes the source for guiding management on the Refuge over the coming 15-year period. It will guide the development of more detailed step-down management plans for specific resource areas and it will underpin the annual budgeting process through submissions to the Refuge Operating Needs System (RONS) and Maintenance Management System (MMS). Most importantly, it lays out the general approach to managing habitat, wildlife, and people at Sherburne NWR that will direct day-to-day decision-making and actions.

The Draft CCP/EA was released for public review and comment on July 18, 2005. A Draft CCP/EA or a summary of the document was sent to more than 200 individuals, organizations, and local, state, and federal agencies and elected officials. An open house event was held on August 17, 2005, at the Refuge following release of the draft document. We received a total of 12 comment letters and e-mails during the 45-day review period. Appendix K of the CCP summarizes these comments and our responses. Several of the comments resulted in changes in the CCP.

# Chapter 3: The Refuge Environment and Management

## Introduction

Sherburne National Wildlife Refuge lies on the edge of three important plant communities in Minnesota: the coniferous forests to the north, the broadleaf forests to the southeast and the prairies to the west.

*USFWS*

The Refuge's sandy, thin soils tell the story of the geological history of land that is known as the Anoka Sandplain. Ten thousand years ago, the area was formed as a sandy glacial lake bottom after the Wisconsin glacier started to melt and retreat. A small river, the St. Francis River, runs through the Refuge and drains into the Elk River, which ultimately enters the Mississippi River south of the Refuge boundary.

The land in the area of the Refuge was originally surveyed in 1855, prior to European settlement, by James Marsh who described a typical township as follows:

> "There are quite a number of lakes and ponds in this township, with some fen marshes and tamarack swamps. The surface is gently rolling, soil sandy and light and... second and third rate timber very poor scattering. Mostly a growth of black and bur oaks, aspens with tamarack in the swamps..there are no settlers in this township."

## Geographic/Ecosystem Setting

### The Fish and Wildlife Service Ecosystem

The Service has adopted an ecosystem approach to conservation and designated 53 ecosystem units. The ecosystem units delineate portions of the landscape where the Service and its partners can set ecosystem-wide resource goals and work together to achieve these goals.

The Refuge is located in the Mississippi Headwaters/Tallgrass Prairie Ecosystem. The extent and features of the ecosystem are described in Chapter 1 of this Draft CCP.

An ecosystem team has identified the following work activities in response to resource management challenges and opportunities:

- # Restore, enhance and conserve important habitats/communities.
- # Restore, enhance and conserve aquatic resources in the Mississippi Headwaters/Tallgrass Prairie Ecosystem.
- # Restore, enhance and conserve quality and rare resources (especially imperiled and native species) to increase or maintain biodiversity.
- # Create or improve partnerships to accomplish ecosystem goals.

## Migratory Bird Conservation Initiatives

Over the last decade, bird conservation planning has evolved from a largely local, site based focus to a more regional, landscape oriented perspective. Significant challenges include locating areas of quality habitat for the conservation of particular guilds and priority bird species, making sure no species are inadvertently left out of the regional planning process, avoiding unnecessary duplication of effort, and identifying unique landscape and habitat elements of particular tracts targeted for conservation, management and restoration. Several migratory bird conservation initiatives have emerged to help guide the planning and implementation process. Collectively, they comprise a tremendous resource as Sherburne NWR engages in comprehensive conservation planning and its translation into effective on the ground management.

### The North American Waterfowl Management Plan

Signed in 1986, the North American Waterfowl Management Plan (NAWMP) outlines a broad framework for waterfowl management strategies and conservation efforts in the United States, Canada, and Mexico. The goal of the NAWMP is to restore waterfowl populations to historic levels. The NAWMP is designed to reach its objectives through key joint venture areas, species joint ventures, and state implementation plans within these joint ventures.

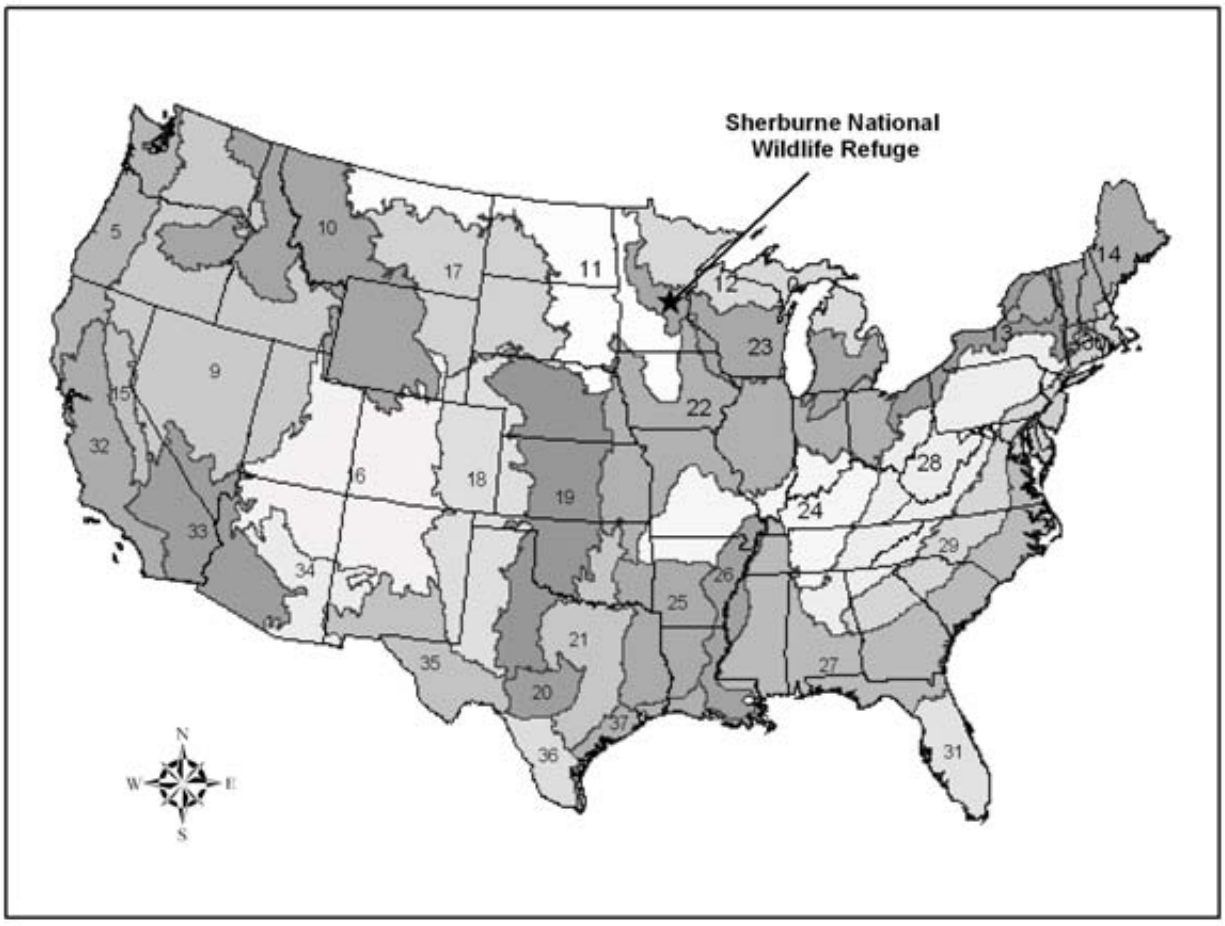
The Refuge is in the Upper Mississippi River Great Lakes Region Joint Venture. One of 12 habitat based joint ventures, this Joint Venture encompasses the states of Michigan and Wisconsin in their entirety, plus portions of Minnesota, Iowa, Nebraska, Kansas, Missouri, Illinois, Indiana and Ohio. The goal of this Joint Venture is to increase populations of waterfowl and other wetland wildlife by conserving, restoring and enhancing wetland and associated upland habitats within the Joint Venture region. The objectives of this Joint Venture are:

- # Conserve 9,118,884 acres of habitat capable of supporting an annual breeding duck population of 1,542,000, under average environmental conditions, by the year 2013.
- # Conserve 532,711 acres of habitat on migration focus areas capable of supporting 266 million duck use days during annual fall migration, under average environmental conditions, by the year 2013.
- # When consistent, contribute to the conservation and/or increase of habitats for wetland and associated upland wildlife species in the Joint Venture, with emphasis on declining migratory birds.

### North American Bird Conservation Initiatives (NABCI)

Formed in 1990, Partners in Flight (PIF) is concerned with most land birds and other species requiring terrestrial habitats. Partners in Flight has developed Bird Conservation Plans for numerous Physiographic Areas across the U. S. These plans include priority species lists, associated habitats, and management strategies. Reflecting the local physiography, Sherburne NWR lies within PIF Physiographic Area 40 Physiographic Area.

**Figure 5: Bird Conservation Planning Physiographic Areas**




The U. S. Shorebird Conservation Plan and the North American Waterbird Conservation Plan are plans that address the concerns for shorebird and water birds. These larger scale plans identify priority species and conservation strategies.

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In a continental effort, the Partners in Flight, North American Waterfowl Management, U. S. Shorebird Conservation, and the North American Water Bird Conservation plans are being integrated under the umbrella of the North American Bird Conservation Initiative (NABCI). The goal of NABCI is to facilitate the delivery of the full spectrum of bird conservation through regionally based, biologically driven, landscape oriented partnerships. The NABCI strives to integrate the conservation objectives for all birds in order to optimize the effectiveness of management strategies. NABCI uses Bird Conservation Regions (BCRs) as its planning units. Bird Conservation Areas are becoming increasingly common as the unit of choice for regional bird conservation efforts; Sherburne NWR lies within BCR 23 (Figure 5.)

Each of the four bird conservation initiatives has a process for designating conservation priority species, modeled to a large extent on the PIF method of calculating scores based on independent assessments of global relative abundance, breeding and wintering distribution, vulnerability to threats, area importance (at a particular scale, e.g. BCR), and population trend. These scores are often used by agencies in developing lists of bird species of concern; e.g., the U. S. Fish and Wildlife

Service based its assessments for its 2002 list of nongame Birds of Conservation Concern primarily on the PIF, shorebird, and water bird status assessment scores.

### Region 3 Fish and Wildlife Conservation Priorities

The Resource Conservation Priorities (RCP) list is a subset of all species that occur in the Region and was derived from an objective synthesis of information on their status. 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. The RCP list also includes invasive species in need of conservation action (Appendix I). Although many species are not included in the priority list, this does not mean that we consider them unimportant.

The list includes 60 species or populations for the Service's Mississippi Headwaters/Tallgrass Prairie Ecosystem.

### Other Conservation and Recreation Lands in the Area

The portion of the Refuge that extends south of County Road 4 is bounded by the Sand Dunes State Forest. This State Forest provides a patchy buffer (due to its 3,155 acres of private inholdings in addition to the 5,456 acres of State-owned land) of undeveloped land where it is adjacent to the Refuge. Its mission as a Minnesota State Forest is to produce timber and other forest crops, provide outdoor recreation, protect watersheds, and perpetuate rare and distinctive species of flora and fauna.

The Uncas Dunes Scientific and Natural Area lies within the Sand Dunes State Forest and contains a rare sand prairie and savanna remnant. Outside of this, over half of the state-owned land area of the Sand Dunes State Forest has been planted to conifers (predominantly Norway pine, white pine, Jack pine, white spruce and Norway spruce). Its vegetative cover differs greatly from that found on the Refuge, for the most part.

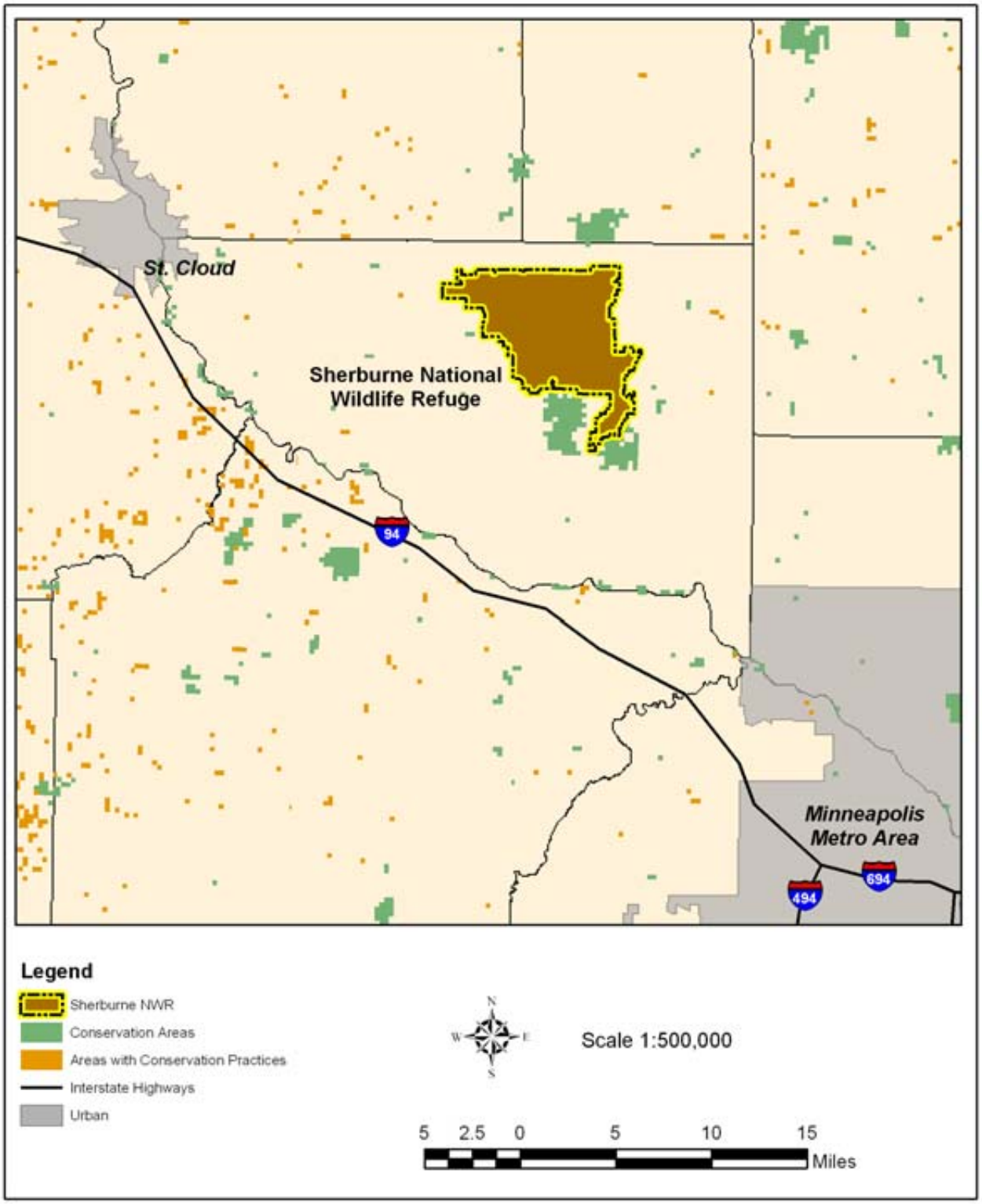
There are also seven state wildlife management areas (WMAs) managed for natural resources within a 5-mile radius of the Refuge (Figure 6). These areas are smaller parcels owned by the State for the purposes of wildlife management, including the provision of wildlife-related recreation and education. They are the Kunkel WMA (2,165 acres located 1 mile to the north), Benlacs WMA (571 acres located 4 miles north), Glendorado WMA (200 acres located about 3 miles north), Freemont WMA (182 acres located about 1 and one-quarter miles to the east), Santiago WMA (80 acres located less than 1 mile to the west), Vietnam Veteran's Memorial WMA (80 acres located about 4 miles to the east, across U.S. Highway 169), and the Bibles WMA (67 acres about 4.5 miles north).

## Socioeconomic Setting

### Population

Minnesota's population grew 9 percent from 1990 to 1998 according to the State Demographic Center at Minnesota Planning. The population is expected to increase 14 percent over the next 25 years with the most dramatic increase in the Brainerd lakes area and the counties around the Twin Cities. The City of St. Cloud and surrounding urban areas expect a 35 percent rise in population between 1998 and 2020.

**Figure 6: Other Conservation Areas in the Proximity of Sherburne NWR**



Sherburne County is in the heart of this suburban expansion. In the years from 1990 to 2000, the townships surrounding the Refuge (Becker, Orrock, Blue Hill and Santiago) saw population increases of 74 to 106 percent. Three cities within Sherburne County have more than doubled in population during this time (Sherburne County Zoning Office). Sherburne County has also been included in the newly expanded nine-county metropolitan area of the Twin Cities.

Sherburne County's population has increased greatly compared to Minnesota and the United States. The County's population has a higher percentage of high school graduates (90 percent) than both the State of Minnesota (88 percent) and the United States (80 percent). Sherburne County's home ownership rate (84 percent) is nearly 20 percent higher than the United States (66 percent) (Minnesota State Demographic Center).

The City of Zimmerman designated Urban Expansion Zone approaches within 1.25 miles of the Refuge boundary from the east. The City of Elk River's Urban Expansion District comes within 1.5 miles of the Refuge boundary to the southeast and the Urban Expansion Zone of the City of Princeton approaches within 2 miles from the northeast.

Urban development throughout the Anoka Sandplain is a major conservation concern. This includes lands surrounding the Refuge. Due to its location and easy access to the St. Cloud and the Twin Cities urban centers, residential and, to a lesser extent, light business development is occurring rapidly in the area around the Refuge.

Lands directly adjacent to the Refuge are developing into rural residential and residential subdivisions, especially on the Refuge's east, southeast and south sides. There are also some areas, especially to the north, west and northeast that remain in agricultural use. The majority of these areas are in production for corn and soybeans, or are used as pasture for cattle.

These land use patterns portray a trend of increasing development of lands adjacent to the Refuge. As more and more people move into the area, the demand for recreational opportunities has also grown.

Sherburne NWR represents the largest public land holding in the County.

## Employment

In 1980, more than two-thirds of employment in Sherburne County was concentrated in four sectors: transportation and public utilities (14 percent), retail trade (17 percent), government (20 percent), and services (20 percent). In 2001, employment continued to be strong in government (13 percent), retail trade (16 percent), and services (33 percent). However, transportation and public utilities experienced a noticeable decline, with employment representing only 4 percent of total employment in Sherburne County. Furthermore, employment in transportation and public utilities was the only sector to suffer any decrease between 1980 and 2001. Dramatic employment increases were exhibited in the construction sector and manufacturing sector.

Employment in Sherburne County escalated between 1980 and 2001 (71 percent). While the Sherburne County population has grown considerably over the last 20 years, the rise in employment has outpaced population growth. The employment increase in Sherburne County is double the employment increase in the State of Minnesota (35 percent) over the same time period.

## Income

In 2001, employment earnings in Sherburne County totaled $789 million, which was an 86 percent increase from earnings in 1980. This earnings growth is nearly double the statewide earnings growth rate in Minnesota.

Employment earnings in 1980 were concentrated in the government sector and in the transportation and public utilities sector, which together accounted for approximately 46 percent of the County's earnings. Between 1980 and 2001, employment earnings have become more evenly distributed across the major business sectors. In 2001, services represented 20 percent of County earnings, which was followed by government (19 percent), manufacturing (16 percent), construction (13 percent), and retail trade (11 percent). The contribution of transportation and public utilities toward County earnings diminished significantly, dropping from 24 percent to 4 percent. The finance, insurance, and real estate sector remained fairly stable, representing between 3 percent and 5 percent of the County's earnings from 1980 to 2001.

During the past two decades, per capita personal income (PCPI) in Sherburne County was consistently less than both Minnesota and the United States. Furthermore, Sherburne County's PCPI was only 85 percent, 80 percent, and 76 percent of Minnesota's PCPI in 1980, 1990, and 2001, respectively. This increasing margin is due to Minnesota's PCPI growth rate exceeding the U.S. growth rate, while Sherburne County's PCPI growth rate has not kept up with the United States.

# Climate

The climate in east-central Minnesota is classified as 'sub-humid continental' and is characterized by significant variations between summer and winter temperatures. The region has four distinct seasons with moderate spring and fall weather. Summer is comfortable because lakes and trees serve as natural air conditioners. The winters in nearby Minneapolis, the second coldest city in the United States, have an average daily temperature of 35 degrees Fahrenheit.

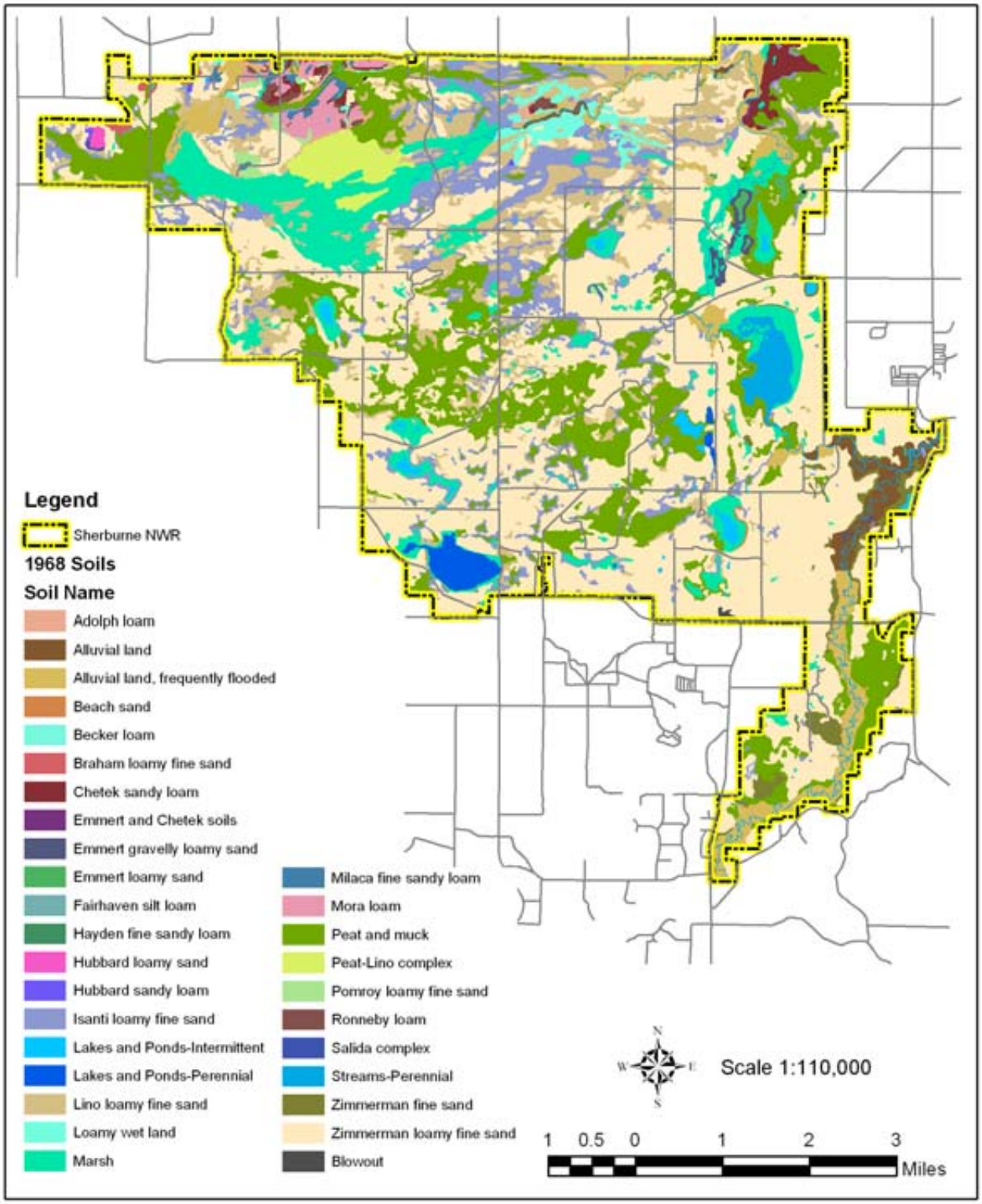
The mean temperature during December, January, and February is 13.3 degrees Fahrenheit. The temperature can drop to between minus 20 degrees and minus 30 degrees Fahrenheit on several days each winter. The June, July and August mean temperature is 68.2 degrees Fahrenheit. Frost is likely to occur until mid-May, and to return by the end of September. The latest recorded occurrence of a freezing temperature in spring is June 9, and the earliest in fall is September 3. The freeze-free period is long enough that such crops as corn, soybeans, small grain, and vegetables generally have time to reach maturity.

Precipitation is well distributed throughout the growing season. About 17.4 inches, or 60 percent of the total annual precipitation, falls during the period from May through September. The average annual precipitation ranges from around 26 to 31 inches. In 1976, a total of only 13.07 inches of precipitation was recorded at the DNR reporting station in nearby Zimmerman during the entire year. During the following 7 months, from January to July 31, 1977, 21.08 inches had fallen, thus indicating the substantial variation that can occur (USDA Climate Data).

# Geology and Soils

The Refuge lies within the deciduous forest-woodland zone of Minnesota on the Anoka Sandplain, a large flat sandy outwash area now thought to be lacustrine in origin, with small dune features and low moraines exposed above the outwash (Wright, 1972). This zone in Minnesota is transitional between tallgrass prairie and deciduous forest. The uplands within the Refuge consist of these flat sandy areas with some rolling small sand dune areas, interspersed with wetlands and four natural lakes. Upland soils are Zimmerman, Lino and Isanti loamy fine sands from 0 to 6 percent slope, good drainage, very low water holding capacity, and high erosion potential, severe limitations for crops, but suitable for pasture or range (USDA, Soil Conservation Service, 1968) (Figure 7). These soils are placed in the Zimmerman-Lino-Isanti-peat Soil Association due to the presence of many small scattered peat bog inclusions. The presettlement vegetation on the uplands throughout the Anoka Sandplain was oak barrens and openings (MN-DNR, 1996b).

**Figure 7: Soils, 1968, Sherburne NWR**



The Mille Lacs Uplands subsection of the State's Ecological Classification System comes into the northern portion Refuge. Overall, this subsection covers the large area of Superior Lobe ground moraines and end moraine in east central Minnesota. The vegetation at pre-European settlement times consisted of a mosaic of forest types. Along the southern boundary, where it intersects the Refuge, maple-basswood forests were prevalent (MN -DNR, 1996b). Soils in the portion of this subsection which lies in the Refuge belong to the Milaca-Mora-Ronneby Soil Association. These nearly level to undulating soils overlay slightly acid, red, glacial till and range from the fine sandy loam Milaca soils to the somewhat poorly drained loam Ronneby soils. Uncleared areas support fair stands of mixed hardwoods (USDA, 1968). Soils in this association make up three percent of the Refuge's total area, while soils in the Zimmerman-Lino-Isanti-peat Association make up the other 97 percent of the Refuge lands (USDA, 1968). The distribution of the major soil associations on the Refuge is shown in Figure 7.

# Water and Hydrology

The majority of the Refuge is located within the St. Francis River Watershed, which extends northward into Benton County (Figure 8). The Refuge was developed along a portion of the St. Francis River Valley, historically known for its wildlife resources. The St. Francis River begins in Benton County, about 18 miles from where it enters the northwest corner of the Refuge. After traveling through the Refuge, the St. Francis River exits the Refuge's south spur and drains into the Elk River just north of Big Lake, then drains into the Mississippi River within the city limits of Elk River. The middle one-third of the Refuge's western boundary follows the boundary of the Snake River Watershed, which lies to its west. A small portion of the Refuge lies within the Snake River Watershed, including Johnson Slough and Orrock Lake.

# Refuge Resources

The predominant presettlement vegetation on the uplands throughout the Anoka Sandplain was oak barrens and openings (MN-DNR, 1993) (Figure 9). Fire suppression began with Euro-American settlement around 1850, dramatically changing vegetative communities that had developed under a fire regime dictated by weather and Native Americans.

*Douglas Johnannsen*

Once open oak barrens filled in to become Dry Oak Forest (Wovka et al. 1996). Often these were pastured. Though light soils presented severe limitations for crops (USDA, Soil Conservation Service, 1968) most settlers became farmers and put large areas under cultivation.

While the nation was reeling from the economic depression of the 1930s, the “dust bowl” years brought another burden to the farmers. The double blow of the Depression and drought was felt in the townships that make up the Refuge, as strongly as any place in the State. Farm abandonment became commonplace during the 1930s and early 1940s. It was from these tax-forfeited lands that the first public land came to exist in the area, as part of the Sand Dunes State Forest. This occurred in 1943, by an act of the State Legislature, in an attempt to stabilize soils. Conifers grew extremely well on the sandy soils and were planted by the millions in the then 2-square-mile State Forest. Private

**Figure 8: Watersheds Surrounding Sherburne NWR**

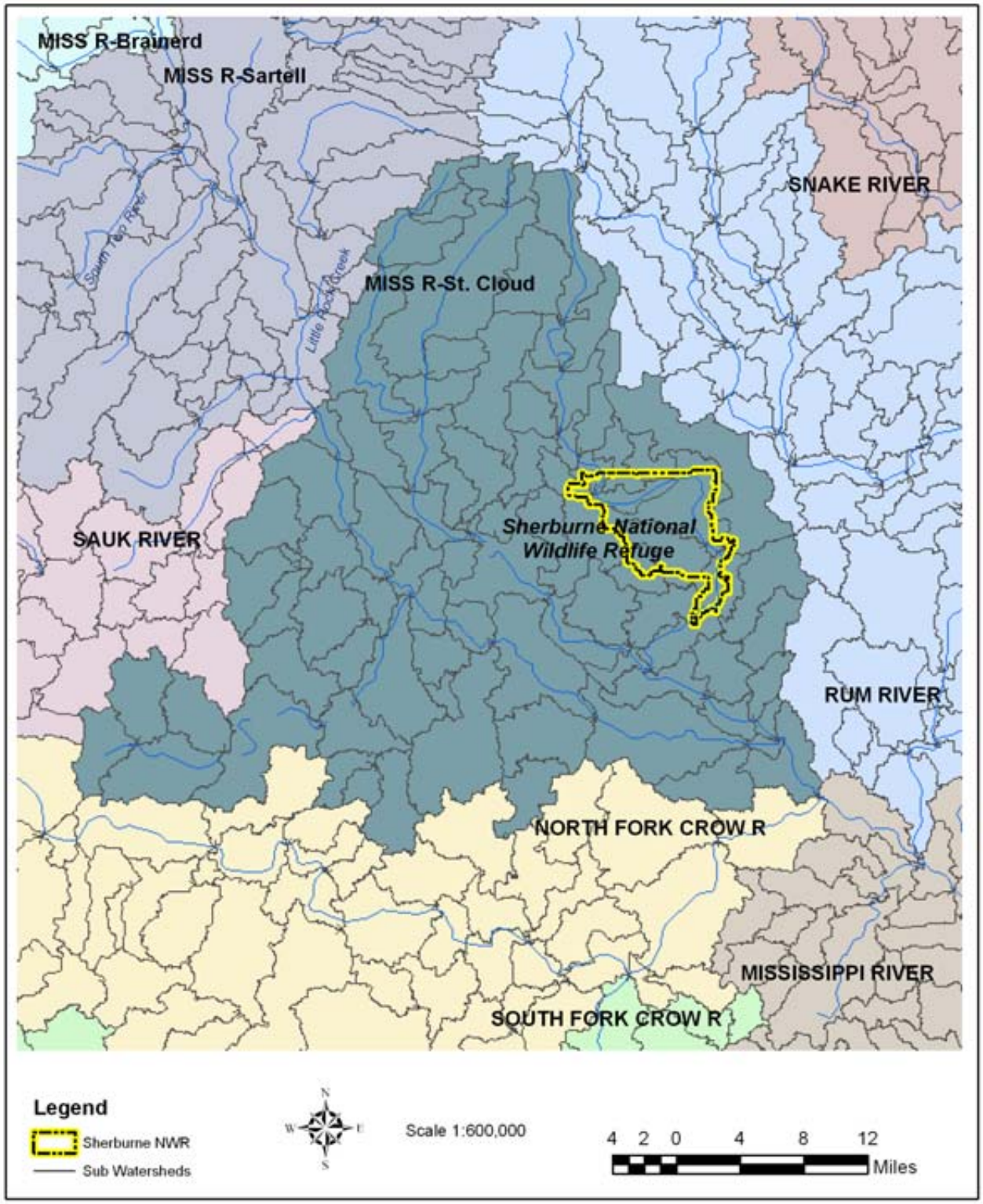
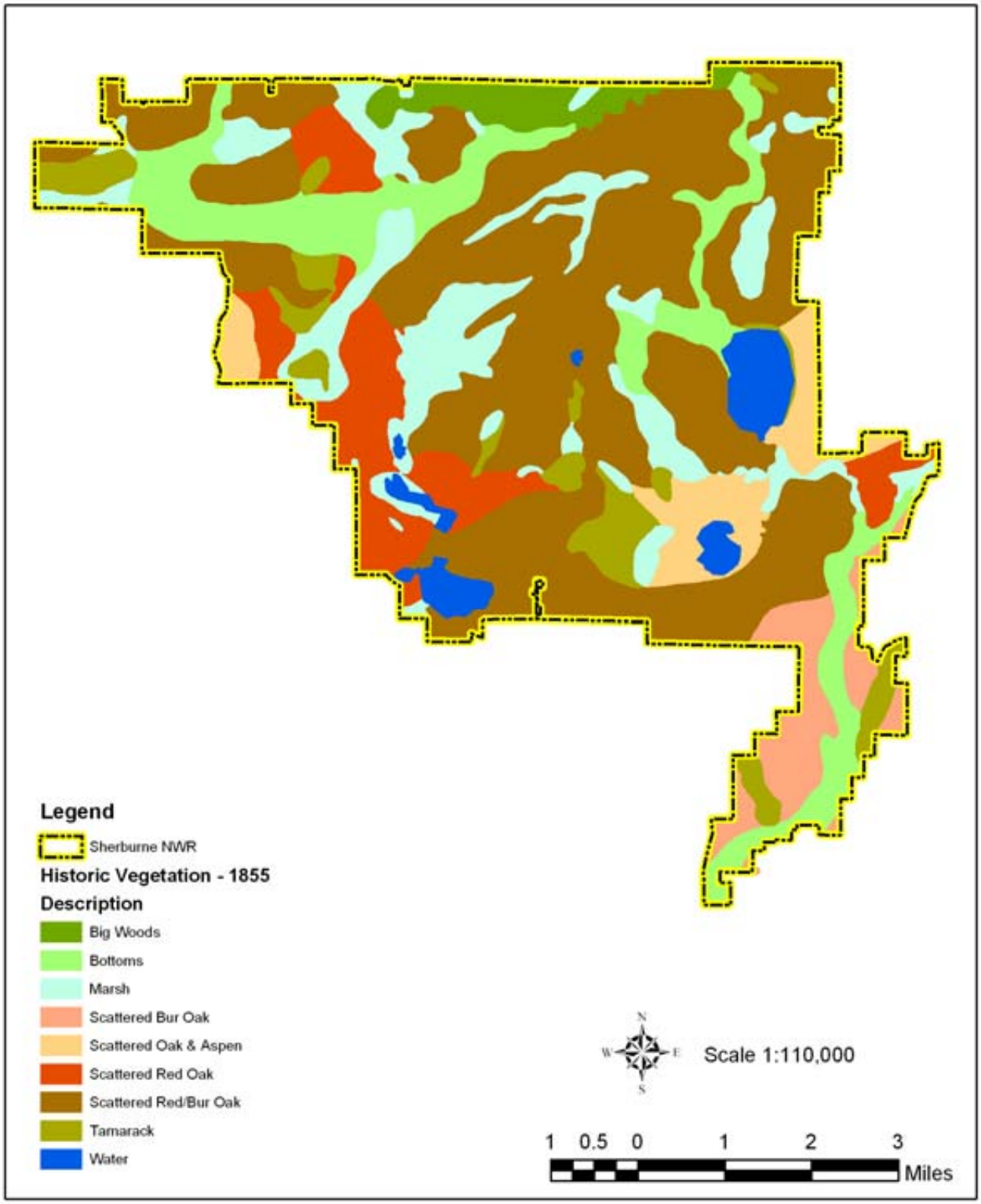


**Figure 9: Historic Vegetation on Sherburne NWR, 1855**



landowners followed the State's example and began planting pine and spruce on their own lands, including lands now held by the Refuge. At the time of Refuge establishment (1965) there were approximately 970 acres of conifer plantations (not including windbreaks) on what are now Refuge lands. With the many acres of conifer plantations being installed in the county, fire suppression became an even higher priority to both local residents and the State's Department of Natural Resources (DNR). From the 1940s until the present day, the policy of the DNR and local fire departments is to extinguish all wildfires, whatever their cause. With the present and projected urban interface, this policy has become more than socially acceptable – it has become a necessity for the protection of life and property.

## Plant Communities

Following establishment of the Refuge in 1965, old agricultural fields began to be seeded into native warm season grass species. Fire began to be used as a tool, primarily to stimulate grassland plantings for dense nesting cover. Relative percent cover and distribution of vegetative cover types when the Refuge was established are shown in Figure 10.

The landscape of the Refuge at the time of establishment was dominated by agriculture in the form of cropped fields (32 percent of the land area). The next most dominant types were "Shrub Swamp" with 19 percent of the land area, and "Oak" with 17 percent of the land area. Much of the Oak type was probably grazed by domestic livestock. Wet meadows had approximately 10 percent of the land cover and mixed hardwoods dominated 6 percent. Conifer plantations at the time occupied about 970 acres, roughly 3 percent of the Refuge's acreage.

As a result of management practices at the Refuge and the cessation of farming on Refuge lands, vegetative communities rapidly changed following establishment of the Refuge. An impoundment system installed in the early 1980s reflooded, and expanded previously drained wetlands. Figure 11 displays present day (2000) vegetative cover type distribution and relative percent cover information.

During the more than 30 years since the Refuge was established, wetland areas have increased from 34 percent relative cover to 45 percent relative cover. This is significant in terms of fire management as many of these wetlands (with the exception of "Open Water") are dominated by emergent vegetation that falls into fuel model 3 of the Fire Behavior Fuel Model System.

Another significant change during this period is the increase of native tallgrass types (also fuel models 1 and 3), which have climbed from 1 percent in 1968 to 27 percent in 1998. At the same time, cultivated fields that accounted for 32 percent of the Refuge in 1968 have disappeared.

Refuge vegetation goals today are directed primarily by the Refuge's Landscape Plan. These goals include returning upland vegetation to, as close as possible, a "pre-settlement" state. Many of the goals were based on the native plant communities of state-wide significance as referenced in the publication "Natural Communities and Rare Species of Sherburne County, Minnesota" (MnDNR 1993). Today's plantings and seedings, in light of these goals, include a large variety of native forbs, grasses and trees, in an effort to restore native plant communities. Fire is being used on most upland types to open forest canopies and restore/maintain native plant associations and structures.

### Wetlands

The Refuge contains a variety of wetlands ranging from shallow wet meadows to permanently flooded mixed emergent marshes. During the restoration of wetlands on the Refuge, dikes with water control structures were placed on 23 ditches. Twenty-two of these structures are still in place and water levels are managed to control rough fish and greatly improve the productivity of the aquatic communities (Figure 12). Many species of waterfowl, marsh, and water birds are attracted to the resulting conditions in search of food and cover. Purple loosestrife, although not found universally, does occur in some of these wetlands and is a major concern.

**Figure 10: Vegetation on Sherburne NWR at Time of Establishment, 1968**

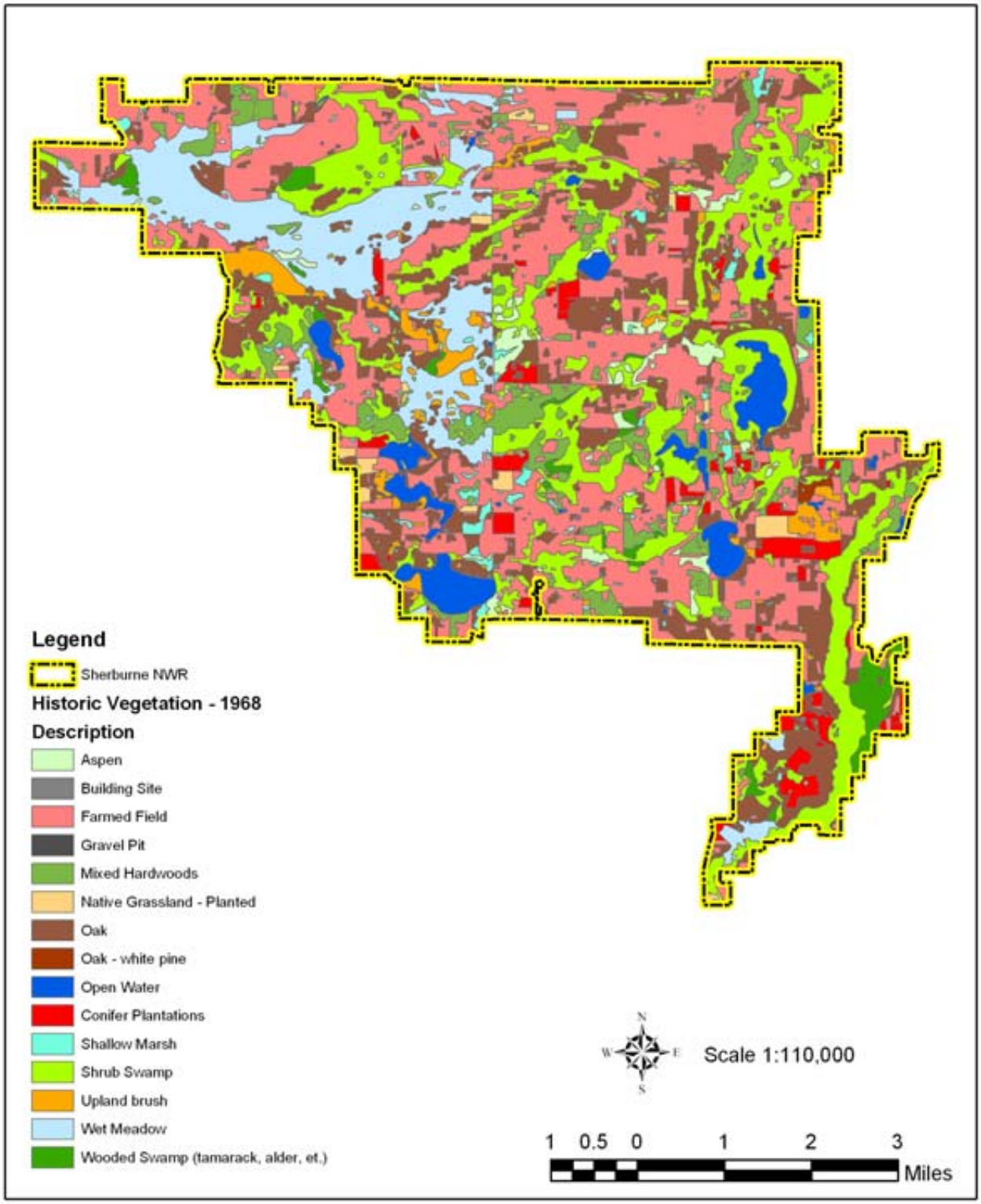


**Figure 11: Current (1999) Vegetation, Sherburne NWR**

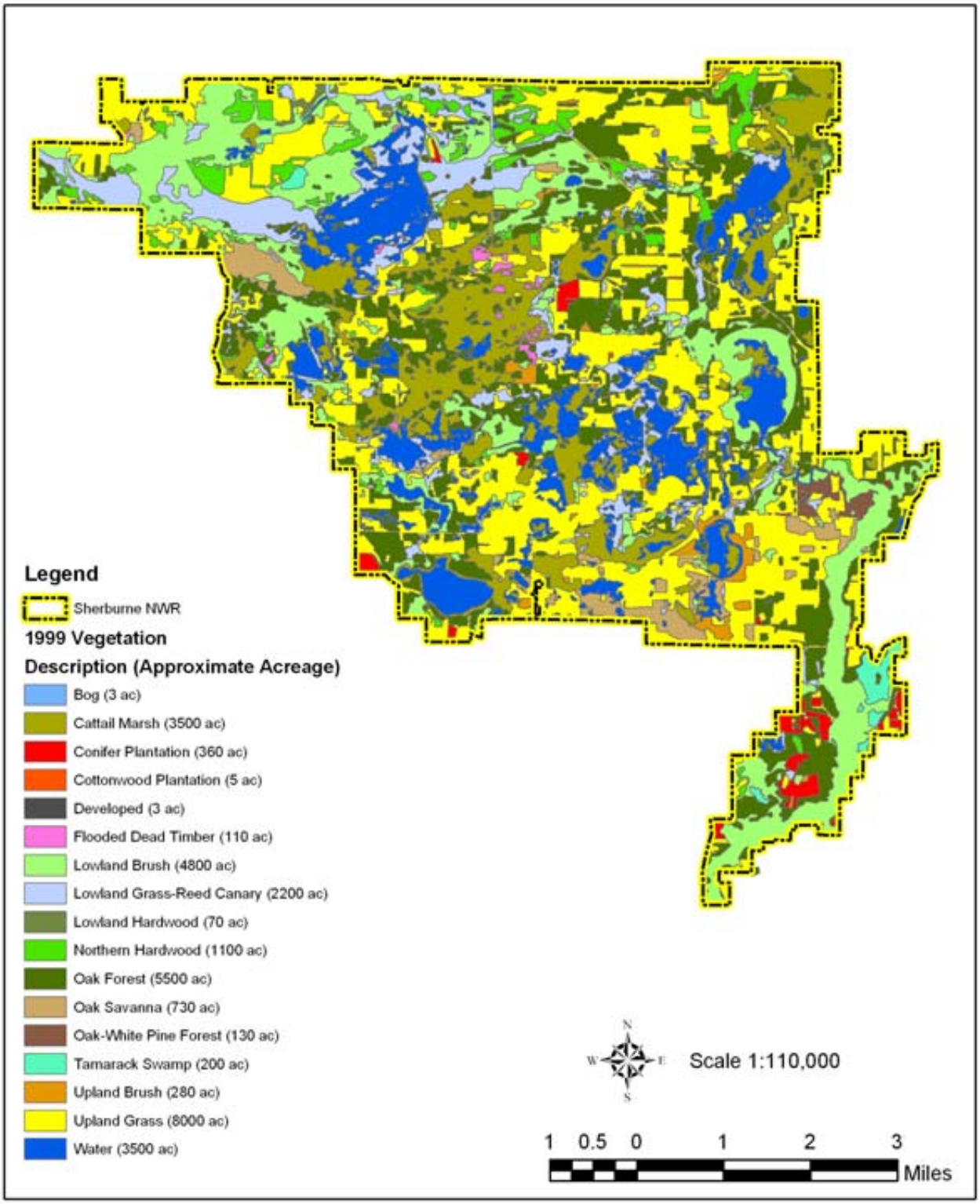
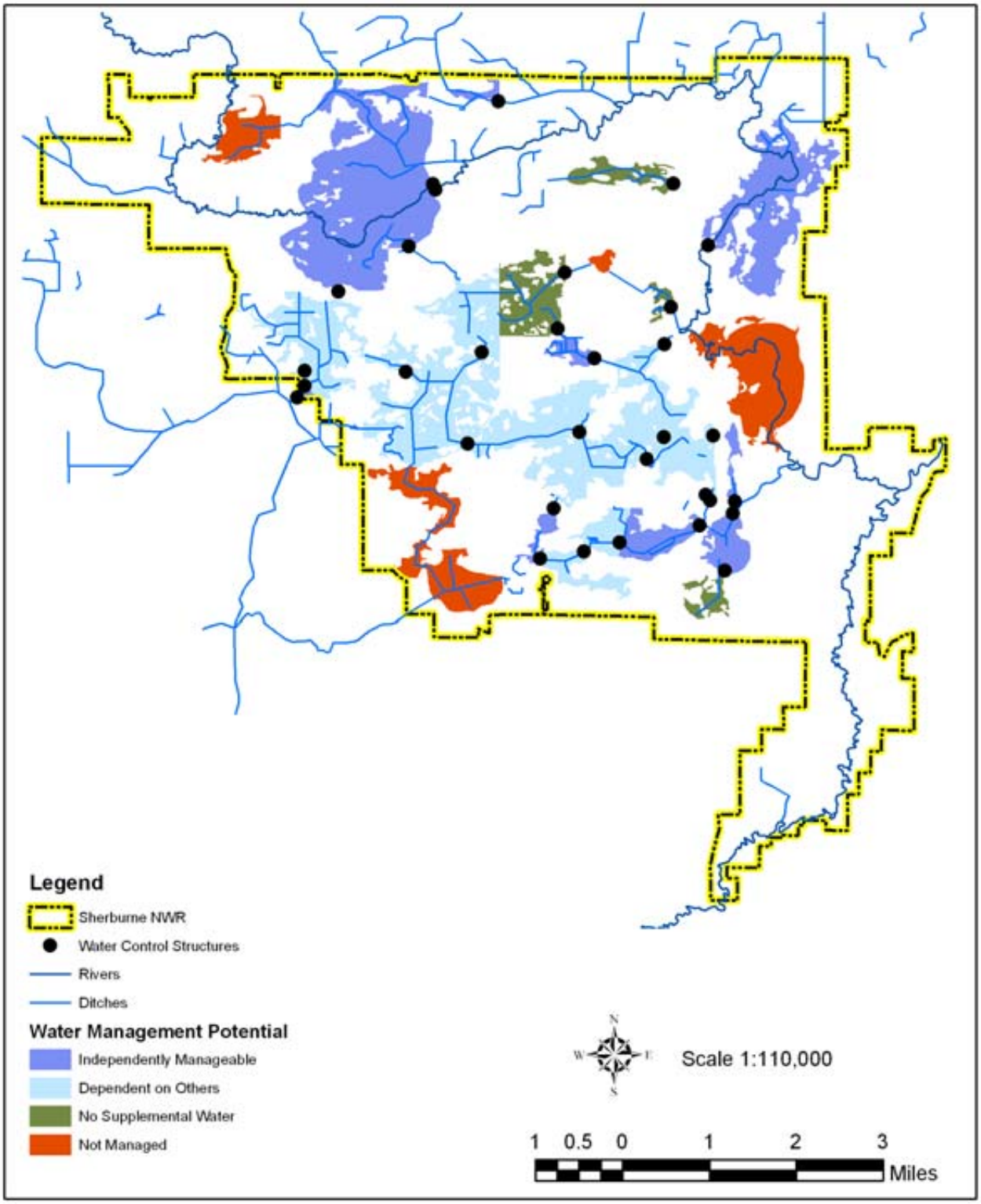


**Figure 12: Water Management Potential, Sherburne NWR**



*An Historical Look at Wetlands*

The Sherburne NWR encompasses 30,569 acres of wetlands according to the National Wetland Inventory. The wetlands of Sherburne NWR were affected by two man-made environmental changes; 1) drainage prior to the Refuge establishment, and 2) flooding after the impoundments were in place and operational. The following analysis looks at both of the these events with the best available information.

This analysis is based on early survey summaries by Marschner, wetland data from the National Wetland Inventory, soil data from the 1968 Soil Survey of Sherburne County and the 1997 soils data from National Resources Conservation Service (NRCS), and Soil Survey Geographic Database (SSURGO), prepared by Kevin Kenow and Jason Rohweder of the U.S. Geological Survey (USGS), ecoregion and watershed data from the Minnesota Department of Natural Resources Data Deli, and the Refuge-specific GIS vegetation surveys and other data developed by Gary Swanson of the Sherburne NWR and summarized by USGS.

*Summary of Wetland Changes*

During presettlement times, 44 percent of the acres within the current Refuge boundaries were wetlands. During the 1930s, 2,152 wet acres were drained resulting in 34 percent of the Refuge in wetlands (Figure 13). In the early 1970s the impoundment system returned more than the original wet acres and now 46 percent of the Refuge is wet.

The effect of these changes can be seen in the vegetation and water levels on the Refuge. The early wetland vegetation of the 1850s was primarily wet meadows; there was no reference to cattail and trees were thin and located in woody swamps (Figure 9). When the wetlands were drained in the 1930s, wetlands changed to shrub-scrub and forested swamps with an increase in woody vegetation and decrease in wet meadows. After the impoundments were in place in the early 1970s, the shrub-scrub wetlands decreased while cattail marshes increased. Figure 14 provides a visual overview of this trend; notice that the woody vegetation in wetlands (Figure 15) peaked at the time of the Refuge was established (late 1960s), but through a combination of management approaches, it has almost returned to the areas originally identified in the early 1850s surveys.

Wild rice is not identified in the vegetation surveys of Sherburne NWR, however the transcripts in the 1960s on the reasons why a refuge was necessary cited a decline in wild rice as one reason why waterfowl had declined in the area.

After the impoundments, the major change has been in the amount of open water identified in the various surveys (Figure 16 and Figure 17). There has been an increasing amount of open water on the Refuge since its inception. Open water signifies an area of water without emergent vegetation. The overall trend is of increasing open water on the Refuge. Since 1994, the Refuge has increased water management to hold pools to lower levels and this has developed the amount of open water.

*A History of Drainage*

The history of wetlands at Sherburne NWR parallels wetland development throughout the agricultural portion of Minnesota. During the early 1900s, county ditch systems were established to drain wetlands and convert them to cropland. Establishment of private ditch systems followed. The county ditch systems on the Refuge were established between 1900 and 1920. Private drainage continued until the establishment of the Refuge in 1965 (Figure 13).

The St. Francis River runs a winding course north and south through the Refuge. The Watershed of the river originally encompassed 59,171 acres or 92 square miles (Figure 8). But the drainage system created in the early 1930s and continuing to this day increases the effective size of the watershed to as

**Figure 13: Drained Wetlands at the Time of Refuge Establishment, Sherburne NWR**

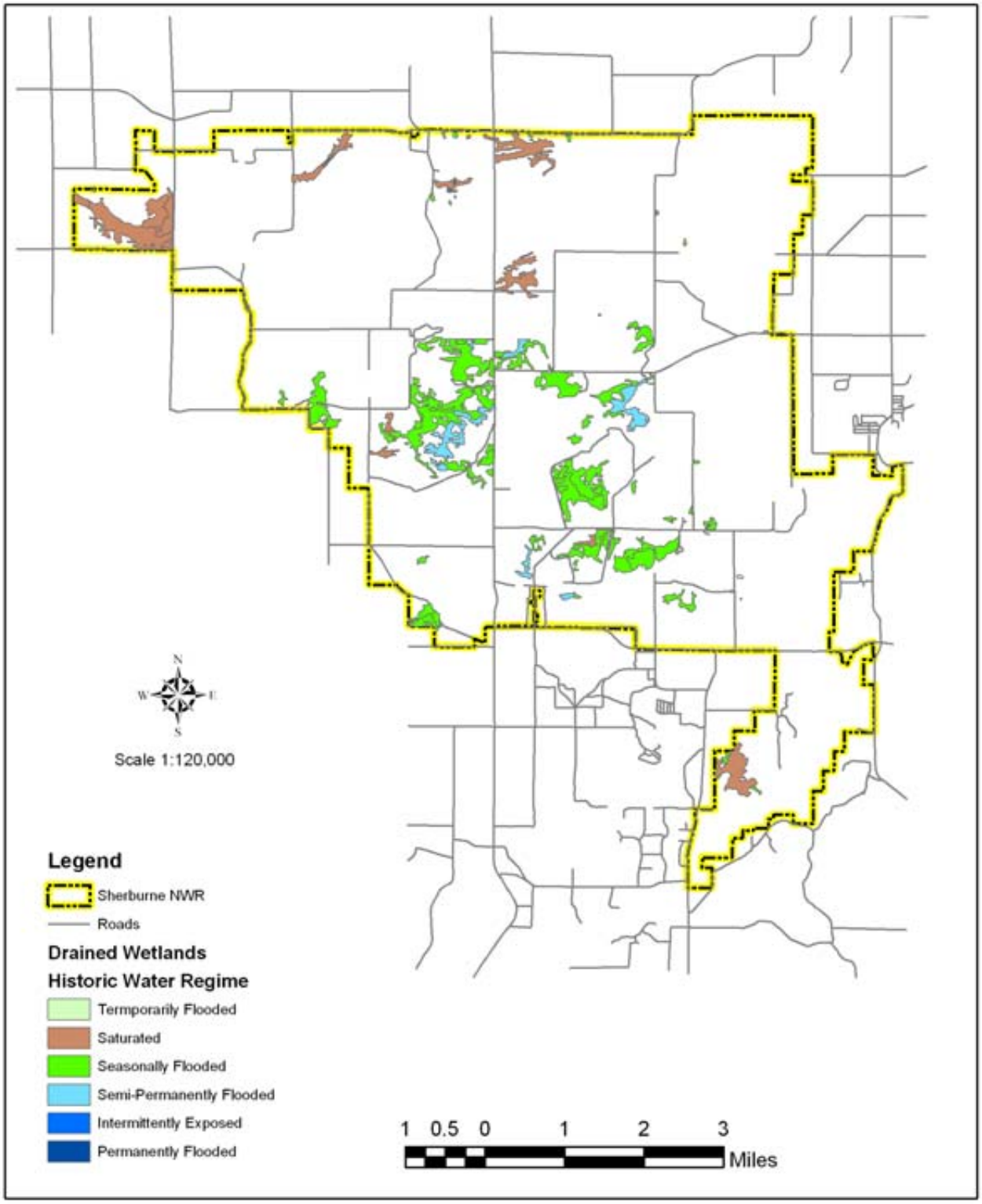


**Figure 14: Changes in Woody Wetland Vegetation Over Time, 1855, 1968, 1999, Sherburne NWR**

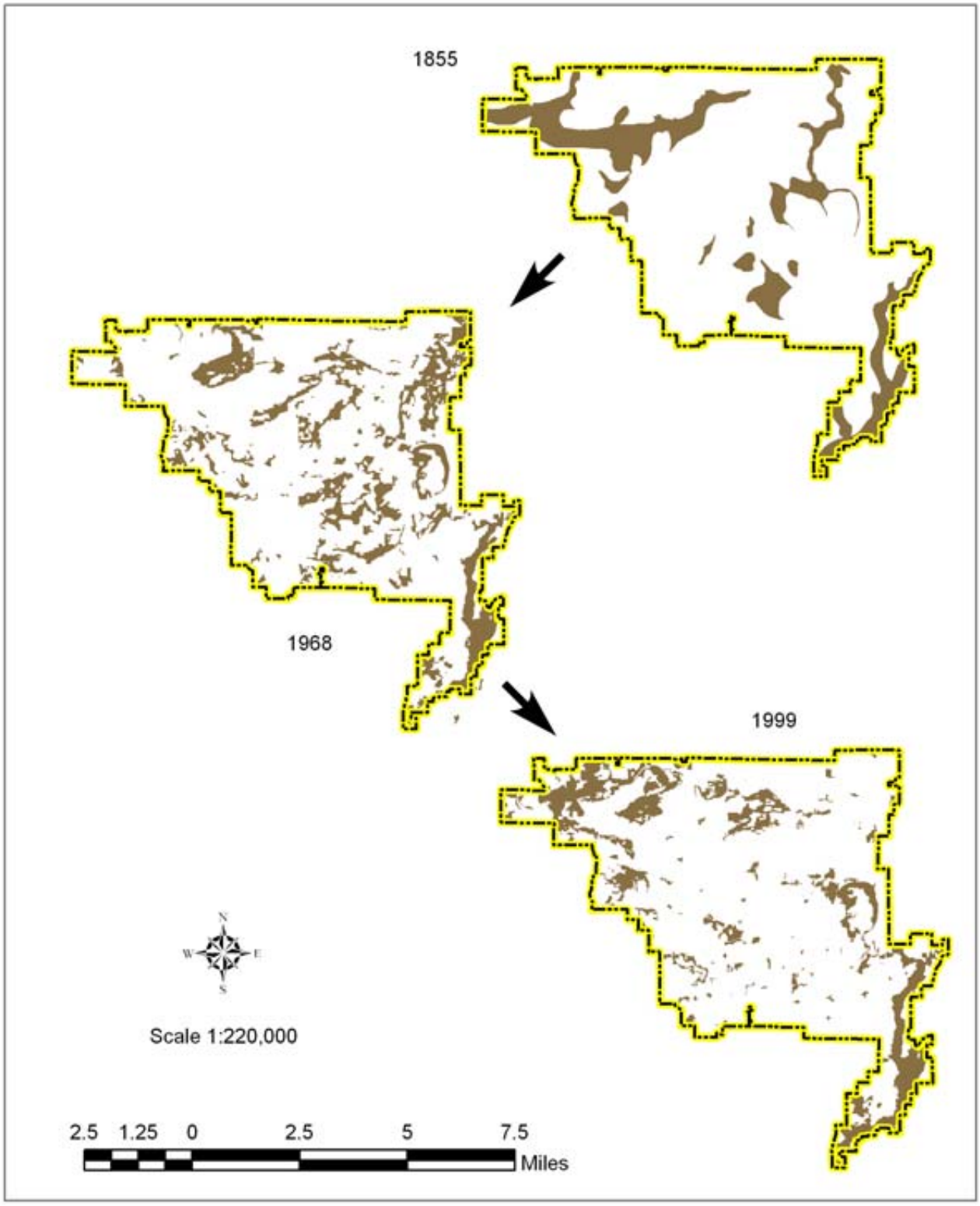


**Figure 15: Historic Wetland Vegetation, 1968 and 1999, Sherburne NWR**

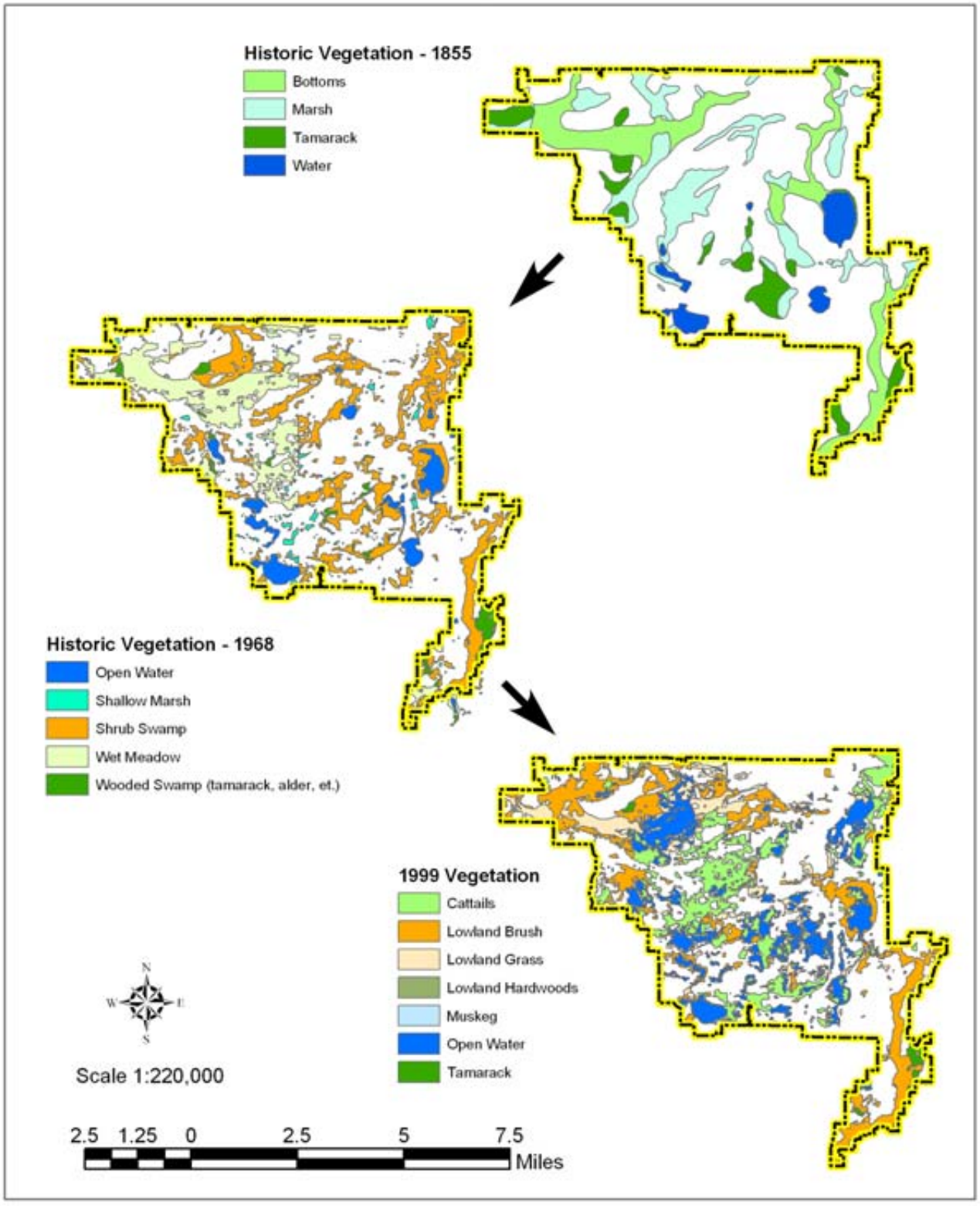


**Figure 16: Increases in Open Water Over Time, 1855, 1968, 1999, Sherburne NWR**

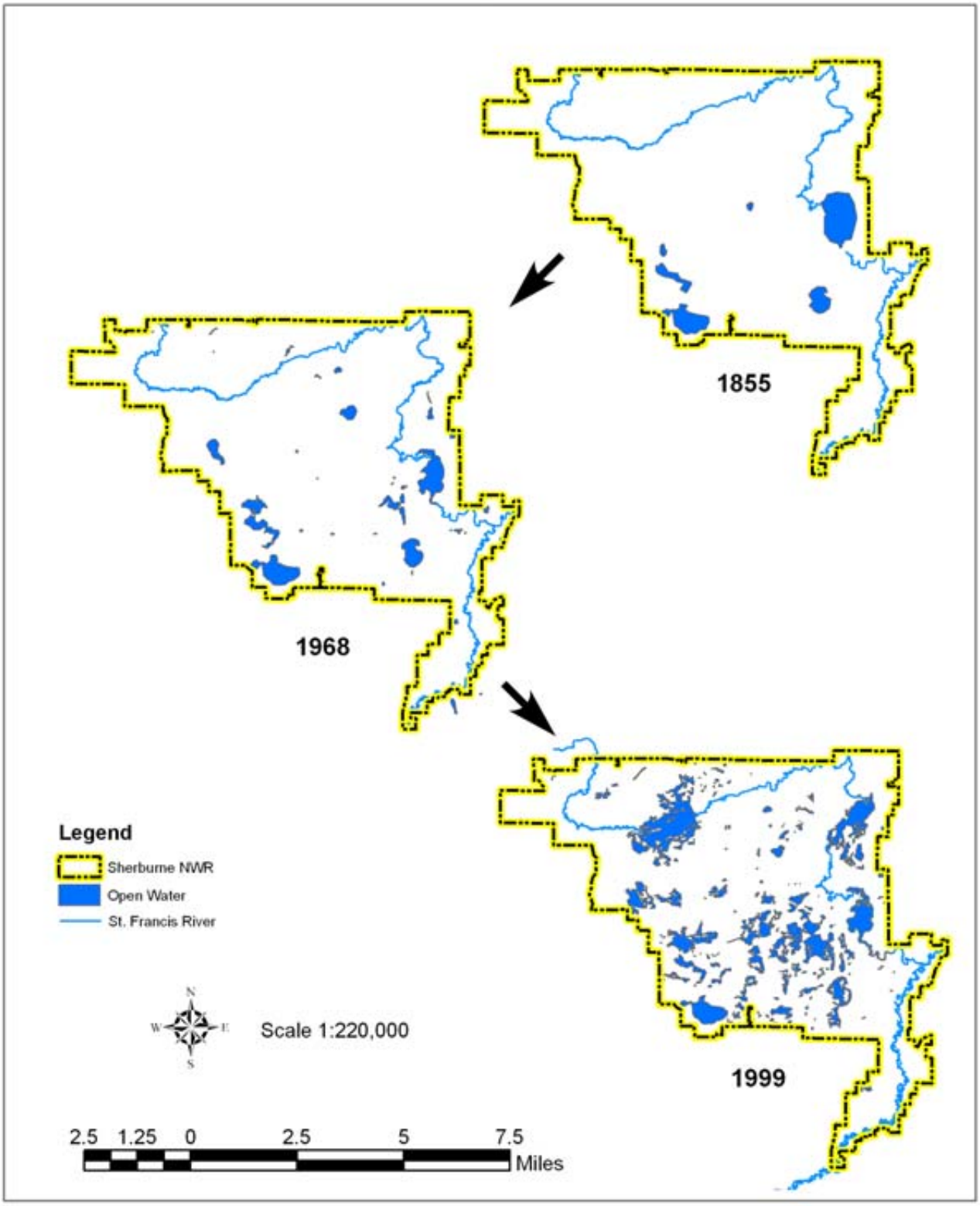


**Figure 17: Flooded Uplands, Sherburne NWR**

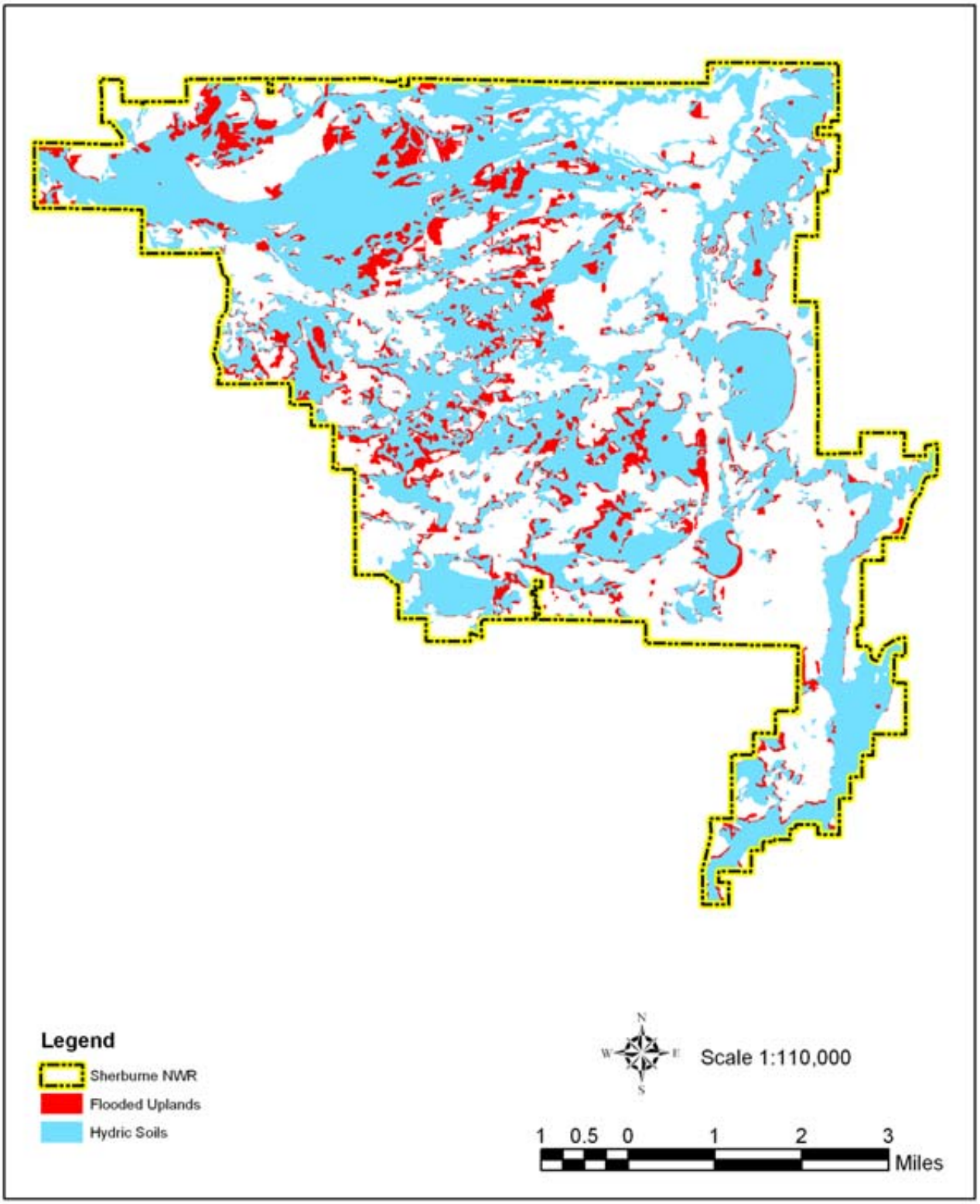


**Table 3: National Wetland Inventory Data Wetlands by Type**

| Water Regime | Acreage |
|---|---|
| Temporarily Flooded | 188 |
| Saturated (wet meadow) | 4,594 |
| Seasonally Flooded (wet meadow) | 4,792 |
| Semi-permanently Flooded (marsh) | 2,306 |
| Intermittently Exposed (marsh) | 432 |
| Permanently Flooded (open water) | 305 |
| Total Wetlands | 12,617 |

large as 214 square miles. The St. Francis River Watershed, a subwatershed of the St. Cloud-Mississippi River Watershed, crosses into the Rum River Watershed as a result of ditching.

Drainage of the larger wetlands was generally inadequate for conversion of the basins to crop land. Surface waters were removed but the soils remained waterlogged. When the Refuge was established, the area was heavily ditched; 130 basins were drained and many of the wetlands were affected by drainage (Figure 13). Drained wetlands were disproportionately the wet meadows known in Cowardin et al. as saturated and seasonally flooded wetlands, also drained were the shallow shrub-scrub wetlands. The shrub-scrub wetlands and other woody wetlands so prevalent in the early 1970s were probably the result of failed drainage. The woody vegetation moved in and dominated many wet areas (Figure 14). The combination of woody vegetation and the loss of the shallow, seasonally flooded wetlands probably contributed to declines in breeding waterfowl and many other types of marsh birds, such as shorebirds, rails, cranes, and bitterns in the area.

The large, shallow sedge wetlands were the easiest to drain and the NWI data reflects this result.

*Impoundments and Wetland Flooding*

After the Refuge was established, impoundments were created in an effort to mitigate the earlier drainage. As a result, most of the Refuge wetlands were affected by the resulting flooding of the impoundments. Open water increased from 818 acres in the late 1960s to 3,508 acres in 1992. Total wetland acres increased from 10,464 in late 1970s to 14,023 acres in 1992. All of the wetlands were affected by the impoundment flooding. Using hydric soils as a conservative estimate of wetland acres prior to alteration by ditching, the construction and flooding of the impoundments resulted in 2,910 acres of the uplands (non hydric soils) being flooded. The flooded uplands are generalized throughout the Refuge as could be expected from a raised water table (Figure 17).

## Uplands

*Oak Savanna*

In pre-European settlement times, the distribution of oak savanna in the Midwest was widespread. It occupied up to half of midwestern landscape, especially along the prairie-forest border and extended over portions of Minnesota, Iowa, Missouri, Illinois, Wisconsin, Indiana, and Ohio, covering 11 to 13 million hectares (27.5 to 32.5 million acres) (Nuzzo, 1985). Since then, these places have become fragmented and in many areas lost entirely. A survey of this plant community by Nuzzo in 1985 found about 0.02 percent of the pre-European oak savanna remaining in scattered remnants. Losses of oak savanna were due to timber cutting, fire suppression (which converted it to oak woodland and forest), and conversion to homesteads and/or farming (pasture, crop fields). Today, oak savanna and open oak woodlands are among the world's most threatened plant communities. The Nature Conservancy ranks Midwest savannas as “globally endangered” (Leach and Ross, 1995) and the U.S. Environmental

Protection Agency chose midwestern oak savanna for its first Ecosystem Recovery Project (Leach and Ross, 1995). As described elsewhere in this chapter, 95 percent of the Refuge's upland was considered oak savanna by Marschner (1930) at the time of European settlement. Today, 732 acres exist on the Refuge as remnants of this important plant community.

*Grasslands*

Very few small, scattered tracts of native prairie exist on the Refuge, amounting to less than 1,000 acres. These rare and unique grasslands include both mesic and dry prairie and they are frequently interspersed with woodland areas, especially forested sites protected from periodic fires. Mesic prairie is dominated by tall grasses including big bluestem and Indian grass. Medium-height grasses such as little bluestem and side oats grama dominate dry prairies. Both mesic and dry prairies found on the Refuge contain shrubs, such as leadplant and wild rose. Pasque flower, purple prairie clover are commonly found in both plant communities.

Native grassland restoration has occurred for many years on some upland sites of the Refuge and on private lands in the area through the Partners for Fish and Wildlife Program. Former croplands are typically planted to native grass mixtures consisting of big bluestem, little bluestem, switch grass, and Indian grass. A mixture of forbs is also included to enhance the biological diversity of many of these sites.

## Fish and Wildlife Communities

The habitats described in the preceding section support an array of wildlife species that are common to east central Minnesota. A rich diversity of birds, mammals, fish, reptiles, and amphibians inhabit lands administered by Sherburne National Wildlife Refuge. (See Appendix C for a Sherburne NWR species list.)

### Birds

*Background:*

The Refuge attracts over 230 species each year to its diverse habitats (Appendix C). Of these, over 120 are known to nest in the area. The Refuge wetlands provide habitat for about 30 nesting pairs of Greater Sandhill Cranes and serves as a staging area for thousands of cranes during fall migration. During fall and spring migration, the Refuge wetlands also support thousands of waterfowl, including Trumpeter Swans, Canada Geese, Wood Ducks, Northern Pintail, Ring-necked Ducks, Mallards, Gadwall, American Wigeon, Northern Shoveler, and Green-winged Teal that use the Refuge as a place to rest and feed along their journey. Common nesting waterfowl of the area include Canada Goose, Mallard, Wood Duck, Blue-winged Teal, and Hooded Merganser.

Other marsh and water birds frequently utilizing the Refuge and surrounding areas include Green Heron, Double-crested Cormorant, Great Blue Heron, Sora, Virginia Rail, and American and Least Bitterns. Exposed mud flats that occur sporadically around the edges of Refuge wetlands attract shorebirds including Greater and Lesser Yellowlegs and Spotted Sandpiper. Both Common Snipe and American Woodcock are commonly found on these lands as well.

Songbirds attracted to the woodland and open grassland areas on the Refuge include Eastern Kingbird, Indigo Bunting, Eastern Meadowlark, Bobolink, Scarlet Tanager, and Brown Trasher which use these upland areas for nesting and raising their young. Several species of warblers and other neotropical migrants pass through the Refuge regularly in the spring on their migration to northern breeding grounds. Year-round residents include Downy, Hairy, Pileated and Red-bellied Woodpecker, Wild Turkey, Ruffed Grouse, and Ring-necked Pheasant. Birds of prey inhabiting Refuge lands include Bald Eagle, Red-tailed Hawk, Red-shouldered Hawk, American Kestrel, Sharp-shinned Hawk, Northern Harrier, and Cooper’s Hawk.

### Mammals

The Refuge lies within the known breeding range of 54 mammal species (Appendix C). Of these, 46 species have been confirmed on the Refuge. Two species, bison and elk, known to historically reside on Refuge lands, were extirpated in the early 1900s.

The largest land mammals currently residing and breeding on the Refuge are black bear and white-tailed deer. Small mammals typical of this area include short-tail shrew, white-footed mouse, thirteen-lined ground squirrel, and deer mouse. Eastern chipmunks, eastern gray, fox, and red squirrels are commonly found in wooded habitats. Both big and little brown bats use the Refuge and its associated lands. Coyote, red fox and gray fox are the most common carnivores of the area. Bobcat are also found on the Refuge. Mammals attracted to aquatic habitats in the Refuge include river otter, mink, muskrat, raccoon, and beaver.

### Reptiles and Amphibians

Twenty-three species of reptiles and amphibians have been reported on the Refuge but little is known about their populations or their limiting factors. Many of these, such as the snapping and painted turtles, are associated with marsh and open waters while others, such as the common garter snake and the hognose snake, occur in oak savanna and prairie.

### Fish

Like most other fresh water systems in the United States, high populations of carp inhabit the St. Francis River. Due to regular spring flooding, many of the Refuge wetlands contain a diversity of fish that originate in the river. For some species, these wetlands offer spawning and nursery habitat.

## State Species of Concern

Several State-listed animal species are known to occur on the Refuge as migrants, breeders, and/or occasional visitors.

*State-listed endangered species:*

- Henslow's Sparrow

*State-listed threatened species:*

- eastern spotted skunk
- Trumpeter Swan
- Peregrine Falcon
- Loggerhead Shrike
- Horned Grebe
- Bald Eagle
- Forster's Tern
- Hooded Warbler
- Blanding's turtle

*State listed as special concern:*

- gray wolf
- least weasel
- plains pocket mouse
- Red-shouldered hawk
- Yellow Rail

- # smooth softshell turtle
- # snapping turtle
- # western hognose snake
- # gopher snake
- # two jumping spiders

Of these species, the Bald Eagle, snapping turtle, Blanding's turtle, and gopher snake would be considered common.

### Threatened and Endangered Species

The federally-listed threatened Bald Eagle is known to breed on the Refuge. In 2004, there were seven active Bald Eagle nests. Since eagles first nested on the Refuge in 1983, almost 100 eagles have been produced.

Transient individuals of the federally listed gray wolf also frequent the Refuge. No established packs occur on the Refuge.

# Threats to Resources

## Invasive Species

Several invasive species exist on the Refuge, most of which are exotic species, that have the potential to significantly affect the diversity and quality of important wildlife habitats and natural vegetation restoration efforts. Currently, leafy spurge, Siberian elm, and black locust pose the greatest threats in the upland areas, followed by European buckthorn, spotted knapweed, and coniferous tree species not native to area before European settlement such as scotch pine, white spruce, red pine, and Colorado spruce. Box elder and aspen are invasive native species that also pose potential problems in upland restoration areas.

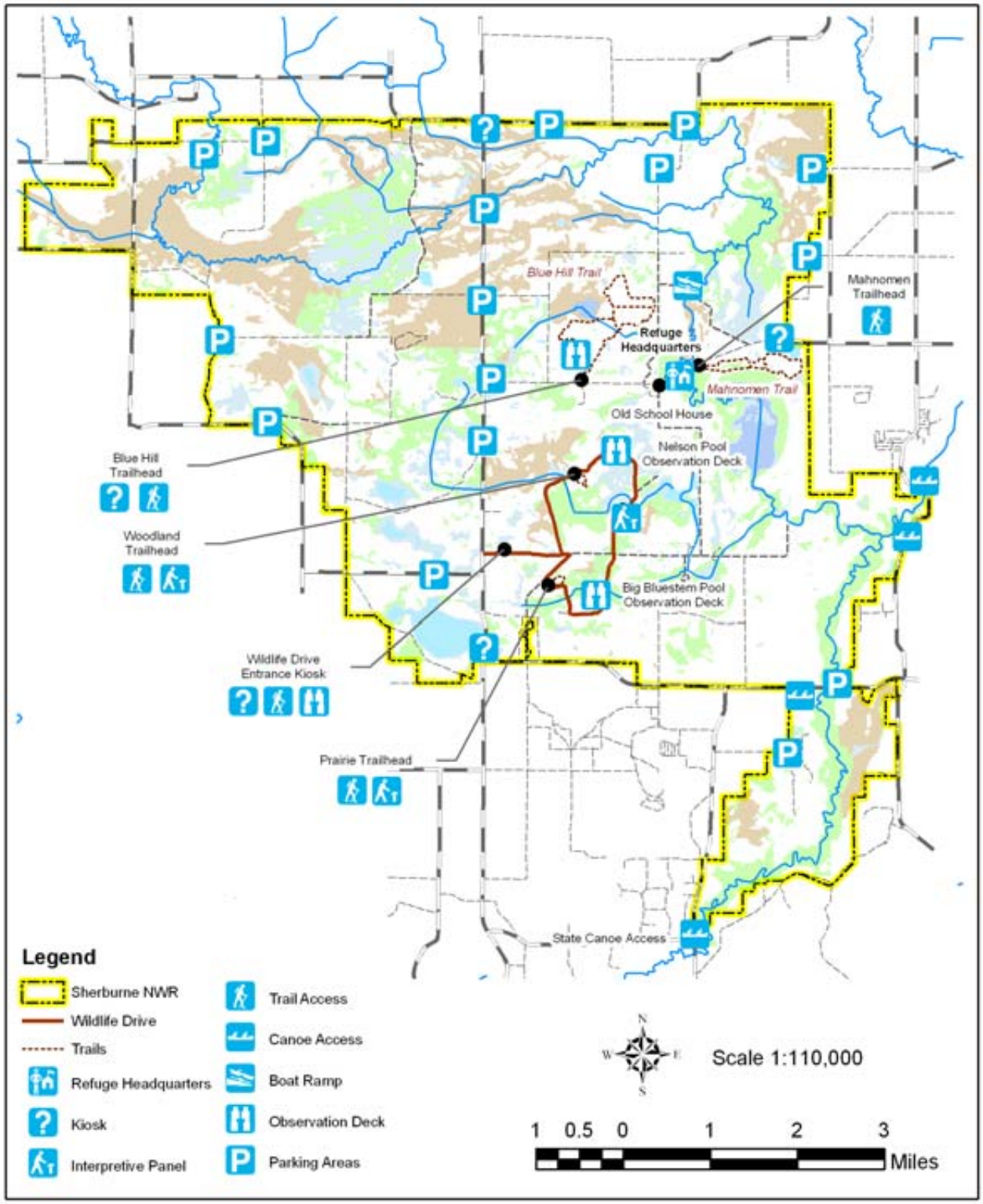
Purple loosestrife is the major exotic species in wetland areas on the Refuge and currently affects at least one-third of the restored wetlands. Reed canary grass is another aggressive species found in wetland areas on the Refuge that can reduce the quality of these areas to wildlife. Eurasian water milfoil also has potential to adversely impact Refuge wetlands and has been found within the watershed above the Refuge.

# Administrative Facilities

Located near the east entrance, the Refuge headquarters is a renovated home with a few additions made through the years (Figure 18). A schoolhouse, constructed early in the 20th century near the Refuge headquarters, has been converted for use as a meeting hall and environmental education facility. The schoolhouse is the center of public use programs on the Refuge.

In 2001, a new maintenance facility was completed for the Refuge. The main building contains a fire bay, heated shop with offices, carpenter shop and storage bay. A large pole barn provides additional storage for Refuge equipment. A four-stall garage provides cover for Refuge vehicles and small equipment.

**Figure 18: Current Facilities, Sherburne NWR**



# Archeological and Cultural Resources

Cultural resources are important parts of the Nation's heritage. The Service is committed to protecting valuable evidence of human interactions with each other and the landscape. Protection is accomplished in conjunction with the Service's mandate to conserve fish, wildlife, and plant resources.

Cultural resources are "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.

Archeological evidence indicates people of all major cultural traditions have occupied the Refuge area from the end of the last glacier to the present time. Paleo-Indian sites, based on the contents of a privately owned collection, would be very important to the State of Minnesota. An archeological resource survey was conducted early in the Refuge's history, with only 1 percent of the Refuge surveyed, there are 53 known sites. The Refuge contains two important Woodland period mound groups and associated villages. The Refuge has 20 reported archeological collections totaling almost 17,000 items. These collections are stored primarily at the Minnesota Historical Society, with a smaller collection at Mississippi Valley Archaeology Center. There was also a National Register of Historic Places property known as the Glidden-Fox house that was moved to the Town of Becker. There are four additional sites on the Refuge that are eligible for the National Register of Historic Places. All four sites are of Native American origin and are sub-surface. They include archeological sites No. 13 and No 14 (Lane 1974), the northern mound group burial site (Lane 1969) and the southern mound group burial site (Lane 1969). While not on the National Registry, the Grundrude Cemetery is a pioneer family cemetery near Orrock and is of local historical significance.

# Wildlife-dependent Recreation

The average annual visitation to the Refuge between 1998 and 2003 was 95,951. Visitors participate in bird, upland game, and deer hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Participation in these wildlife-dependent recreation activities is displayed in Table 4.

In preparation for comprehensive planning, visitors to the Refuge were surveyed from April 2001 to April 2002. The survey was a cooperative effort with the University of Minnesota Department of Forest Resources and Minnesota Cooperative Fish and Wildlife Research Unit. The survey results are available in a report, "Sherburne National Wildlife Refuge: A Study of Visitor Experiences and Preferences in Support of Comprehensive Conservation Planning." The surveyors contacted 760 visitors. A detailed survey was completed by 451 respondents.

In the survey we learned that most respondents were white and had at least a high school degree. Approximately 40 percent had a college degree. About 25 percent live in rural communities. Over half of the respondents traveled 20 miles or fewer to visit the Refuge.

Respondents were given a list of activities that they could participate in while on the Refuge. The five activities with the greatest participation were: watching wildlife, observing on the Wildlife Drive from a vehicle, viewing scenery, bird watching, and looking at wildflowers. The five activities engaged in least often were: hunting from disability blinds, mushroom picking, fishing from a canoe, cross-country skiing off-trail, and berry picking. Participation in activities varied across seasons. Hunting, of course, occurred in the fall during open seasons.

**Table 4: Participation in Public Use Activities, Sherburne NWR**

| | 1998[1] | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|
| *Total Refuge Visitation* | 86,881 | 102,261 | 93,049 | 88,365 | 94,000 | 111,151 |
| *Hunting* | | | | | | |
| Waterfowl | 1,334 | 1,425 | 1,608 | 1,479 | 1,438 | 1,764 |
| Upland Game | 951 | 1,054 | 1,182 | 1,196 | 1,844 | 2,435 |
| Big Game | 3,594 | 3,928 | 4,300 | 3,831 | 4,446 | 4,251 |
| *Total* | 5,879 | 6,407 | 7,090 | 6,506 | 7,728 | 8,450 |
| *Fishing* | 1,991 | 2,095 | 1,670 | 1,420 | 1,341 | 1,958 |
| *Interpretation, Observation, Photography* | | | | | | |
| Wildlife Drive | 18,000 | 20,654 | 19,445 | 16,977 | 18,547 | 24,942 |
| Foot Trails | 15,000 | 18,659 | 18,465 | 17,240 | 17,837 | 22,795 |
| Special Events | 1,539 | 1,862 | 1,542 | 1,431 | 1,061 | 1,388 |
| *Total* | 34,539 | 41,175 | 39,452 | 35,648 | 37,445 | 49,125 |
| *Environmental Education* | | | | | | |
| *Staff/volunteer-led* | 2,002 | 1,539 | 1,359 | 1,092 | 1,037 | 1,233 |
| *Teacher-led* | 3,517 | 1,331 | 1,591 | 1,421 | 1,694 | 1,145 |
| *Total* | 5,519 | 2,870 | 2,950 | 2,513 | 2,731 | 2,378 |

*1.Years presented are U.S. Fish & Wildlife Service fiscal years, which run from October through September.*

To identify the motivations important to visitors, respondents were asked to rate how important 32 experiences were to them in relation to their most satisfying recreational activity at the Refuge. The five experiences with the highest importance mean scores were to: experience nature, see wildlife, view scenic beauty, enjoy smells and sounds of nature, and get away from usual demands of life.

Visitors were asked to look over a list of 27 possible problems and rate how much the problem detracted from their experience. Mean scores indicate that none of the problems are more than a slight distraction from their experiences when looking across all respondents. However, about one-third of the respondents indicated that litter and trash left by others was a moderate to severe problem for them. One-third of the respondents also indicated that people not following hunting regulations and people not obeying Refuge rules detracted moderately to severely from their experience. Visitors were also asked about the number of other visitors they saw at various places on the Refuge. In general, respondents did not feel crowded. About a third of visitors reported the number of people in the field while hunting deer with firearms as somewhat to very unacceptable. In addition, a little over 20 percent of visitors found the number of people in the field while hunting waterfowl was unacceptable.

Visitors were asked to rate their support or opposition to 17 possible management actions. Respondents slightly supported: controlling invasive species, closing access to promote nesting, providing more educational opportunities, and providing more exhibits. Respondents slightly opposed: decreasing prescribed burning, limiting number of hiking trails, providing fewer hunting opportunities, and providing fewer information signs. Approximately a third of the respondents strongly opposed providing fewer hunting opportunities.

Finally, visitors were asked about their general feelings about the Refuge, the staff, and the Fish and Wildlife Service. Overall, respondents most strongly agreed that the time they spent at the Refuge could not have been spent elsewhere. They identify strongly with the Refuge and see it as an important place for their children and future generations. Respondents generally agreed that they feel welcome at the Refuge. They trust that the U.S. Fish and Wildlife Service will make good decisions, have confidence in the local staff, and believe that the staff will do what is best for the Refuge.

Analysis of the survey data reveals several major trends that should be addressed in future management decisions. First, and most importantly, visitors greatly appreciate the recreational opportunities and other benefits the Refuge provides. Secondly, distinct user groups visit the Refuge and each group has its own special needs. Conflicts between groups could potentially cause problems and efforts should be made to avoid this. Building positive, strong relations between visitors and between visitors and Refuge managers will not only improve experiences on the Refuge, but will also create a sense of community and connectedness among Refuge visitors. Actions promoting a positive social environment will also enhance visitor support and dedication to the Refuge and will more firmly establish the Refuge's role within the community.

*Maintain and Improve Current Opportunities at the Refuge*

Although a wide range of preferences exists, Refuge visitors are very satisfied with current recreation activity and experience opportunities at the Refuge. Managers should make efforts to maintain the diversity of activities available and improve techniques used to inform visitors and enhance experience opportunities. Visitors will be better able to achieve recreational goals and pursue interests if they are aware of the possibilities. For example, signs, brochures, and maps can clearly direct people to locations suitable for hiking, observing wildlife, biking, hunting, or other activities appropriate to the Refuge. Additionally better and/or timelier information can help visitors attain and benefit from their desired experiences.

Observing wildlife and scenery were the most popular visitor activities. It is therefore important that visitors have a variety of viewing opportunities. Current viewing locations, such as observation platforms, trails, and the wildlife drive, should be monitored to ensure sites continue to provide opportunities to see a Great Blue Heron, a fading summer sunset, and so on. Over time, modifications may need to be made to viewing stations and perhaps new ones created.

Educating visitors can also help visitors attain and benefit from experiences they value. For example, Refuge visitors reported that they highly value observing wildlife. But, they also reported they were not able to attain this experience to their desired level. Often, spotting wild animals takes practice and patience. Visitors may be looking at the wrong time of day, in the wrong type of habitat, or may need to be quieter on trails or on the wildlife drive. Interpretive programs or signs could provide visitors with hints on how to improve their observation techniques to enhance their wildlife viewing opportunities. Letting visitors know what types of animals they should be looking for in a specific area might also improve their success.

Visitors were also interested in learning more about nature in general and the natural history of the area. Several individuals expressed interest in guided Refuge tours and the establishment of a permanent educational center. While an education center may not be an immediate possibility, an increase in educational/ interpretive programs, signs, brochures, and activities will help satisfy this visitor need. Programs could be designed and led by volunteers if budgetary or other constraints exist.

*Creating a Sense of Community Among Refuge Visitors*

Creating a community atmosphere among Refuge visitors can result in substantial and far-reaching benefits. Although most visitors had very few complaints regarding their visit to Sherburne National

Wildlife Refuge, some did report feelings of crowdedness or the presence of too many people. In addition, it seems that many visitors would benefit from a better understanding of other individuals with differing recreational interests. Learning to appreciate a variety of recreational interests and values could help alleviate feelings of crowdedness and conflicts between visitors.

The survey data reveals distinctions between fall and summer visitors. Winter/ spring visitors were very similar in most aspects to summer visitors. Differences in attitudes, perceptions, and interests can lead to varying degrees of conflicts between visitors. Currently there does not appear to be any severe problems, however, the potential exists. By encouraging all types of visitors to interact or learn more about different viewpoints, managers can help improve visitors' relationships with one another. Better understanding of fellow visitors is vital to acceptance of others and to the construction of a visitor community.

One area that deserves attention is hunting. A large number of respondents support hunting on the Refuge and enjoy hunting on the Refuge. Others believe that the Refuge should serve as a haven for wildlife and hunting should be excluded. Hunting is an essential tool managers use to keep wildlife populations in balance with the habitat resources. Programs concentrating on the role of hunting in wildlife Refuges – and Sherburne NWR in particular – could be implemented to inform visitors of the benefits of hunting to wildlife populations as well as to continued visitor opportunities to view wildlife.

Compared to summer and winter/spring visitors, fall visitors appear to place less importance on the Refuge's role in managing habitat for wildlife, retaining and restoring ecosystem functions, preserving natural landscapes, and providing educational opportunities for visitors. A majority of fall visitors are hunters. Perhaps more than other groups, hunters should be targeted with information and education efforts to increase their knowledge and understanding of the Refuge's many different goals. A better understanding on the part of hunters on the role of the Refuge would improve the relationship between hunters and non-hunters. It might also increase support for management strategies and tactics designed to eliminate or decrease visitor caused damage to resources and other visitors' experiences.

Another way to foster a sense of community among Sherburne NWR visitors is to encourage volunteerism and membership in the *Friends of Sherburne* group. Currently the Refuge has a large and active volunteer force – one out of every seven visitors volunteers time at the Refuge engaging in activities such as collecting prairie seeds to serving as an interpreter along the wildlife drive during summer – and an active *Friends* group. Although a diversity of volunteer opportunities exists, the list of volunteer activities could be expanded to include a greater diversity of visitors. Retaining dedicated volunteers contributes immensely to creating a sense of community and shared values between visitors and staff.

# Current Refuge Programs: Where We Are Today

Sherburne National Wildlife Refuge conducts a wide array of wildlife conservation activities both on and off the Refuge. Over the years, a variety of habitat management approaches has been applied to the Refuge. Many of these practices were aimed at improving Refuge lands for waterfowl production, an historic focus of the U.S. Fish and Wildlife Service. In 1999, the Refuge, with the input of other conservationists, assessed its habitat restoration and management programs and developed a Landscape Plan. This plan basically set forth the philosophy of restoring Refuge plant communities to native species. It also identified the importance of using natural processes such as prescribed fire and water management to maintain the diversity and productivity of these communities. This philosophy remains today and will be integral within this Comprehensive Conservation Plan.

The Refuge's proximity to urban areas also offers unique opportunities to interact with diverse and supportive audiences. For example, Refuge staff have the privilege to work with a large cadre of

**Table 5: Wildlife Observation Visitors, Sherburne NWR**

| | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 |
|---|---|---|---|---|---|---|
| Total Refuge Visitation | 86,881 | 102,261 | 93,049 | 88,365 | 94,000 | 111,151 |
| Wildlife Drive | 18,000 | 20,654 | 19,445 | 16,977 | 18,547 | 24,942 |
| Foot Trails | 15,000 | 18,659 | 18,465 | 17,240 | 17,837 | 22,795 |

dedicated volunteers. Environmental education programs are provided to area schools from suburban or rural locations. Likewise, hunting, fishing, wildlife observation, photography, and interpretive opportunities are offered on Refuge lands.

## Current Visitor Use on the Refuge

### Wildlife Observation and Photography

The Refuge is open to the public for wildlife observation and photography for a variety of activities during daylight hours. On average, more than 74,000 visitors participate in wildlife observation and photography each year while using the wildlife drive, using hiking trails, canoeing on the St. Francis River or bicycling on Refuge roads (Table 5). The 7.3-mile Prairie's Edge Wildlife Drive provides vehicle and bicycle access for wildlife viewing in wetlands, oak savannas, prairie openings, and woodlands. The Drive is open from late April through October. The Blue Hill and Mahnomen trails provide nearly 8 miles of easy walking and are open year-round. Each trail is designed with three loops that pass through oak woodlands and prairie openings, skirting nearby wetlands. When snow has accumulated, these trails are open for cross country skiing. Snowshoeing and walking are permitted to the side of ski tracks on the Mahnomen Trail. Canoeing is permitted on Battle Brook and on the St. Francis River south from Battle Brook. Bicyclers are welcome on the Wildlife Drive from late April through October, and on Refuge service roads from September 1 to February 28. Hiking trails are closed to bicyclists and off-road travel is not permitted.

### A Haven for Wildlife – March 1 to August 31

The majority of the Refuge is posted for no entry from March 1 to August 31. This period gives wildlife the chance to breed and raise their young without human disturbance. During this period, the Blue Hill and Mahnomen Hiking Trails, the Wildlife Drive, the St. Francis River canoe route, and fishing access points remain open for public use.

### Special Events/Outreach

Five special events are annually co-sponsored by the Refuge and the Friends of Sherburne: the Wildlife Festival in October, the Wildlife Film Festival in January, Winterfest in February, Spring Clean-up in April and Migratory Bird Day in May. These events provide an excellent avenue for public outreach and education (Table 6).

### Environmental Education

Sherburne County Environmental Education (EE) Days are annually held during the third week of September at Sherburne NWR and Sand Dunes State Forest. Nearly 900 fifth and sixth grade students from Elk River, Zimmerman, Otsego, Becker, Clear Lake and Foley participate in the program. Each student spends a half-day at the Refuge and a half- day at Sand Dunes State Forest participating in a variety of 20-minute environmental education programs conducted by staff from the Refuge, the University of Minnesota Extension Service for Sherburne County, the Natural Resource Conservation Service, Minnesota Department of Natural Resources, and the Sherburne County Soil and Water Conservation District. The Refuge is responsible for programs on wildlife management and prescribed burning.

**Table 6: Special Event Attendance, Sherburne NWR**

| Special Events | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 |
|---|---|---|---|---|---|---|
| Wildlife Festival | 350 | 600 | 575 | 600 | 200 | 400 |
| Wildlife Film Festival | 228 | 111 | 83 | 38 | 87 | 99 |
| Winterfest | 700 | 800 | 500 | 425 | 375 | 500 |
| Spring Clean-up Day | 200 | 300 | 350 | 300 | 340 | 340 |
| Migratory Bird Day | 54 | 35 | 24 | 50 | 42 | 29 |
| TOTAL | 1,532 | 1,846 | 1,532 | 1,413 | 1,043 | 1,368 |

**Table 7: Total Environmental Education Participation, Sherburne NWR**

| Environmental Education | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 |
|---|---|---|---|---|---|---|
| Staff/volunteer-led on-site | 2,002 | 1,539 | 1,359 | 1,092 | 1,037 | 1,233 |
| Teacher-led on-site | 3,517 | 1,331 | 1,591 | 1,421 | 1,694 | 1,145 |

**Table 8: Days of Use by Hunters, Sherburne NWR**

| | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 |
|---|---|---|---|---|---|---|
| Waterfowl Hunting | 1,334 | 1,425 | 1,608 | 1,479 | 1,438 | 1,764 |
| Upland Game Hunting | 951 | 1,054 | 1,182 | 1,196 | 1,844 | 2,435 |
| Big Game Hunting | 3,594 | 3,928 | 4,300 | 3,831 | 4,446 | 4,251 |

In addition to the EE Days program, teachers lead their own programs on the Refuge with planning assistance from staff. Staff and volunteers also lead programs upon special request (Table 7).

## Hunting

Small game, waterfowl, and big game hunting are permitted on the Refuge for certain species, in designated areas, in accordance with state and federal laws. Seventeen off-road, mowed parking areas are provided for hunters. Long Pool is the most heavily hunted location on opening weekend of waterfowl season with an average of 44 hunters on the pool. Opening day of firearms deer hunting averages over 900 hunters (Table 8). Three waterfowl blinds and one firearms deer blind are provided for hunters with disabilities during waterfowl and firearms deer season.

## Fishing

Fishing is enjoyed on the St. Francis River at six designated access points marked on the Refuge recreation map. State regulations apply (Table 9).

**Table 9: Days of Use by Anglers, Sherburne NWR**

| | FY 1998 | FY 1999 | FY 2000 | FY 2001 | FY 2002 | FY 2003 |
|---|---|---|---|---|---|---|
| Anglers | 1,991 | 2,095 | 1,670 | 1,420 | 1,341 | 1,958 |

**Table 10: Volunteer Hours, Sherburne NWR**

| | 1998[1] | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|
| Volunteers | 503 | 745 | 574 | 717 | 546 | 603 |
| Volunteer hours | 8,866 | 8,662 | 8,001 | 8,733 | 7,752 | 8,603 |

*1. Years presented are U.S. Fish & Wildlife Service fiscal years, which run from October through September.*

### Volunteer Program

Volunteers actively participate in a wide variety of visitor services and biological programs. Their activities include litter pick-up, trail maintenance, roving wildlife interpretation, wildflower gardening, prairie seed collections, and wildlife surveys. From 1998 to 2003 volunteers contributed an average of 8,436 hours each year (Table 10). Many accomplishments would not be possible without the contributions of these dedicated individuals..

### Friends Group

The Friends of Sherburne NWR, a non-profit group formed in 1993, assists the Refuge with educational programs and provides financial backing for selected programs and projects through fund-raising activities. At the end of fiscal year 2003, the Friends had 248 members.

## Habitat Management on the Refuge

The primary objective of the habitat management program at the Refuge is to maintain diverse, productive, and sustainable native plant communities. Through periodic treatments, these lands maintain their value to Refuge wildlife and help meet their production, feeding, and migration requirements. The major habitat types of the Refuge can be divided into three categories; wetlands, big woods, and oak savanna.

### Wetlands

The Refuge lies within the St. Francis Watershed and contains a variety of wetlands ranging from shallow wet meadows to permanently flooded mixed emergent marshes. After the Refuge was established, impoundments were created along the existing agricultural drainage ditches. Open water increased from 818 acres in the late 1960s to 3,508 acres in 1992. Total wetland acres increased from 10,464 in late 1970s to 14,023 acres in 1992.

Sherburne National Wildlife Refuge has 22 restored wetlands, or impoundments, where the water level can be manipulated. Not all of the impoundments are kept at the same depth. Water management by controlled fluctuations creates a variety of habitats to provide for a diversity of wildlife requirements. Water level management is the primary technique used to maintain the diversity and productivity of Refuge impoundments. Through periodic drawdowns, followed by subsequent reflooding, they support a variety of aquatic emergents and expose mudflats that attract good concentrations of waterfowl, waterbirds, and shorebirds.

### Big Woods

Big woods, sometimes referred to as a maple-basswood forest, was historically dominated by these two tree species but also includes elm, red oak, and green ash. Canopy cover is 80 to 100 percent. The understory is comprised of shade tolerant herbaceous plants such as ironwood and sugar maple, sparse shrub layer, and a diverse ground layer of mesic forest herbs.

Woodlands near the northern boundary of the Refuge are managed to maintain native trees and restore a Big Woods habitat. Snags and downed timber are retained for use by wildlife for roosting, loafing, nesting, hunting, feeding, and food storage.

## Oak Savanna

Historically, oak savanna was the predominant habitat on the upland areas that are now part of the Refuge. This plant community is characterized by scattered individuals and clumps of oaks growing with an understory dominated by tall grasses and prairie flowers. Oak savanna was historically a very dynamic habitat, fluctuating into a more open or less open state depending on frequency of wildfires or drought. It was associated with the more open prairie areas and also more dense oak woodlands and brushlands. Today, woodland areas and prairie openings on the Refuge are considered a part of the oak savanna.

The Refuge is reestablishing prairie grasses and wildflowers that once dominated the oak savanna through an active planting program. Big bluestem, little bluestem, Indian grass and switch grass, as well as a rich diversity of native prairie wildflowers (forbs) can now be found here. The sandy soils on the Refuge provide well-drained growing conditions for many plants more typically found in more arid regions of the west. Several species of wildflowers, such as lupine, hoary puccoon, and Indian paintbrush, are found in the Refuge at the limits of their range. Oak seedlings are being planted in some portions of the Refuge to restore the overstory of the oak savanna while in other areas oaks are naturally spreading into the grassland plantings.

Oak savanna is a fire-dependent plant community that today is restored and maintained by prescribed burning. Burning serves three primary functions. It encourages the growth of native wildflowers and warm season grasses, such as big and little bluestem, Indian grass and switch grass, which provide food and cover for nesting waterfowl and wildlife. It also reduces competition from exotic cool season grasses and encroaching trees and shrubs that are not fire tolerant. In addition, prescribed burning opens up the canopy in more heavily wooded areas to re-create oak savanna.

The Refuge's fire program focuses on prescribed burning for habitat and wildlife management and wildfire control. Though the main reason for conducting prescribed burning is to restore and maintain a healthy Refuge ecosystem, fuel reduction for wildfire management is also a benefit. Prescribed burning consumes dead vegetative fuels under controlled conditions, reducing the wildland fuel load. Reducing these fuel loads under controlled conditions facilitates the suppression of wildfires, should they start. This is particularly important because the Refuge lies in an area that has a lot of residential development.

Table 11 shows the history of fires on the Refuge from 1986 to 2002.

## Invasive Species Control

The overall strategy for the control of exotic and aggressive native species is to reduce the use of chemicals and use mechanical and biological means where possible and effective. Efforts will be concentrated on those species posing the biggest threat to natural vegetation restoration efforts. The understanding is that some exotic species will be a part of today's landscape because they are too prolific to expel of but do not pose a major threat, e.g., hoary allysum and noble yarrow.

The Refuge has control programs in place for some species. An aggressive chemical control program for Siberian elm and black locust was begun many years ago and has made much progress in getting these species under control. Problem areas have been reduced to small patches and, at the present rate, total control should be realized in 10 years.

In addition to chemical control, the Refuge has an active biological control program in place for purple loosestrife and leafy spurge. Currently, purple loosestrife infestations range in size from a few plants to approximately 400 acres (i.e., Long Pool) with the larger infestations occurring on the eastern half of the Refuge. Purple loosestrife has become established on approximately 835 acres of the Refuge; the exotic plant can be found on 13 of our impoundments, Rice Lake, Buck Lake, Type 2/3/4 wetlands, Battle Brook, and the St. Francis River. However, some of the impoundments contain less than a

**Table 11: History of Fire on Sherburne NWR**

| Year | Wildfires | | Prescription Burns | | Total Acres |
|---|---|---|---|---|---|
| | Number | Acres | Number | Acres | |
| 2002 | 4 | 2.3 | 15 | 6604 | 6,606.3 |
| 2001 | 5 | 25 | 1 | 946 | 971 |
| 2000 | 4 | 2.7 | 9 | 4,743 | 4,745.7 |
| 1999 | 7 | 12.6 | 6 | 4,120 | 4,132.6 |
| 1998 | 11 | 60.5 | 10 | 6,426.0 | 6,486.5 |
| 1997 | 2 | 16.0 | 5 | 3,459.0 | 3,475.0 |
| 1996 | 3 | 1,299.6 | 3 | 3,357.0 | 4,656.6 |
| 1995 | 10 | 329.9 | 5 | 4,103.0 | 4,432.9 |
| 1994 | 1 | 12.0 | 4 | 466.2 | 478.2 |
| 1993 | 4 | 7.1 | 7 | 2,490.0 | 2,497.1 |
| 1992 | 3 | 5.5 | 8 | 6,821.0 | 6,826.5 |
| 1991 | 4 | 72.1 | 7 | 2,574.0 | 2,646.1 |
| 1990 | 3 | 913.5 | 1 | 1,200.0 | 2,113.5 |
| 1989 | 1 | 0.3 | 5 | 4,334.0 | 4,334.3 |
| 1988 | 5 | 748.2 | 0 | 0.0 | 748.2 |
| 1987 | 2 | 3.0 | 3 | 1,495.0 | 1,498.0 |
| 1986 | 1 | .3 | 2 | 392.0 | 392.3 |

quarter of an acre of infestation. To date, an estimated 187,000 leaf-eating beetles (*Galerucella* sp) have been released at 49 locations on-Refuge and thirteen private land sites within the Refuge's watershed. Root-boring weevils (*Hylobius* sp) have also been released at five locations including one private land site.

An integrated pest management approach is used for leafy spurge. Chemical methods are used to treat small patches (i.e., < 2500 sq ft) of leafy spurge. However, larger infestations are treated with flea beetles of the *Aphthona* species as the biological control agent. To date, we have released 128,710 flea beetles at 27 locations. Approximately 24 of the Refuge's total 45 acres of infestation have been treated with biological agents. The main target area for leafy spurge is in the vicinity of Bergerson, Bohm, and Josephine Pools where the invasive plant appears to be spreading.

Non-native conifer species are mainly controlled through mechanical means. Plantations of these trees in existence when the Refuge was established are harvested commercially when they reach merchantable size. About 65 percent of the non-native conifers present on the Refuge have been controlled in this manner. Scattered individuals in active burn units are left to be controlled by fire.

## Fish, Wildlife, and Plant Monitoring

The monitoring of fish, wildlife, and their habitats at the Refuge is conducted to provide information used to make management decisions and support statewide and national conservation efforts. Fish, wildlife, and plant monitoring activities currently occurring on the Refuge are summarized as follows:

*Waterfowl Survey:* Waterfowl surveys are conducted weekly during spring and fall migrations and biweekly between migration times. The data are used to provide managers and the public with current information on the distribution and abundance of waterfowl using the Refuge, and to identify annual trends in waterfowl use.

*Water Bird Survey:* conducted in conjunction with waterfowl survey, this survey provides data on the distribution of these birds, their chronology of use, and monitors long-term trends in use of the Refuge habitats.

*Bald Eagle Survey:* All Bald Eagle nests on the Refuge are monitored weekly by staff and volunteers to obtain phenology and productivity data. All information is shared with the DNR Nongame Program, which monitors nesting activity throughout the state.

*White-tailed Deer Harvest Data:* Sex, age, and kill data is collected on an annual basis during the firearms deer season. This information is used to help track the harvest and contributes to the Minnesota DNR population model that helps set management goals for the upcoming season.

*Sandhill Crane Surveys:* A spring unison call survey is conducted annually to estimate the number of breeding pairs of Greater Sandhill Cranes. In the fall, counts are done as the cranes leave their roost to estimate the number of cranes utilizing the Refuge for a staging area. Both of these surveys track long-term trends of crane use of the Refuge.

*Predator and Furbearer Scent Post Survey:* This survey is conducted annually to determine the relative distribution and abundance of these species on Refuge lands. In addition, this information is provided to the Minnesota DNR for incorporation into its statewide database.

*Herptile Drift Fence:* Baseline presence-absence information was established from annual surveys conducted from 1996-2000. These surveys will be repeated for 2 consecutive years every 5 years to monitor long-term trends.

*Frog and Toad Calling Survey:* Frog/toad calling surveys are conducted annually at specific sites to determine population status and diversity. The survey methods were adopted from the North American Amphibian Monitoring Program. The data collected is shared with Minnesota Frog Watch, which administers the Minnesota frog/toad survey efforts.

*Waterfowl Harvest Survey:* Each year a survey is done by checking the age, sex and species harvested during the waterfowl season. This information is used to track the composition of the harvest and hunter success rate.

*Breeding Bird Survey:* A road-based Breeding Bird Survey is conducted each year by volunteers. The results are incorporated into a national database to track distribution and trends of songbirds.

*Habitat-based Breeding Bird Point Counts:* Every 3 to 5 years point counts are performed for 2 consecutive years in three habitat types in an effort to track population trends and habitat associations of breeding songbirds. Sixty-eight points were sampled in 1994-95, and 2000-01.

*Marsh Bird Survey:* A survey of secretive marsh birds is conducted annually during the months of April, May, and June. Play-back calls are used to detect the presence of Yellow Rails, Virginia Rails, Soras, Least Bitterns, American Bitterns and Pied-billed Grebes. In addition, marsh and water birds are recorded during the waterfowl surveys.

*Purple Loosestrife Monitoring:* Annual reconnaissance is undertaken to track existing and new infestations of this invasive plant. In addition, the Refuge tracks the progress of biological control efforts by following a national protocol developed by Cornell University, an evaluation technique developed by the Minnesota DNR, and photo-points to document the effectiveness of biocontrol agents on loosestrife and monitor changes in wetland plant community.

*Tamarack Swamp Restoration Monitoring:* Permanent plots were established in an area where tamarack seedlings were planted in 1999 and 2000 in an effort to restore a tamarack swamp. These plots were set up to be sampled annually for the first 3 years and then on a semi-annual basis through 10 years to determine the survivorship, growth pattern, competition, and overall health of the trees.

*Leafy Spurge Monitoring:* Annual monitoring of areas where biological and chemical control methods have been used to determine the efficacy of these treatments in controlling the spread of this invasive species.

*Bur Oak and Prickly Pear Reintroductions:* These two species were planted at select Refuge sites in 1997 and 1998, respectively. All sites are monitored for survival and success of the plantings.

*Prescribed Fire Monitoring:* Following the protocol established by the National Park Service, 107 permanent plots are sampled pre-burn, immediately post-burn, and at intervals of 1, 2, 5 and 10 years after a prescribed burn is conducted. The purpose of this monitoring is to determine the long-term effects of the fire on vegetation composition and to determine if the objectives for the application of fire are being met.

## Visitor Services

The majority of the Refuge is closed to all public access from March 1 to August 31 to allow wildlife to breed and raise their young free from human disturbance. During this time the Wildlife Drive (after the eagles hatch in late April), the hiking trails, the St. Francis River canoe route, and fishing access points remain available for wildlife-dependent recreation.

### Hunting

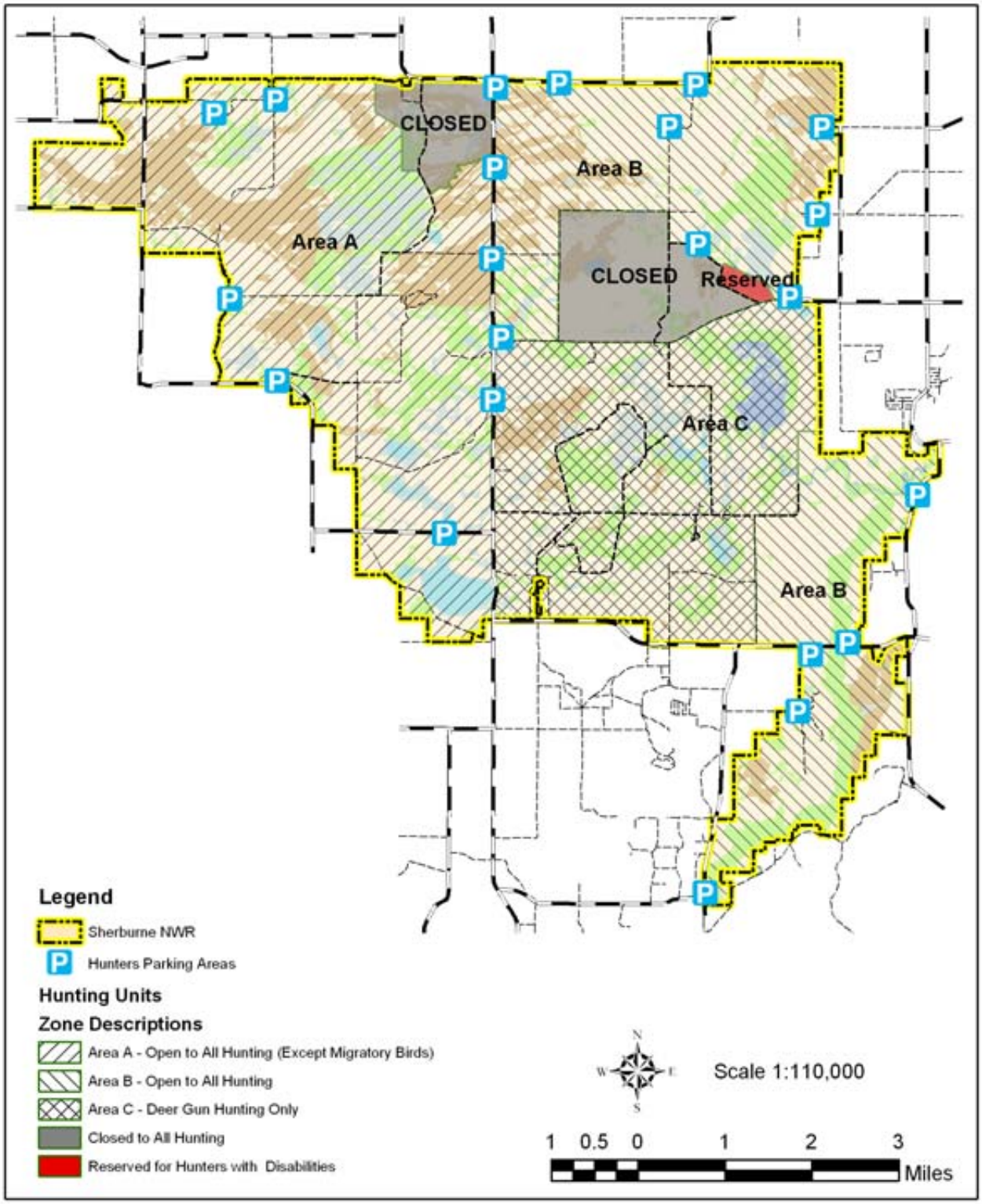
White-tailed deer is the most actively sought game mammal on the Refuge. The Refuge provides archery and shotgun hunting opportunities for white-tailed deer during the regular state seasons. Archery hunting is allowed in Refuge Hunting Areas A and B (Figure 19). Firearms hunting is allowed in Areas A, B, and C. During firearms-deer season, the Brande Road, off Co. Rd. 9, is closed to all access including foot travel. The Refuge is not open to bear, Wild Turkey, or special deer muzzleloader hunting.

The Refuge provides small game hunting for Ruffed Grouse, Pheasant, gray and fox squirrel, rabbit, and hare in Areas A and B during the regular state season for these species. Shotgun hunters must possess and use only non-toxic shot while hunting small game on the Refuge. The Refuge is not open to raccoon hunting.

Ducks, coots, geese, rails, woodcock, and snipe can be hunted in Area B of the Refuge during the regular state seasons. Hunters must remove boats, decoys and artificial blinds from the Refuge at the end of each day. Hunters can only use motorless boats, and they must be launched at designated access sites on Long Pool and the St. Francis River. Hunters are allowed to use dogs while hunting birds, but the dogs must remain under strict control.

During the waterfowl and firearms seasons, three waterfowl blinds and one firearms deer blind are provided by reservation for hunters with disabilities.

**Figure 19: Hunting Areas, Sherburne NWR**



## Fishing

Fishing occurs at six access points on the St. Francis River. Anglers are primarily trying for northern pike, although carp and bullheads represent a large part of the fishery biomass.

## Interpretation

Interpretation is provided at kiosks, interpretive signs along the wildlife drive, exhibits in the office, and through personal contact. Staff and volunteer wildlife interpreters give interpretive talks and demonstrations and lead tours. Interpreters contact visitors on the Wildlife Drive, lead bird hikes during special events, and conduct hayrides, presentations, and demonstrations at the annual Wildlife Festival and Winterfest special events. Interpretive themes include wildlife, wildlife management through water management and prescribed burning, upland habitat restoration through non-native tree removal and planting of native grasses and wildflowers, control of invasive plant species through biological and chemical programs. Five special events are held each year: Wildlife Festival, Wildlife Film Festival, Winterfest, Spring Clean-up Day, and Migratory Bird Day.

## Environmental Education

Environmental education activities include staff and volunteer led programs on the Refuge, teacher led programs on the Refuge, and workshops offered to teachers. The Refuge also participates in the annual Sherburne County Environmental Education Days. During this event nearly 900 fifth grade students spend a half-day at the Refuge and a half-day at the Sand Dunes State Forest participating in a variety of 20-minute programs. The Refuge is responsible for programs on wildlife management and prescribed burning.

## Wildlife Observation and Photography

Hiking, bicycling, canoeing, cross-country skiing, and snowshoeing are allowed in support of wildlife observation and photography. From mid-April through October, the 7.3-mile Wildlife Drive, the 5-mile Blue Hill Trail and the 3-mile Mahnomen Trail are open to wildlife observation and photography. The Wildlife Drive features three wildlife observation decks, the half-mile Prairie Trail, the half-mile Woodland Trail, and a quarter-mile accessible trail. During this period bicycling is permitted on the Wildlife Drive and on County roads crossing the Refuge. Bicycling is not permitted on hiking trails. In addition, from September 1 to February 28, Refuge service roads are open to bicycling, hiking, cross-country skiing and snowshoeing.

Most Refuge lands are open to hiking, cross-country skiing and snowshoeing from September 1 to February 28. The Brande Road is closed to all public entry during the firearms deer season. The Mahnomen and Blue Hill hiking trails are for hikers only. Bicycles and horses are prohibited on the trails.

Two ungroomed trails are available on the Refuge for cross-country skiing. The Blue Hill Trail has three moderate-grade loops and is open only to cross-country skiing. The Mahnomen Trail features three easy loops and is open to cross-country skiing, snowshoeing, and hiking.

During daylight hours, canoeing is permitted on Battle Brook south of Little Elk Lake and on the St. Francis River south of Battle Brook.

## Mushroom and Berry Picking

The Refuge is open to recreational picking of berries, fruits, nuts and mushrooms for personal consumption within 100 feet of trails or public right of ways. Visitors are asked to be respectful of the needs of wildlife and never pick an area clean or destroy plants.

## Law Enforcement

Enforcement of federal wildlife laws, as well as regulations specific to the Refuge System, is an integral part of Refuge operations. Law enforcement plays a crucial role in ensuring that natural and cultural resources are protected and that visitors encounter a safe environment. The Refuge currently has no officers who are commissioned to conduct law enforcement on federal property. However, federal law enforcement is a cooperative effort by many agencies in the region. Cooperative relationships and strategies have been developed with state conservation officers in the area and the Sherburne County Sheriff Department. Federal officers from other nearby Fish and Wildlife Service stations also help enforce the laws at Sherburne NWR.

## Wilderness Review

As part of the CCP process, we reviewed lands within the legislative boundaries of the Refuge for wilderness suitability. The wilderness review process consists of three phases: inventory, study, and recommendation. In the inventory phase we look at Service-owned lands and waters within the Refuge that are not currently designated wilderness and identify those 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 are called Wilderness Study Areas (WSAs). In the study phase we develop and evaluate a range of management alternatives for the WSAs to determine if they are suitable for recommendation for inclusion in the National Wilderness Preservation System. In the recommendation phase we forward the suitable recommendations in a Wilderness Study Report that moves from the Director through the Secretary and the President to Congress.

No lands were found suitable for designation as Wilderness as defined in the Wilderness Act of 1964. The Refuge does not contain 5,000 contiguous roadless acres nor does it have any units of sufficient size to make their preservation practicable as Wilderness. Lands acquired for the Refuge have been substantially affected by humans, particularly through agriculture and transportation infrastructure.

## Farm Services Administration Conservation Easements

Sherburne NWR has 47 Conservation Easements in its eight-county district. The breakdown is as follows: five easements in Isanti County, five easements in Benton County, eight easements in Kanabec County, 11 in Mille Lacs County and 18 in Pine County. Most, if not all, of these easements were a result of Farmers Home Administration (FmHA) debt restructuring. Conservation Easements were placed on the wetland areas to safeguard them for the future. Some of these easements are managed by the Minnesota DNR.

## Habitat Management: Private Lands Program

Sherburne NWR is responsible for an eight-county Refuge Management District. Refuge staff assist private landowners with wetland and grassland restoration projects in this District, primarily through the Partners for Fish and Wildlife Program. Wetland restorations occur primarily through plugging drainage ditches, breaking drain tile, and building dikes. Grassland restorations occur through planting former croplands with native grasses and giving technical assistance to landowners. Restored wetlands are typically placed under a 10-year conservation agreement. Grasslands are conserved under a 15-year agreement. On average, 500 acres of wildlife habitat is restored on private land in the District each year.

In addition to numerous successful habitat restorations, this program has fostered excellent relationships between the Service and many local partners including the Minnesota DNR, Natural Resource Conservation Service, soil and water conservation districts, conservation clubs and organizations, and most importantly, private landowners.

# Chapter 4: Management Direction

## Planned Refuge Programs

### Introduction

#### Managing Habitat for Wildlife

*Gary Moss*

In the past, management of Sherburne NWR has followed a mixed strategy. As a result, the uplands of Sherburne NWR are a mosaic of habitats forming many different communities from oak savanna to grasslands and big woods to shrub. The wetlands have been largely maintained at high water with some experimental reductions in water level. Future management will focus on oak savanna in the upland (Alternative 4 in the EA). The result will be one of the largest oak savanna restorations in the Midwest. Oak savanna is recognized as globally endangered and this large scale restoration effort will take many years beyond the 15-year planning horizon of the CCP. The wetlands of Sherburne NWR will be managed to maximize their productivity for water birds in migration. This means that many of the wetlands will be drawn down asynchronously on a 4- to 5-year cycle to simulate semipermanent wetlands. This wetland type creates a dynamic cycling of water and nutrients and provides a rich resource for all waterbirds.

Refuge management will maintain a portion of the current water impoundment system to provide migratory habitat for water birds. This would create a diversity of wetland types to support water-dependent species. Vegetation communities and hydrology on the remainder of the Refuge would approximate conditions typical of the Anoka Sandplain in the mid-1800s. Management of upland habitats will focus on maintaining and restoring these plant communities through the use of ecological processes that shaped these communities prior to European settlement. Environmental interpretation and education programs on and off-Refuge will compare the biology of managed systems to that of natural landscapes and the cultural history of pre-European settlement to post-European settlement. Opportunities for hunting, fishing, wildlife observation, and wildlife photography will give visitors a personal experience with wildlife and native habitats. Off-Refuge outreach, private lands, and partnership activity will emphasize natural processes, and native habitat restoration and conservation to form ecologically functioning connections to and from the Refuge. Cultural resources of the Refuge will be valued, interpreted and conserved.

*Artist's concept shows the front of a possible new visitor center. Mike Niziolek*

*Artist's concept shows the back of a possible new visitor center. Mike Niziolek*

The specifics of how this shift in management will be conducted is outlined in the following goals and objectives. The lack of knowledge regarding the hydrologic regime on the Refuge is a major concern for Refuge staff and regional planners preparing the comprehensive conservation plan. To address this concern, a hydrologic study is proposed with the understanding that the information gained may require refining and revising planned management actions.

### Improving Visitor Services

A new visitor center and headquarters facility will be designed to provide optimal educational opportunities for teaching the visiting public and school groups about Refuge wildlife and habitat management. The visitor's education begins on the short walk from the parking area to the building, which leads them through native habitats, preparing them visually for the messages they will receive inside.

The lobby area, immediately inside the front doors, will hold a reception desk, brochure display area, public restrooms, and a video alcove where up to 10 people can view an orientation film on the Refuge. The Friends of Sherburne will have a retail area close to the reception desk where educational materials will be available.

An exhibit hall will provide space for a variety of interactive educational displays that will inform the visitor about Refuge habitat, habitat management activities, and the wildlife using the Refuge. Large windows will provide a view of School House Pool and wildlife using the Pool. A meeting room that can also be used as a classroom will provide seating for a minimum of 100 people.

Visitor support facilities will include two staff offices, a volunteer staging area with lockers, a kitchenette and a workroom. All necessary mechanical, janitorial, and storage rooms will be included.

Outside the visitor center a modest trail system will provide an opportunity for short-stay visitors and school groups to experience oak savanna, prairie opening and wetland habitats. Interpretive signs providing habitat and wildlife messages, an observation deck for wildlife viewing, and a wetland boardwalk to facilitate wetland studies, will be provided.

In addition to the proposed new visitor center, improvements to visitor services will be accomplished as environmental education and interpretation programming continues to grow. Additional information kiosks and interpretive panels of current facilities are possible. Partnerships with local schools, communities and businesses will also facilitate improved programming. To reduce potential conflicts among and between recreational user groups, management methods such as time zoning, hunt quotas, and recreational carrying capacities may be employed. These management activities will lead to improved visitor services.

# Goals, Objectives and Strategies

The goals are designed to meet the purposes of the Refuge and the mission of the National Wildlife Refuge System. The following goals were established for Sherburne NWR and will form the direction for the Refuge over the next 15 years.

- *Goal 1:* Upland Anoka Sandplain habitats approximate mid-1800s conditions, contributing to the preservation of these declining ecotypes and their associated Service priority species.
- *Goal 2:* A diverse mosaic of riverine and wetland habitats meets the needs of Service priority riparian and other wetland-dependent species.
- *Goal 3:* A balanced diversity of native migratory birds and other native wildlife reflects an emphasis on Service priority species appropriate to Refuge habitats.
- *Goal 4:* A complex of natural areas, corridors, and watershed conservation practices in the surrounding landscape complements Refuge habitat and wildlife goals.
- *Goal 5:* Visitors enjoy wildlife-dependent opportunities that further an appreciation of Refuge wildlife and habitats.
- *Goal 6:* Visitors and local citizens demonstrate a strong conservation ethic that leads to support of the Refuge, conservation of the surrounding landscape, and global environmental awareness.
- *Goal 7:* The cultural resources and cultural history of the Refuge are valued and preserved, and connect Refuge staff, visitors, and the community to the area's past.

The objectives are specific statements of what will be accomplished to help achieve a goal. Objectives describe the who, what, when, where, and why of what is to be accomplished. Strategies are potential actions or courses of action that can be taken to achieve the objectives. There is flexibility where and if these strategies are implemented. To help visualize how the Refuge would look in the future, maps were created to show the ultimate habitat distribution (100 years from now) (Figure 20). Then resource managers met in working groups to determine what was practical to accomplish in the 15-year time frame of this document, based on their technical expertise and experience in the field. With

today's GIS technology, maps were created to give a visual representation of the practical acreages and show the potential 15-year habitat changes (Figure 21). These maps help visualize the future conditions and facilitated the comparison of alternative management scenarios. The potential accomplishments were based on the philosophical agreement of those involved in the working groups. For example, there may have been agreement that creating larger blocks of certain habitats was important, or it may have been decided what habitats seemed most likely to be able to be converted within the 15-year time frame to meet an objective. These maps are meant to illustrate the potential within 15 years, but not require the exact location of implementation for any particular strategy on the ground. It will be up to the staff to decide during the CCP implementation, what strategies to apply, at what level they should be applied, and where to apply them on the ground.

**Goal 1:**
Upland Anoka Sandplain habitats approximate mid-1800s conditions, contributing to the preservation of these declining ecotypes and their associated Service priority species.

**Objective 1.1** *Restore Big Woods:* In 15 years, initiate restoration efforts on 540 acres with an expected total restoration of 1,050 acres in 100 years. Although it can take hundreds of years for full canopy development, composition and placement of key trees should simulate Big Woods canopy.

*Rationale:* Big woods, also known as maple-basswood forest, is a plant community that takes hundreds of years to fully develop. Canopy cover in a mature forest is 80 to 100 percent and the trees can stretch 70 to 80 feet high. Tree species in the canopy are typically a mixture of maple, bass, elm, red oak, and green ash. There is a subcanopy of ironwoods and sugar maple, a sparse shrub layer, and diverse ground layer of mesic forest herbs. Sherburne NWR is located in a confluence of three ecosystems and the maple-basswood forest typifies one of them. The forest was originally present on the northern border of the Refuge where the natural course of the St. Francis River blocked many wildfires and where the soils form a clay base, due to a variation in the glacial history. Unlike many oak species, maple and basswood flourish in areas that are not burned and where moisture is retained in the soil.

*Strategies:*

- # Exclude fire to replicate a natural return interval of greater than 100 years as identified in the Refuge's *Fire Management Plan.*
- # Plant desirable species such as maple, basswood, elm, red oak, and green ash.
- # Protect seedlings by excluding herbivores.

**Objective 1.2** *Manage Dry Oak Forest:* Allow dry oak forest to develop in outlying areas that can not be burned effectively given the urban development that is occurring around the Refuge.

*Rationale:* Dry oak forest is the native habitat in areas that have been protected from fire, where the soil is sandy and prone to drought. It was the natural result when fire was suppressed in this area after European settlement. The habitat type provides a home to many species of animals and plants that do not occur in the more open oak savanna. Dry oak forest plant community is identified as a deciduous forest community with relatively short canopy of oak at 50 feet and 85 percent cover. The subcanopy is sparse or absent, the shrub layer is often dense, and the ground layer is patchy. Canopy species include northern pin oak, bur oak, quaking aspen. Subcanopy species include black cherry, red maple, and bur oak. Forests of

**Figure 20: Future Desired Upland Condition, 100-year Preferred Vegetation, Sherburne NWR**

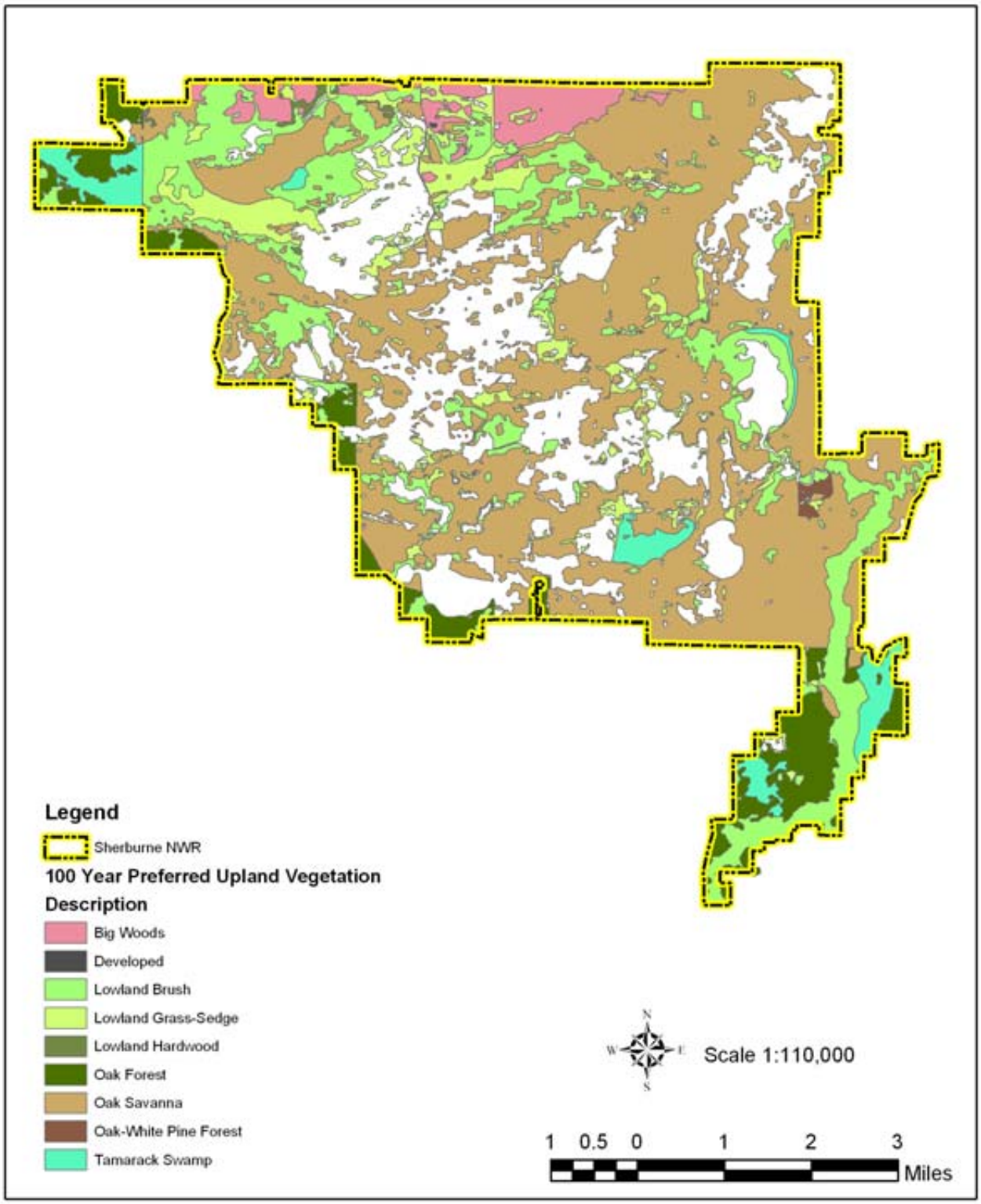
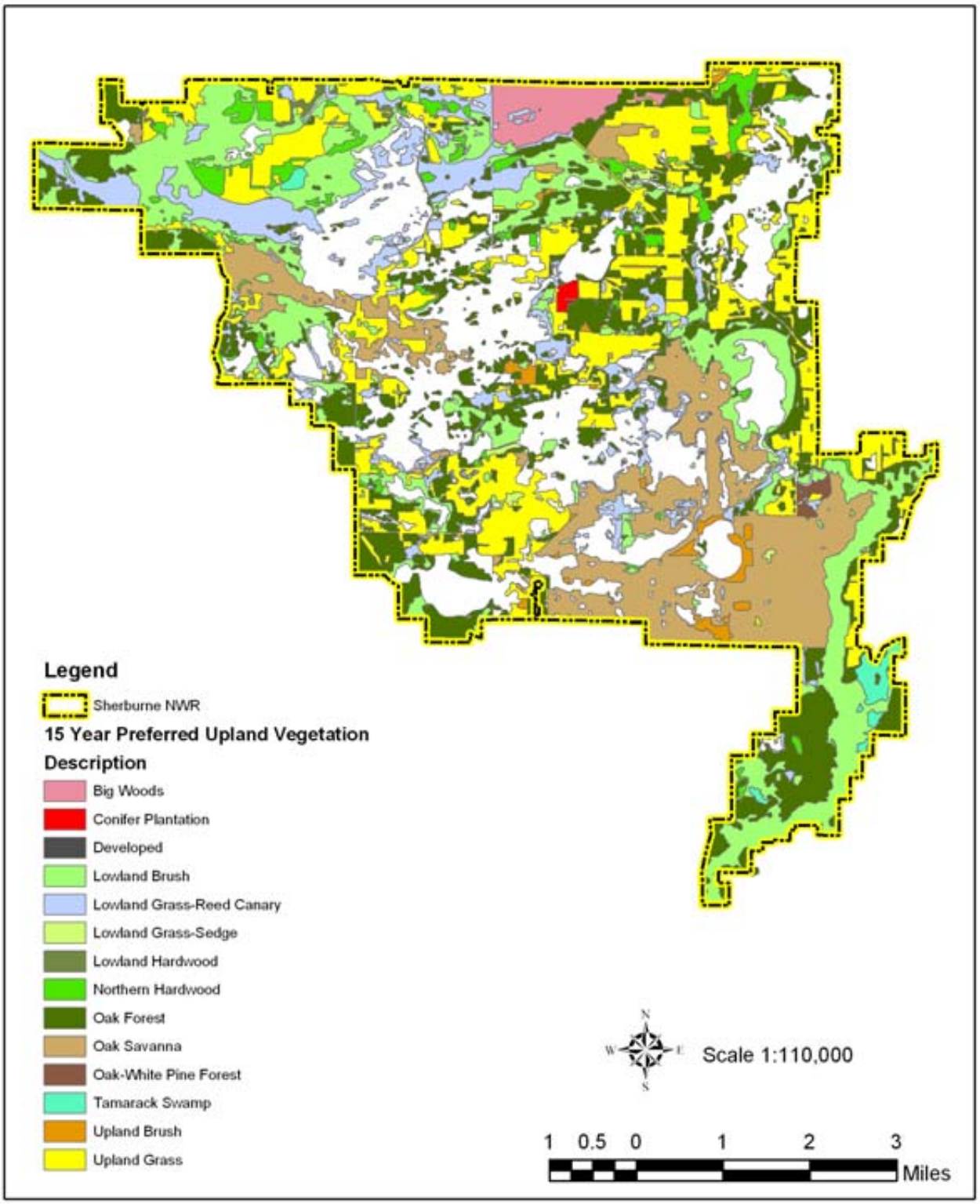


**Figure 21: Future Desired Upland Condition, 15-year Preferred Vegetation, Sherburne NWR**



recent origin typically have even-aged, multiple stemmed trees with a fairly dense, even-height canopy. Older forest have single stem trees of different ages, canopy trees with wide rounded crowns and natural gaps filled with aspen or birch.

*Strategies:*

# Prescribed burning with longer return burn intervals (50 years or more) and lower intensity burns as identified in the *Fire Management Plan*.
# Plant areas to native vegetation.

**Objective 1.3** *Restore Oak Savanna:* Restore oak savanna in the uplands with a 15-year goal of 3,900 acres and a 100-year goal of 13,000 acres.

*Rationale:* "The uplands of Sherburne were predominantly oak openings," Kevin Kenow writes in describing the early surveyors notes about the Sherburne landscape. The restoration of oak savanna outlined in this CCP will be one of the largest attempted in the Midwest. It is important because this habitat type is so rare throughout its former range. The Nature Conservancy has identified oak savanna as a globally endangered habitat type. In the past 150 years, most oak savanna was converted to agriculture but the open appeal of the landscape and the beauty of the trees also stimulated housing developments as urban areas moved into surrounding country. Oak savanna requires hundreds of years to fully develop and is characterized by 10-85 percent canopy closure, 5-35 percent relative cover of shrubs, and at least 25 percent relative cover of diverse native grasses and 25 percent relative cover of diverse native forbs.

*Strategies:*

# Convert grassland patches greater than 40 acres in size by planting trees. Do not actively plant trees in grassland openings less than 40 acres in size.
# Rotational burning every 3 years as a goal but not letting anything go more than 10 years as outlined in the *Fire Management Plan*.
# Mechanical followed by chemical treatments can be used to get to the goal acres, but once goal is achieved natural process will be used to maintain.
# Convert woodlands to oak savanna.
# Convert old field and cropland to oak savanna.
# Convert cottonwood and pine plantations to oak savanna.
# Convert old grassland plantings (planted with non-local ecotypes), replant all acres of planted grassland with local ecotype seeds and ultimately convert to oak savanna.
# Maintain current oak savanna.

**Objective 1.4** *Oak/White Pine Forest:* Maintain 60 acres of oak/white pine forest.

*Rationale:* This area is representative of a natural habitat type identified by the Minnesota DNR (*Minnesota's St. Croix River Valley and Anoka Sandplain: A guide to native habitats* by Wovcha et al. 1995). The habitat type was present on a portion of the Refuge at the time of European settlement. This forest is characterized as a dry to dry mesic community, it usually has a tall canopy of white pine with 20 to 80 percent cover beneath which is a short canopy of oak, aspen or maple trees. Canopy species include white pine, red oak, red maple, big toothed aspen, basswood, bur oak, northern pin oak.

*Strategy:*

# Protect the area from fire because its natural fire return interval is 200 to 300 years.

**Objective 1.5** *Grassland Management:* Manage 5,000 acres of upland grasslands.

*Rationale:* Many of the farm fields were converted to grasslands, some with non-local ecotypes and southern grass species. These will eventually be a part of the oak savanna restoration, but this will take many years to complete. In the interim, these grasslands will be burned during the process of conversion. In many places, conversion to oak savanna will require planting trees (see oak savanna objectives). Grasslands are characterized by less than 10 percent canopy closure, less than 5 percent shrub cover, and a diverse native grass and forb species mix.

*Strategies:*

# Burn each unit on rotation every 3 to 10 years as outlined in the *Fire Management Plan.*
# Convert grassland patches greater than 40 acres in size by planting trees. Do not actively plant trees in grassland openings less than 40 acres in size.
# When burning is not effective in controlling brush, use mechanical treatments such as brush cutting and hydro-axe. Use chemical treatments if burning and mechanical control are not effective.
# Convert old grassland plantings (planted with non-local ecotypes), replant all acres of planted grassland with local ecotype seeds and ultimately convert to oak savanna.

**Objective 1.6** *Invasive Species Control:* Inventory and actively reduce invasive species throughout the Refuge. Reduce invasive species locations by 50 percent from 2004 levels and eliminate new infestations as they occur.

*Rationale:* Invasive species are often introduced from other areas (usually Europe) and they have no native biological controls. They are often early successional species adapted to disturbance and they move in quickly. They are difficult to control and they interfere with natural ecological processes. If they are not controlled, they can completely take over an area, out-competing native flora and fauna and reduce its biological potential and benefit to native wildlife.

*Strategies:*

# When available, use biological control as a preferred strategy.
# If effective biological control techniques have not been developed, use chemical and mechanical means to control infestations.
# Fire can be effective in controlling invasive plant species.
# Monitor the infestations and effectiveness of control measures through field work.
# To conserve Refuge habitat, monitor exotic/invasive plant species within a 15-mile radius and continue to work with partners and landowners on a control program.
# Document the location and size of invasive populations with GIS mapping.

**Objective 1.7** Apply prescribed fire on an average of 5,000 burnable acres annually as determined by the *Fire Management Plan*, and monitor its effect.

*Rationale:* Prescribed fire is an important tool in restoring and maintaining oak savanna, the scale of the restoration requires an ambitious prescribed fire program. If an average of 5,000 acres can be burned every year, the identified restoration will be possible to achieve in the time frame of the plan.

*Strategies:*

# Follow the *Fire Management Plan.*

## Goal 2

A diverse mosaic of riverine and wetland habitats meet the needs of Service priority riparian and other wetland-dependent species.

**Objective 2.1** *Tamarack Swamp:* Maintain a minimum of 200 acres of existing tamarack swamp with additional restoration of 730 acres occurring after the 15-year planning horizon.

*Rationale:* Tamarack swamp was on the Refuge at the time of European settlement and it is identified by the early surveyors. It will be retained in areas on the Refuge because it is a unique wetland type, and because it benefits and provides habitat for trust species such as the Golden-winged Warbler.

*Strategies:*

# Plant seedlings in specified areas.
# Aerial seeding of seeds.
# Fire prevention. Fire breaks have been installed around seeded areas.

**Objective 2.2** *Sedge Meadow (Reed Canary Grass Conversion):* Assess the feasibility of converting reed canary dominated areas to native species. By the end of the 15-year planning period, increase native sedge meadow/lowland graminoids by a minimum of 20 acres.

*Rationale:* Sedge meadow is a rare wetland habitat in the region due to habitat destruction. The Nature Conservancy has identified Sherburne NWR as important regionally because the Refuge retains a small portion of the remaining sedge meadow present in the Midwest. Sedge meadow is vulnerable to invasion by reed canary grass, and once this tenacious grass has taken root, it is very difficult to remove.

*Strategies:*

# Initiate a research project to study feasibility of converting reed canary to native species (cord grass and native sedges, etc.).
# Manipulate habitat and develop test plots.
# Experiment with a variety of ways to recreate sedge meadow habitat and control reed canary grass.
# Encourage sedge meadow in basins that are allowed to return to pre-ditched water levels. Monitor reed canary grass domination.

# Use prescribed fire to reduce brush encroachment in combination with drawdowns.

# Manipulate water level, depending on where sedge meadows are located relative to the impoundments.

**Objective 2.3** *Maintain Lowland Brush:* For the benefit of brush-associated marsh birds, maintain a minimum of 1,250 acres of lowland brush.

*Rationale:* Lowland brush is an important habitat for many native marsh birds. It adds habitat structure necessary for many marsh-edge species of sparrows, warblers, rails, etc.

*Strategies:*

# Manipulate water levels to encourage shrub germination.

# Develop a monitoring protocol to track long-term trends in diversity of this wetland type.

**Objective 2.4** *Understanding the Refuge's Hydrology:* Develop a hydrologic study for the river wetland systems within 5 years of the CCP approval. Based on the outcome, identify and implement management actions necessary to maintain progress toward achieving habitat expectations. The hydrology study should result in an understanding of impoundment management and water movement between pools in relation to the ground water.

*Rationale:* Before the impoundments were put in place, a hydrological overview was done for Sherburne NWR and some guesses were made about the impact of the impoundment system on the ground water and the St. Francis River. The impoundments were put in place but there was no follow-up study to determine what impact they have. For the most part, the impoundments have been managed at high water levels and open water has dominated. Now the Refuge would like to consider returning to a more historical condition of the impoundments. The wetland technical group determined that before these manipulations could be conducted, a study was necessary.

*Strategies:*

# Conduct research.

# Based on the outcome of a hydrologic study, identify and implement management actions necessary to maintain progress toward achieving habitat expectations.

**Objective 2.5** Promote an understanding of the watersheds surrounding and within the Refuge.

*Rationale:* Understanding the hydrology around and within the Refuge is an important step in understanding the context within which the Refuge sits. The hydrology within the Refuge's watershed and adjacent watersheds is interconnected. What happens in the watershed influences what happens on the Refuge, just as what happens on the Refuge influences the watershed. This understanding can lead to collaborative approaches to solve potential regional hydrologic issues such as water quality and watershed health.

*Strategies:*

# Use existing databases to determine a reasonable goal for understanding the regional watershed.
# Collaborate with other agencies in managing the watersheds.
# Educate on the importance of regional watershed conservation.

**Objective 2.6** *Dynamic Cattail Habitat Management:* For the benefit of marsh nesting birds, annually manage 2,500 acres of cattail marsh in a variety of heights, densities and water depths. Less than 70 percent of cattail is desirable on any one basin but this will be achieved through a natural, dynamic process, not as a static target. Maintain 20-40 percent of the cattail acreage with a VOR of 50-80 cm.

*Rationale:* Cattail creates important structure within a wetland that changes the microhabitat (chemical, temperature, and current) in a way that can benefit native invertebrate populations and form the critical basis of the food chain for many marsh nesting bird species. Cattail that is not managed correctly, can also tie up nutrients and cause a marsh to become less productive for marsh nesting birds.

*Strategies:*

# Water level manipulation to flood cattail and if possible, burn openings in cattail beds where roots are compacted.
# Encourage a healthy muskrat population to facilitate cattail control and to create cattail openings.

**Objective 2.7** *Open Water Management in the Spring:* For the benefit of open water dependent breeding birds, provide open water in two pools or more annually, from mid-April to July, in those years that weather conditions allow.

*Rationale:* Some nesting species require open water for nesting. Birds in migration will have priority over breeding birds in water management decisions.

*Strategy:*

# Manipulate water according to the *Annual Water Management Plan*.

**Objective 2.8** *Open Water Management in the Fall:* Provide at least four pools with predominately open water annually from August through November, in those years that weather conditions allow.

*Rationale:* Open water is often used by migrating waterfowl, often providing necessary resting and roosting sites during fall migration. This kind of habitat also provides hunters with access to waterfowl during the fall waterfowl hunting season.

*Strategy:*

# Manipulate water according to the *Annual Water Management Plan*.

**Objective 2.9** *Fall Migrating Waterfowl and Other Seed-eating Migrants:* For the benefit of fall migrant waterfowl, from mid-July to mid-September, provide 50-150 acres of sparsely distributed (<20 percent cover), short native vegetation (<20 cm) flooded to depths ranging from moist soil to 12 cm of water.

*Rationale:* Waterfowl will pause on open water to rest during migration, but they need a food resource to stay. The abundant seeds of annual aquatic plants allowed to grow in moist soil and then flooded during migration provides a very necessary food resource for migrants, it also holds the birds in an area, which benefits local hunters during the waterfowl hunting season.

*Strategy:*

# *Annual Water Management Plan* calls for at least two pools to be in drawdown during the year, then water will be returned in the fall.

**Objective 2.10** *Wild Rice Management:* For the benefit of seed-eating fall migrants, manage the schedule to obtain 700 acres total across at least three basins of seasonal wetland habitat dominated by native annual plants (70 to 90 percent), including wild rice.

*Rationale:* Waterfowl will pause on open water to rest during migration, but they need a food resource to stay. The abundant seeds of annual aquatic plants allowed to grow provides a very necessary food resource for migrants, it also holds the birds in an area, which benefits local hunters during the waterfowl hunting season. Wild rice, which grows in many of the area lakes, will also provide excellent food for fall migrating waterfowl. The wild rice beds in this area of the country may have been originally augmented by Native Americans and were probably the reason this area was known as a great area for hunting.

*Strategies:*

# Water level manipulation of pools (pools in drawdown change from year to year in accordance with the Refuge *Annual Water Management Plan*).
# Active removal of beaver dams on Orrock and Buck Lakes.

**Objective 2.11** *Spring Drawdown:* To benefit spring migrant shorebirds and pre-breeding dabbling ducks, manage impoundments to provide 30-50 acres annually of shallow water habitat characterized by sparsely distributed (<20 percent cover) short vegetation (<20 cm) flooded to depths ranging from moist to 12 cm in a way that would encourage invertebrate densities.

*Rationale:* Shorebirds are attracted to aquatic invertebrates, particularly aquatic midge larvae in the order Diptera (Chironomidae). These larva, also known as blood worms, are detritivors and build rapidly to large numbers when a wetland is managed as an early successional, seasonal wetland. It takes several years to make the right conditions happen. It is important to allow annual vegetation to grow, and then drown the vegetation and allow it to decompose to build up the nutrient level in the water, which results in more midges in the wetland bottom. Midge often take several years to mature. They will remain out of reach for most shorebirds unless a second drawdown is timed for the migration period and the midge population is exposed. To make invertebrates available to shorebirds, begin a drawdown in the spring by April 15, continuing through June 15. Each drawdown requires 3 years of preparation.

*Strategies:*

# Year 1: Manage the wetland as a moist soil unit by encouraging germination of annual vegetation in the first year (could also increase nutrients by introducing hay).

# Year 2: Then raise water to a level of 12 to 30 cm during the second year to drown the vegetation and encourage decomposition of vegetation.

# Year 3: Finally, manage a slow drawdown beginning in April and continuing through June 15 of the third year.

**Objective 2.12** *Fall Drawdown:* For the benefit of fall migrating shorebirds provide 30-50 acres of sparsely vegetated (<20 percent cover), seasonal wetland habitat with water levels ranging from 12 cm to mudflat in slow drawdown from June 15 to August 30.

*Rationale:* The same rationale described under Objective 2.11 applies to this objective as well.

*Strategies:*

# Year 1: Manage the wetland as a moist soil unit by encouraging germination of annual vegetation in the first year.

# Year 2: Then raise water to a level of 12 to 30 cm during the second year to down the vegetation and encourage decomposition of vegetation.

# Year 3: Finally, manage a slow drawdown beginning in June of the third year.

**Objective 2.13** *Manage Wetland Diversity:* Manage the impoundments to maximize wetland diversity within the capabilities of the system. Create wetlands that vary from temporary to permanent by varying the water regime. Focus on semi-permanent wetlands to provide optimal habitat for water-birds in migration.

*Rationale:* An impoundment system allows the manager to simulate a natural wetland complex by manipulating water in a variety of ways to increase the diversity of wetland types. At Sherburne NWR, water level manipulation has created many types of wetlands. We have a high number of semipermanent wetlands because, with correct water manipulation, these wetlands can be the most productive for water birds.

*Strategies;*

# Manipulate water according to the *Annual Water Management Plan*.

# Develop wetland/habitat allocation tracking system.

**Goal 3:**

A diversity of native migratory birds and other native wildlife reflects an emphasis on Service priority species appropriate to Refuge habitats.

**Objective 3.1** *RCP Species:* Within 15 years of CCP approval, 60 percent of the Region 3 RCP species associated with historically occurring habitats will be present on the Refuge.

*Rationale:* Region 3's Resource Conservation Priority (RCP) list includes rare and declining species, federally listed, and recreationally important species that are of high concern in the upper Midwest. The RCP list was developed to help prioritize management.

*Strategies:*

# Monitor population trends (point counts, waterfowl surveys, breeding bird survey) according to the wildlife inventory plan.
# Support research activities that are directed toward these species.

**Objective 3.2** *Sandhill Cranes:* Provide roosting areas for up to 5,000 Sandhill Cranes. Public use is prohibited between September 1 and December 1. The area is characterized by 200 acres of shallow water (less than 46 cm) with 150 m buffer of open space surrounding the roost for a total roost and buffer area of 500 acres.

*Rationale:* Sandhill Cranes are neither endangered nor on the RCP list, but they are an important bird on the Refuge because they are native to the area and are enjoyed and valued by the viewing public. The Refuge provides an important roosting area during fall migration. Many people who come to the Refuge to enjoy wildlife can see these large, vocal birds and feel their trip to the Refuge was a success.

*Strategies:*

# Water level management to provide this habitat somewhere within the Refuge.
# Provide food resource off-Refuge by working with local land owners.

**Objective 3.3** *Monitoring Plan:* Develop a new monitoring plan for wildlife within 5 years of CCP approval.

*Rationale:* Monitoring is a key element in determining if Refuge management is achieving its goals of providing habitat for key wildlife species.

*Strategies:*

# Management changes will revolve around establishing "thresholds" based on long-term averages from a variety of sources (regional, Refuge based, literature, BBS, etc.). The initial thresholds will be established with the best available information and revised through the monitoring process.
# Periodically, as identified in the inventory and monitoring plan, determine the variety and abundance of native, migratory birds and other native wildlife with an emphasis on Service priority species.
# We will use the data we acquire through monitoring wildlife numbers as a "feedback" indicator of the appropriateness of our habitat objectives or our success at meeting habitat objectives (as stated in habitat goals).
# Through adaptive management we will reevaluate habitat objectives and the effectiveness of strategies used to meet the objectives.

**Objective 3.4** *Federal and State Endangered, Threatened and Candidate Species:* Annually, provide habitat for all Federal and State-listed species documented as of 2005 and that are associated with historically occurring habitats on the Refuge.

*Discussion:* Sherburne NWR is home to two wildlife species that are federally listed threatened species: the Bald Eagle and Gray Wolf. In 2004, seven Bald Eagle pairs nested on the Refuge. Almost 100 eagles have been produced since nesting eagles returned to the Refuge in 1983. Transient, individual gray wolves also frequent the Refuge. However, no established packs are known to use the Refuge.

In addition, several species listed by the State of Minnesota are also known to occur on the Refuge including the Henslow's Sparrow, Trumpeter Swan and Loggerhead Shrike. Many of the State-listed species are Regional Resource Conservation Priority species for the Service.

*Strategies:*

# Endangered and threatened species will be protected to the maximum extent possible under all management actions discussed in this plan.
# Adhere to "avoidance of adverse effects" stipulations listed in the Intra-Service Section 7 Biological Evaluation Form completed for the CCP and dated November 2005.
# Support research activities that are directed toward these species.

**Objective 3.5** Maintain deer population densities that are less than or equal to numbers sustainable by the habitat. Our present information indicates that a spring population of no more than 16 per square mile meets this objective.

*Rationale:* It is necessary to maintain the deer population at a healthy density. If the population exceeds a certain density, disease and starvation occur in the herd and the deer will damage the Refuge vegetation and habitat. A large deer herd also will spill onto neighboring suburban developments.

*Strategies:*

# Control through annual hunt (See public use objectives).
# Identify the deer densities that impact habitat.
# Management hunt (if necessary).
# Consider using alternative treatments in addition to hunting to control deer.
# Monitor chronic wasting disease.
# Develop a chronic wasting disease contingency plan.

**Objective 3.6** Within 10 years support a study to determine the feasibility of reintroducing extirpated species, such as bison, elk or prairie butterflies, onto the Refuge as a part of the proposed habitat restoration efforts.

*Rationale:* The restoration of natural communities, such as oak savanna, goes beyond the re-establishment of the vegetative communities. Many animals play important roles within plant communities and contribute positively to their sustained health by performing such key functions as grazing and pollination. It is an important part of a habitat restoration effort to examine if animal species known to have been in a historic habitat could be reintroduced to again play these roles. Prior to any reintroduction, present day challenges and constraints need to be identified to determine the feasibility of such an action. Questions such as habitat availability, human safety, interactions with current wildlife populations, and the ability to replicate the historic timing and scale of the impact these animals had on the habitat are some of the issues that should be explored.

*Strategies:*

# Research the literature.

# Interview people who have experience managing and/or reintroducing these animals to identify successes, challenges, and potential constraints.

# Perform small scale experimentation on the Refuge.

# Collaborate with other agencies, organizations, and natural area managers with similar habitat types and reintroduction interests to examine portions of the problem on their areas.

**Goal 4:**
A complex of natural areas, corridors, and watershed conservation practices in the surrounding landscape complements Refuge habitat and wildlife goals.

**Objective 4.1** *Landscape Conservation:* Participate in development of a plan to coordinate conservation of a complex of natural areas, corridors, and watersheds in the landscape surrounding the Refuge.

*Rationale:* As the land around the Refuge continues to develop into a suburban landscape, it will be important to augment Refuge habitat with greenways and other natural areas.

*Strategies:*

# Coordinate a green infrastructure plan to ensure the preservation of a complex of natural areas, corridors and watershed conservation practices in the landscape surrounding the Refuge.

# Within 2 years of plan approval, map natural and managed areas.

# Obtain fundamental hydrologic data for the entire St. Fancis watershed, the Snake River watershed (between the Refuge and Elk River), and sub-watersheds adjacent to the Refuge.

# Identify potential corridors to facilitate wildlife movement between conservation areas.

# Use existing programs such as green infrastructure and Partners for Fish and Wildlife Program and conservation easements.

**Objective 4.2** *Functioning Watershed:* Determine what level of function can be returned to the Refuge's hydrologic regime.

*Rationale:* The Refuge has a unique opportunity to restore the natural function of the St. Francis River. Most of the river occurs within the Refuge boundaries. Over time, this has resulted in a stream bed that is disconnected from much of the flood plain within the watershed. Returning the river to a more natural relationship to the floodplain will require time and research.

*Strategies:*

# Facilitate completion of a watershed management plan emphasizing the entire St. Francis River and Snake River in partnership with local governments and landowners. Implement using the results of the hydrological study.

# Review and consider existing plans and DNR stewardship plans.

# Use the private lands program to restore wetlands and riverine habitats within the watersheds identified.

**Objective 4.3:** *Restore Wetlands on Private Lands:* Restore 400 wetlands off-Refuge, with priority given to those within the St. Francis River Watershed.

*Rationale:* The restoration of wetland on private lands buffers wetland loss throughout the region and it augments habitat provided to water birds on the Refuge. It creates valuable alliances with private land owners and other partners of the Service.

*Strategies:*

# Use the Partners for Fish and Wildlife Program.
# Use the standard approach to restoration including plugging ditches, breaking tile, and building dikes.
# Exclude grazing from riverbanks.
# Plant native aquatics.
# Develop demonstration areas.
# Encourage research into wildlife response to restoration.

**Objective 4.4** *Restore Native Uplands on Private Lands:* Restore 100 areas with priority given to areas within 15 miles of the Refuge.

*Rationale:* Many of the restored wetlands are enhanced by having native grasslands in the uplands surrounding the wetlands. This benefits nesting grassland and marsh species, particularly nesting waterfowl. In addition, oak savanna restoration in the landscape surrounding the Refuge can augment native habitat restoration on the Refuge.

*Strategies:*

# Link upland and wetland restoration.
# Follow Mississippi Headwaters/Tallgrass prairie ecosystem team's recommendation on species composition in restorations.
# Annually, recommend to an average of three new private land-owner participants within the Sherburne Management District that they use prescribed burning to manage native grasslands and savanna.
# Work with NGOs to buy development rights and then assist in restoration of larger blocks (250 acres) for oak savanna and prairie interspersed habitat.
# Provide technical assistance.
# Use permanent easements.
# Encourage prairie and oak savanna plantings by private individuals.
# Restoration of demonstration areas in conjunction with schools.

**Objective 4.5** *Encourage Native Habitat on Private Land Development:* The Refuge will coordinate with an average of two new land developments within the upper St. Francis watershed to encourage the inclusion of no more than 15 percent impervious surfacing within developed areas and include native habitat for wildlife within development plants.

*Rationale:* Suburban land development is common around the Refuge and many of the developers are open to the idea of green space because it increases the value of the new development both to them and the new owners of homes in the area. Working with the developers, the Refuge could encourage the planting of native species in planned green space.

*Strategies:*

# Partnerships include Sherburne County Soil and Water Conservation District and Sherburne County Planning and Zoning.
# Ensure habitats are connected to other habitats and use native plants.
# Provide seed source.
# Provide technical expertise and equipment.

**Objective 4.6** Monitor current land easements in the region surrounding the Refuge and visit all Refuge easements annually.

*Rationale:* Current Refuge easements are vulnerable to violations throughout the year from surrounding land use, off-road vehicle violations, draining, and other methods of destruction. Monitoring them is important to maintaining their contribution to the natural landscape surrounding the Refuge. In some cases, management of easements may contribute to the overall impact of the Refuge in maintaining the natural landscape. Active monitoring and management of the easements needs to planned and included in the overall activities of the Private Lands Program.

*Strategies:*

# Develop a database for easement monitoring.
# Determine future direction of easement management.

**Goal 5:**
Visitors enjoy wildlife-dependent opportunities that further an appreciation of Refuge wildlife and habitats.

*Hunting*

**Objective 5.1** Increase hunting opportunities from the level offered in 2004.

*Rationale:* Hunting is an important and valuable activity on the Refuge and is one of the wildlife-dependent recreational uses approved by law in the 1997 Improvement Act.

*Strategies:*

# Annually provide at least four blinds for hunters with disabilities for deer and waterfowl seasons.
# Reserve blinds for exclusive use by hunters with disabilities on a first come/ first serve basis.
# Provide annual firearms deer hunt within the framework of the Minnesota State Department of Natural Resources (DNR) on at least 70 percent of the Refuge lands.
# Continue small-game hunting opportunities as defined by state regulations on areas identified in the Refuge hunting brochure.

# Add a spring turkey hunt for hunters with disabilities in designated blinds in specific areas.
# Continue the youth waterfowl hunt.
# Continue waterfowl hunting within the state framework on areas identified in the Refuge hunting brochure.
# Continue archery deer hunting within the state framework on areas identified in the Refuge hunting brochure.
# Develop operational definition of success and measures for hunting through a survey of hunter satisfaction. Include indicators directed toward recreational users with disabilities.

*Fishing*

**Objective 5.2** Increase fishing opportunities from the level offered in 2004.

*Rationale:* Fishing is an important and valuable activity on the Refuge and is one of the wildlife-dependent recreational uses approved by law, when compatible with Refuge purposes, in the 1997 Improvement Act.

*Strategies:*

# Provide an accessible fishing platform.
# Provide fishing opportunities on St. Francis River at a minimum of four access points; reassess the program every 5 years.
# Develop operational definition of success and measures for fishing through a survey of angler satisfaction. Include indicators directed toward recreational users with disabilities.
# Provide opportunities for youth fishing.

*Wildlife Observation*

**Objective 5.3** Increase wildlife observation opportunities from the level offered in 2004.

*Rationale:* Wildlife observation is an important and valuable activity on the Refuge and is one of the wildlife-dependent recreational uses approved by law, when compatible with Refuge purposes, in the 1997 Improvement Act.

*Strategies:*

# Maintain a fully accessible trail (currently one-eighth mile) on the wildlife drive.
# Maintain Refuge lands open for winter wildlife viewing.
# Maintain four to six platforms to facilitate wildlife viewing, photography, information and education experiences.
# Maintain a 7.3-mile wildlife drive (auto tour route) and 9 miles of hiking trails.
# Develop an operational definition of success and measures for wildlife observation through a survey of visitor satisfaction. Include indicators directed toward recreational users with disabilities.
# Develop additional hiking trails in conjunction with a new visitor center.
# Construct an observation deck overlooking Rice Lake.

# Provide a viewing station within the new visitor center that is linked to a remote camera for wildlife observation.

# Work with local units of government on the development of regional trails that link to the Refuge.

*Wildlife Photography*

**Objective 5.4** Continue opportunities for nature photography at the level offered in 2004.

*Rationale:* Nature photography is an important and valuable activity on the Refuge and is one of the wildlife-dependent recreational uses approved by law, when compatible with Refuge purposes, in the 1997 Improvement Act.

*Strategies:*

# During the sanctuary time (spring and summer), photography will be restricted to the tour route and trails, but special use permits are possible. At other times of the year, nature photography is permitted with few restrictions.

# Develop operational definition of success and measures for photography through a survey of photographers. Include indicators directed toward recreational users with disabilities.

*Environmental Education*

**Objective 5.5** Target a 10 percent increase in participation in environmental education programs over present levels within 5 years of CCP approval.

*Rationale:* Environmental education is an important and valuable activity on the Refuge and is one of the wildlife-dependent recreational uses approved by law, when compatible with Refuge purposes, in the 1997 Improvement Act.

*Strategies:*

# Provide facilities and a program for teacher-lead environmental education activities for area schools, and other Refuge visitors, with a message emphasis on migratory water birds, pre-settlement habitats, and wildlife management activities.

# Provide a new visitor center to facilitate environmental education and interpretation.

# Train volunteers to assit with environmental education programming.

# Partner with the Department of Education at nearby universities and colleges to recruit student teachers to develop and lead environmental education programs.

# Reach out to a variety of audiences (example, K-12, colleges, elderhostels, etc.).

# Encourage partnerships with local schools.

# Provide teacher workshops.

# Increase the level of programming to increase use of the Refuge by schools and other community organizations.

**Objective 5.6** Annually, 70 percent of visitors and students participating in Refuge-sponsored environmental education understand and appreciate the management emphasis of migratory water birds, pre-settlement habitats and wildlife management activities.

*Rationale:* Environmental education must be evaluated to determine if it is effectively meeting the goals of the program. Without evaluation, it is impossible to know if understanding is actually increasing.

*Strategies:*

# Develop operational definition of success and measures for environmental education. Include indicators directed toward participants with disabilities.

*Environmental Interpretation.*

**Objective 5.7** Interpretation will emphasize wetlands and migratory birds, ecological processes, pre-settlement habitats, and the importance of wildlife management.

*Rationale:* Environmental interpretation is an important and valuable activity on the Refuge and is one of the wildlife-dependent recreational uses approved by law, when compatible with Refuge purposes, in the 1997 Improvement Act.

*Strategies:*

# Annually provide programs, events, festivals and/or tours to interpret the Refuge and enhance visitor understanding of the Refuge and its mission.
# Conduct at least 10 programs or events each year.
# Provide six kiosks that help visitors interpret Refuge habitats, wildlife and wildlife regulations.
# Provide for a changing demography and address new audiences about the issues raised with urban expansion.
# Provide special programs and seminars for continuing education and train volunteers to act as roving interpreters.
# Provide interpretive panels on hiking trails and the auto tour route.
# Construct interpretive panels at fishing access points and high-use hunter parking areas.

**Objective 5.8** Eighty percent of visitors understand the Refuge mission, purpose, and management actions as assessed every 5 years.

*Rationale:* It is important to reach user groups so that they can better understand the Refuge management that is being conducted. Interpretation must be assessed to determine if it is effectively meeting the goals of the program. Without evaluation, it is impossible to know if understanding is increasing or if visitor expectations are being met.

*Strategies:*

# Develop an operational definition of success and measures for environmental interpretation. Include indicators directed toward recreational users with disabilities.

# Develop a survey instrument to measure success in meeting expectations of recreational user groups. The objective of the survey, implemented as outlined in the Visitor Services Plan, would be: 1) 80 percent of visitors understand the Refuge mission, purpose, and management actions as assessed every 5 years; and 2) Annually, 70 percent of visitors participating in Refuge-sponsored hunting and fishing understand and appreciate the management theme of ecological processes, migratory water birds, and pre-settlement habitats.

**Goal 6:**
Visitors and local citizens demonstrate a strong conservation ethic that leads to support of the Refuge, conservation of the surrounding landscape, and global environmental awareness.

**Objective 6.1** *Community Outreach:* Increase awareness of Refuge management within surrounding areas by annually providing opportunities for at least 2,000 students to participate in programs, 20 teachers to participate in training programs, 600 people to volunteer at the Refuge, and 300 people to be members of a supporting friends group.

*Rationale:* It is critical to the mission of the Refuge that the neighbors and citizens in the surrounding landscape know about the Refuge and support it as a valuable and contributing part of the community.

*Strategies:*

# Provide 10 programs, events and tours annually. These would include the Winterfest, Wildlife Festivals, Migratory Bird Day, Wildlife Film Festival, and guided bird and nature tours.
# Offer training programs for teachers centered on the Refuge's place in the ecological landscape and the importance of habitat management.
# Train volunteers to assist in Refuge programs
# Support and cooperate with the Friends group.
# Increase membership of Friends on the Refuge by 10 percent from 2004 levels.
# Offer student programs centered on the Refuge's place in the landscape and the importance of management.
# Participate in off-site community events.
# Issue regular news releases.
# Maintain a Refuge website with current information about Refuge management and events.
# Increase community partnerships.
# Support an active volunteer program.

**Objective 6.2** *Community Awareness:* Sixty percent of neighbors, community leaders, and residents of nearby communities express an awareness of the Refuge's mission and the need for increased local conservation.

*Rationale:* Community awareness should be evaluated to determine if the Refuge programs designed to increase awareness are being effective.

*Strategies:*

# Develop a community assessment survey and conduct the survey every 5 years to determine community awareness of the Refuge's mission and the importance of local conservation efforts.
# Contract with a university to develop the assessment survey.
# Increase partnerships with community businesses and organizations.

**Objective 6.3** *Provide Technical Assistance:* Ninety-five percent of the residents within the eight-county area around the Refuge designated as Sherburne Management District (Figure 22) who seek technical assistance receive a response within 1 week of their request and feel good about their experience with the Service.

*Rationale:* When the public comes to the Refuge with a question, it is important that they receive assistance and information that is useful in a timely and thoughtful way. Some requests may even require on-the-ground assistance from Refuge staff. These requests should be honored within the budget constraints of the Refuge.

*Strategies:*

# Provide technical assistance or information to inquiring private landowners in the Sherburne Management District within annual budget constraints.
# Inform residents within the Sherburne Management District about the Partners for Fish and Wildlife Program through one or more formats such as radio addresses, brochures, news releases, talks to community organizations and the Refuge website.

**Objective 6.4** *Private Landowner Contacts:* Make 20 contacts with private landowners each year in the St. Francis River watershed to provide technical restoration assistance. The message should focus on wetland loss and impacts of changing land use on the regional hydrograph.

*Rationale:* One of the best ways to be helpful in the community is to provide on-the-ground technical assistance and aid for restoration projects on private land. The Refuge will make an effort to actively contact private landowners and talk with them about available assistance.

*Strategies:*

# Provide technical assistance and information to inquiring private landowners in the St. Francis River watershed within the annual budget constraints.
# Inform residents within the St. Francis River watershed about the Partners for Fish and Wildlife Program through one or more formats such as radio addresses, brochures, news releases, talks to community organizations and the Refuge website.

**Goal 7:**
The cultural resources and cultural history of the Refuge are valued and preserved, and connect Refuge staff, visitors, and the community to the area's past.

**Objective 7.1** Ensure archeological and cultural values are described, identified, and taken into consideration prior to implementing undertakings. (The intent of this statement is to cover Section 106 of the National Historic Preservation Act and Section 7(e)(2) of the FWS Improvement Act.)

**Figure 22: Refuge Management District, Sherburne NWR**


*Rationale:* The historic and pre-historic artifacts on the Refuge are limited and irreplaceable national treasures. Many of the sites have been identified but not researched.

*Strategies:*

# Initiate a Cultural Resources Management Plan within 3 years of CCP approval that incorporates all existing surveys and investigations and identifies future needs. Develop a step-down plan for surveying lands to identify archeological resources and for developing a preservation program. (The intent of this statement is to meet the requirements of Section 14 of the Archaeological Resources Protection Act and Section 110(a)(2) of the National Historic Preservation Act.)

# Prepare a museum property Scope of Collections Statement for the Refuge. (The intent of this statement is to meet the requirements of the DOI Departmental Manual, Part 411.)

# Develop an oral cultural history to preserve the "community memory" about the area.

**Objective 7.2** *Cultural Resources Appreciation:* Seventy percent of visitors will understand and appreciate the cultural history of the Refuge.

*Rationale:* The interest and depth of a natural landscape is enhanced by an understanding of its history. An effective program that increases the understanding of this history by visitors to the Refuge will increase their sense of the Refuge's value. This effort should be evaluated to make sure it is successful in achieving the goals of increased appreciation.

*Strategies:*

# Incorporate cultural history messages into programs, exhibits and other media with an emphasis on use of the Refuge landscape throughout time.

# Chapter 5: Plan Implementation

## New and Existing Projects

This Comprehensive Conservation Plan outlines an ambitious course of action for the future management of Sherburne NWR. The ability to pro-actively manage wildlife habitats and to maintain existing and develop new public use facilities will require a significant commitment of staff and funding from the Service. Consequently, the Refuge will continually need appropriate operational and maintenance funding to implement the objectives in this plan.

*Douglas Johannsen*

The following provides a brief description of the highest priority Refuge projects (Tier 1), as chosen by the Refuge staff and listed in the Refuge Operating Needs System (RONS). A full listing of unfunded Refuge projects and operational needs can be found in the Appendices.

### Refuge Operating Needs (Highest Priority)

*Improve Visitor Services – New Staff.* Add a visitor services specialist to increase and improve visitor services. Sherburne NWR is located between the growing Twin Cities and St. Cloud metropolitan areas and annual visitation is over 100,000. The addition of a visitor services specialist will allow the Refuge to improve current public use services and provide additional service directed toward wildlife observation, fishing, hunting, environmental education, nature photography. $63,500

*Refuge Facility Expenses.* Provide funds to operate the Refuge office including expenses for heating, air conditioning, required safety inspections, electrical expenses, and safety improvements. These funds will also allow for upkeep of Refuge facilities including parking lots, interpretive kiosks, interpretive trails, and water control structures. About 100,000 people visit Sherburne NWR each year and it is important to maintain facilities to provide a quality experience. The project will help pay fuel bills, electric bills and the day-to-day costs of operating a Refuge. $198,720

*Water Control Structure on Iron Pool.* Install a control structure on Iron Pool to increase the effectiveness of water level manipulation. The original structure, designed in the 1970s has limited water level control capabilities. The new structure will allow the Refuge to manage the pool at lower levels and change water levels in smaller increments, which will benefit many species of migratory and resident wildlife. This capability will allow habitat management for a greater diversity of species during critical periods of the year. $27,000

*Big Woods Habitat Restoration.* Restore 300 acres of Big Woods habitat on Sherburne NWR. Since settlement of this region of Central Minnesota in 1850, most of the Refuge habitats have been altered or destroyed. A major habitat component of the area that was severely altered was Big Woods forest. The information and techniques are now available to restore this important habitat to the Refuge. The extent and location of the proposed restoration is contained in the document "Landscape Plan for Sherburne National Wildlife Refuge." $32,400

*New Fire Equipment.* Purchase a bombardier to create fire breaks and allow the Refuge to burn large tracts of land. The habitats on Sherburne NWR, including oak savanna, native prairie and wetlands are fire-dependent and prescribed fire is essential for the health of these lands and the resources they support. Sherburne NWR has an annual prescribed fire goal of 5,000 acres and an active wildfire prevention program. Current equipment is not adequate to meet these objectives on this large, urban Refuge. This same vehicle would provide enhanced fire suppression capabilities in the event of a wildfire and would improve our ability to conduct many of our present prescribed burns under safer conditions. $125,900

# Future Staffing Requirements

Implementing the vision set forth in this CCP will require changes in the organizational structure of the Refuge. Existing staff will direct their time and energy in new directions and new staff members will be added to assist in these efforts. The following are organizational charts and tables of the current staff of the Refuge, Fiscal Year 2004, as well as staff needed to fully implement this plan by Fiscal Year 2019 (Figure 23, Table 12).

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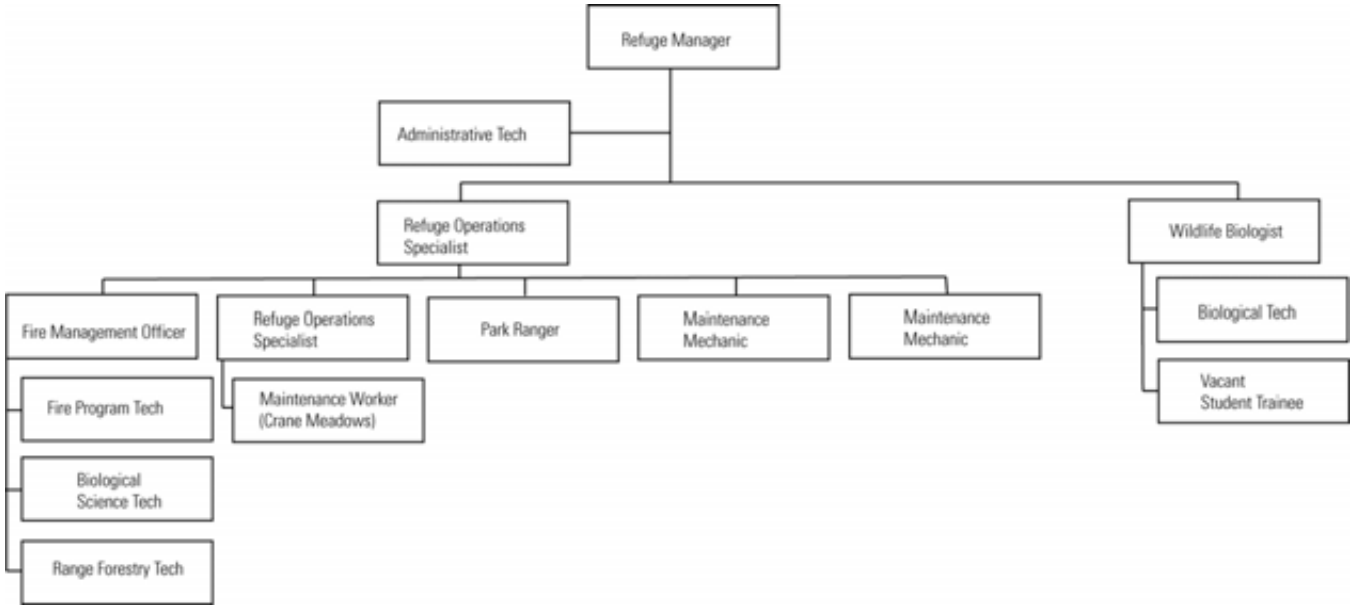
**Table 12: New Staff Required to Fully Implement the Sherburne NWR CCP by 2019**

| Position | FTE |
|---|---|
| Visitor Services Specialist | 1.0 |
| Fire Technician | 0.5 |
| Seasonal Outdoor Recreation Specialist | 0.5 |
| Office Automation Clerk | 0.6 |
| Law Enforcement Officer | 1.0 |
| Total | 3.6 |

**Figure 23: Current Staff Chart (2005), Sherburne NWR**



# Partnership Opportunities

Partnerships have become an essential element for the successful accomplishment of Sherburne NWR goals, objectives, and strategies. 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. Sherburne NWR will continue to seek creative partnership opportunities to achieve its vision for the future.

The Friends of the Sherburne NWR, a non-profit organization comprised of Refuge supporters from many walks in life, has been an important ally and Refuge advocate in the past and will become an increasingly important partner in the future. This association has demonstrated its ability to reach out to the community for support and assistance for Refuge projects and conservation issues. Refuge staff will continue to seek guidance, support, and assistance from the Friends into the foreseeable future.

Other notable partners include The Nature Conservancy, Conservation Fund, Central Minnesota Audubon, Saint Cloud State University, Minnesota Waterfowl Association, and the Minnesota DNR. Conservation organizations and agencies that have been very supportive of habitat restoration efforts on both private and public lands in the Refuge District include Ducks Unlimited, Minnesota Pheasant Forever chapters, and the Benton County and Sherburne County Soil and Water Conservation Districts.

# Step-down Management Plans

Several step-down management plans describe specific actions that support the accomplishment of Refuge objectives. The management plans identified in Table 13 will be reviewed and revised as necessary to achieve the results anticipated in this CCP.

**Table 13: Step-down Management Plans**

| Plan | Date | Anticipated Revision |
|---|---|---|
| Landscape Plan | 1999 | 2015 |
| Refuge Interpretive and Recreation Plan Visitor Services Plan | 1981 | 2010 |
| Law Enforcement Plan | 1986 | 2013 |
| Water Management Plan | 1988 | Annual |
| Woodland Management Plan | 1987 | 2015 |
| Hunting Plan | 1987 | 2010 |
| Wildlife Inventory Plan | 1988 | 2018 |
| Safety Management Plan | 1990 | 2019 |
| Grassland Management Plan | 1987 | 2015 |
| Trapping Plan | 1986 | 2012 |
| Sign Plan | 1988 | 2010 |
| Disease Contingency Plan | 1987 | 2011 |
| Fire Management Plan | 1999 | 2020 |
| Cultural Resources Plan | 2008 | NA |
| Museum Property Scope of Collections Statement | 2008 | NA |
| Fishing Plan | 1988 | 2010 |

# Monitoring and Evaluation

The direction set forth in this CCP plus specifically identified strategies and projects will be monitored throughout the life of this plan. Monitoring will be developed to measure progress toward meeting the objectives set forth in this plan. Based on the results of monitoring, the objectives will be reviewed and revised as necessary. In addition, on a periodic basis, the Regional Office will assemble a station review team whose purpose will be to visit Sherburne NWR and evaluate current Refuge activities in light of this plan. The team will review all aspects of Refuge management, including direction, accomplishments and funding. The goals and objectives presented in this CCP will provide the baseline from which this field station will be evaluated.

# Plan Review and Revision

The CCP for the Sherburne NWR is meant to provide guidance to Refuge managers and staff over the next 10-15 years. However, the CCP is also a dynamic and flexible document and several of the objectives contained herein are subject to such things as drought, floods, windstorms and other uncontrollable events. Likewise, many of the strategies are dependent upon Service funding for staff and projects. Because of all these factors, the recommendations in the CCP will be reviewed periodically and, if necessary, revised to meet new circumstances.

# Archeological and Cultural Values

Cultural resources 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 archeological permits, and for Indian tribal involvement. The Regional Historic Preservation Officer (RHPO) advises the Regional Director about procedures, compliance, and implementation of the several cultural resources laws. The Refuge Manager assists the RHPO (Regional Historic Preservation Officer) by early informing the RHPO about FWS undertakings, by protecting archeological sites and historic properties on Service-managed and administered lands, by monitoring archeological investigations by contractors and permittees, and by reporting violations.

As part of its larger conservation mandate and ethic, the Service through the Refuge Manager applies the several historic preservation laws and regulations to ensure historic properties are identified and are protected to the extent possible within its established purposes and Refuge System mission.

The Refuge Manager early in project planning for all undertakings, informs the RHPO (Regional Historic Preservation Officer) to initiate the Section 106 process. Concurrent with public notification and involvement for environmental compliance and compatibility determinations if applicable, or cultural resources only if no other issues are involved, the Refuge Manager informs and requests comments from the public and local officials through presentations, meetings, and media notices; results are provided to the RHPO.

Archeological investigations and collecting are performed only in the public interest by qualified archeologists or by persons recommended by the Governor working under an Archaeological Resources Protection Act permit issued by the Regional Director. The Refuge Manager has found this third-party use of Refuge land to be compatible. (The requirements of ARPA apply to FWS cultural resources contracts as well: the contract is the equivalent of a permit.) Too, the Refuge Manager issues a special use permit. Refuge personnel take steps to prevent unauthorized collecting by the public, contractors, and Refuge personnel; violators are cited or other appropriate action taken. Violations are reported to the Regional Historic Preservation Officer.

The Refuge Manager will, with the assistance of the RHPO, develop a step-down plan for surveying lands to identify archeological resources and for developing a preservation program to meet the requirements of Section 14 of the Archaeological Resources Protection Act and Section 110(a)(2) of the National Historic Preservation Act.

The Refuge Manager should have and implement a plan for inspecting the condition of known cultural resources on the Refuge and report to the RHPO changes in the conditions.

The Refuge Manager will initiate budget requests or otherwise obtain funding from the 1% O&M program base provided for the Section 106 process compliance:

- # Inventory, evaluate, and protect all significant cultural resources located on lands controlled by the FWS, including historic properties of religious and cultural significance to Indian tribes.
- # Identify and nominate to the National Register of Historic Places all historic properties including those of religious and cultural significance to Indian tribes.
- # Cooperate with Federal, state, and local agencies, Native American tribes, and the public in managing cultural resources on the Refuge.
- # Integrate historic preservation with planning and management of other resources and activities.

# Appendix A: Finding of No Significant Impact (FONSI)

# Finding of No Significant Impact

## Environmental Assessment and Comprehensive Conservation Plan for Sherburne National Wildlife Refuge, Minnesota

An Environmental Assessment has been prepared to identify management strategies to meet the conservation goals of the Sherburne National Wildlife Refuge (Refuge). The Environmental Assessment 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 Environmental Assessment presented and evaluated five alternatives for managing fish, wildlife and plant habitats, as well as visitor services, on the Refuge over the course of the next 15 years:

The Environmental Assessment identifies five possible alternatives primarily centered on habitat management. The Alternatives are 1) Current Management, 2) Pre-settlement Processes, 3) Enhanced Off-Refuge Coordination, 4) Migratory Water Bird Emphasis (preferred alternative), and 5) Priority Wetland and Grassland Birds Emphasis. The preferred alternative, Migratory Water Bird Emphasis, will see 1) an increase in changes in the water impoundment system and upland management to create a diversity of wetland types and historic upland plant communities, 2) increased opportunities for all types of wildlife-dependent recreation, and 3) outreach, private lands, and partnership activities that will emphasize natural processes, including native habitat restoration and protection, to form ecologically functioning connections to and from the Refuge.

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 4 as the management alternative for the Refuge CCP 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

Regional Director

DEC 23 2005

Date

# Appendix B: Glossary

## Appendix B: Glossary

| | |
|---|---|
| *Alternative* | A set of objectives and strategies needed to achieve refuge goals and the desired future condition. |
| *Biological Diversity* | The variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur. |
| *Compatible Use* | A wildlife-dependent recreational use, or any other use on a refuge that will not materially interfere with or detract from the fulfillment of the mission of the Service or the purposes of the refuge. |
| *Comprehensive Conservation Plan* | A document that describes the desired future conditions of the refuge, and specifies management actions to achieve refuge goals and the mission of the National Wildlife Refuge System. |
| *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. |
| *Ecosystem* | A dynamic and interrelated complex of plant and animal communities and their associated non-living environment. |
| *Ecosystem Approach* | A strategy or plan to protect and restore the natural function, structure, and species composition of an ecosystem, recognizing that all components are interrelated. |
| *Ecosystem Management* | Management of an ecosystem that includes all ecological, social and economic components that make up the whole of the system. |
| *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. |
| *Environmental Assessment* | A systematic analysis to determine if proposed actions would result in a significant effect on the quality of the environment. |
| *Extirpation* | The local extinction of a species that is no longer found in a locality or country, but exists elsewhere in the world. |
| *Goals* | Descriptive statements of desired future conditions. |

| | |
|---|---|
| *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. |
| *Issue* | Any unsettled matter that requires a management decision. For example, a resource management problem, concern, a threat to natural resources, a conflict in uses, or in the presence of an undesirable resource condition. |
| *National Wildlife 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. |
| *Objectives* | Actions to be accomplished to achieve a desired outcome. |
| *Preferred Alternative* | The Service's selected alternative identified in the Draft Comprehensive Conservation Plan. |
| *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. |
| *Species* | A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification. |
| *Strategies* | A general approach or specific actions to achieve objectives. |
| *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 1973 Endangered Species Act and published in the Federal Register. |
| *Vegetation* | Plants in general, or the sum total of the plant life in an area. |
| *Vegetation Type* | A category of land based on potential or existing dominant plan species of a particular area. |
| *Watershed* | The entire land area that collects and drains water into a stream or stream system. |
| *Wetland* | Areas such as lakes, marshes, and streams that are inundated by surface or ground water for a long enough period of time each year to support, and that do support under natural conditions, plants and animals that require saturated or seasonally saturated soils. |

| | |
|---|---|
| *Wildlife-dependent Recreational Use* | A use of refuge that involves hunting, fishing, wildlife observation and photography, or environmental education and interpretation, as identified in the National Wildlife Refuge System Improvement Act of 1997. |
| *Undertaking:* | "A project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license or approval...," i.e., all Federal actions. |
| *Wildlife Diversity* | A measure of the number of wildlife species in an area and their relative abundance. |
| *Water Birds* | 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 C:  Species List

# Appendix C: Species List

## Mammals of Sherburne NWR

| Common Name | Family | Genus | Species | Sub-Species | Confirmed on Sherburne NWR |
|---|---|---|---|---|---|
| Bison | Bovidae | *Bison* | bison | | Extirpated |
| Gray fox | Canidae | *Urocyon* | *cinereoargen-teus* | | Y |
| Coyote | Canidae | *Canis* | *latrans* | | Y |
| Red fox | Canidae | *Vulpes* | *vulpes* | | Y |
| Gray wolf | Canidae | *Canis* | *lupus* | | Y |
| Beaver | Castoridae | *Castor* | *Canadensis* | | Y |
| Moose | Cervidae | *Alces* | *Alces* | | Incidental |
| Mule deer | Cervidae | *Odocoileus* | *hemionus* | | Incidental |
| Elk | Cervidae | *Cervuse* | *laphus* | Canadensis | Extirpated |
| White-footed (wood) mouse | Cricetidae | *Peromyscus* | *leucopus* | | Y |
| Southern red-backed vole | Cricetidae | *Clethrionomys* | *gapperi* | | Y |
| Meadow vole | Cricetidae | *Microtus* | *pennsylvanicus* | | Y |
| Prairie deer mouse | Cricetidae | *Peromyscus* | *maniculatus* | bairdii | Y |
| Woodland deer mouse | Cricetidae | *Peromyscus* | *gracilis* | maniculatus | ? |
| Southern bog lem-ming | Cricetidae | *Synaptomys* | *cooperi* | | ? |
| Muskrat | Cricetidae | *Ondatra* | *zibethicus* | | Y |
| Western harvest mouse | Cricetidae | *Reithrodonto-mys* | *megalotis* | | Y |
| Porcupine | Erethizontidae | *Erethizon* | *dorsatum* | | Y |
| Bobcat | Felidae | *Lynx* | *rufus* | | Y |
| Plains pocket gopher | Geomyidae | *Geomys* | *bursarius* | | Y |
| Plains pocket mouse | Heteromyidae | *Perognathus* | *flavenscens* | | Y |
| Eastern cottontail | Leporidae | *Sylvilagus* | *floridanus* | | Y |
| White-tailed jackrab-bit | Leporidae | *Lepus* | *townsendii* | | last seen 1990 |
| Snowshoe hare | Leporidae | *Lepus* | *Americanus* | | Y |
| House mouse | Muridae | *Mus* | *musculus* | | Y |
| Norway rat | Muridae | *Rattus* | *norvegicus* | | Y |
| Longtail weasel | Mustelidae | *Mustela* | *frenata* | | Y |
| Mink | Mustelidae | *Mustela* | *vison* | | Y |
| Shorttail weasel (ermine) | Mustelidae | *Mustela* | *erminea* | | Y |

## Mammals of Sherburne NWR (Continued)

| Common Name | Family | Genus | Species | Sub-Species | Confirmed on Sherburne NWR |
|---|---|---|---|---|---|
| River otter | Mustelidae | *Lutra* | *Canadensis* | | Y |
| Striped skunk | Mustelidae | *Mephitis* | *mephitis* | | Y |
| Least weasel | Mustelidae | *Mustela* | *nivalis* | | Y |
| Badger | Mustelidae | *Taxidea* | *taxus* | | Y |
| Eastern spotted skunk | Mustelidea | *Spilogale* | *putorius* | | Y |
| Raccoon | Procyonidae | *Procyon* | *lotor* | | Y |
| Red squirrel | Sciuridae | *Tamiasciurus* | *hudsonicus* | | Y |
| Woodchuck | Sciuridae | *Marmota* | *monax* | | Y |
| Southern flying squirrel | Sciuridae | *Glaucomys* | *volans* | | Y |
| Eastern fox squirrel | Sciuridae | *Sciurus* | *niger* | | Y |
| Franklin's ground squirrel | Sciuridae | *Citellus* | *franklinii* | | Y |
| 13-lined ground squirrel | Sciuridae | *Citellus* | *tridecemlinea-tus* | | Y |
| Eastern gray squir-rel | Sciuridae | *Sciurus* | *carolinensis* | | Y |
| Eastern chipmunk | Sciuridae | *Tamias* | *striatus* | | Y |
| Arctic shrew | Soricidae | *Sorex* | *arcticus* | | Y |
| Pygmy shrew | Soricidae | *Microsorex* | *hoyi* | | Y |
| Shorttail shrew | Soricidae | *Blarina* | *brevicauda* | | Y |
| Masked shrew | Soricidae | *Sorex* | *cinereus* | | Y |
| Eastern mole | Talpidae | *Scalopus* | *aquaticus* | | Y |
| Starnose mole | Talpidae | *Condylura* | *christata* | | Y |
| White tailed deer | Ungulata | *Odocoileus* | *virginianus* | | Y |
| Black bear | Ursidae | *Ursus* | *americanus* | | Y |
| Little brown myotis | Vespertilionidae | *Myotis* | *lucifugus* | | Y |
| Keen's myotis | Vespertilionidae | *Myotis* | *keenii* | | ? |
| Silver-haired bat | Vespertilionidae | *Lasionycteris* | *noctivagans* | | ? |
| Big brown bat | Vespertilionidae | *Eptesicus* | *fuscus* | | ? |
| Red bat | Vespertilionidae | *Lasiurus* | *borealis* | | ? |
| Hoary bat | Vespertilionidae | *Lasiurus* | *cinereus* | | ? |
| Meadow jumping mouse | Zapodidae | *Zapus* | *hudsonius* | | Y |

## Reptiles and Amphibians of Sherburne NWR

| Species | Common Name | Scientific Name |
|---|---|---|
| ***Species known to ocur on the Refuge*** | | |
| *Snakes* | | |
| | Bullsnake | *Pituaphis sayi* |
| | Eastern Hognose Snake | *Heterodon platyrhinos* |
| | Western Hognose Snake | *Heterodon nasicus* |
| | Eastern Garter Snake | *Thamnophis sirtalis* |
| | Plains Garter Snake | *Thamnophis radix* |
| | Redbelly Snake | *Storeria occipitomaculata* |
| | Smooth Green Snake | *Opheodrys vernalis* |
| *Lizards* | | |
| | Northern Prairie Skink | *Eumeces septentrionalis* |
| *Turtles* | | |
| | Spiny Softshell Turtle | *Apalone spinifera* |
| | Snapping Turtle | *Chelydra serpentina* |
| | Painted Turtle | *Chysemys picta* |
| | Blanding's Turtle | *Emydoidea blandingii* |
| *Frogs* | | |
| | Cope's Gray Tree Frog | *Hyla chrysoscelis* |
| | Gray Tree Frog | *Hyla verisicolor* |
| | Western Chorus Frog | *Psedacris triseriata* |
| | Green Frog | *Rana clamitans* |
| | Northern Leopard Frog | *Rana pipiens* |
| | Mink Frog | *Rana septentrionalis* |
| | Wood Frog | *Rana Sylvatica* |
| | Spring Peeper | *Pseudacris crucifer* |
| *Toads* | | |
| | American Toad | *Bufo americanus* |
| *Salamanders* | | |
| | Tiger Salamander | *Ambystoma tigrinum* |
| | Blue-spotted Salamander | *Ambystoma laterlae)* |
| ***Species thought to occur on the Refuge*** | | |
| *Snakes* | | |
| | Brown Snake | *Storeria dekayii* |
| *Turtles* | | |
| | Northern Map Turtle | *Graptemys geopgraphica* |

## Fish Species Occurring on Sherburne NWR

| Common Name | Family | Genus | Species | Confirmed |
|---|---|---|---|---|
| Bowfin | Amiidae | *Amia* | *calva* | Y |
| White Sucker | Catostomidae | *Catostomus* | *commersoni* | Y |
| Silver Redhorse | Catostomidae | *Moxostoma* | *anisurum* | Y |
| Shorthead Redhorse | Catostomidae | *Moxostoma* | *macrolepidotum* | Y |
| Green Sunfish | Centrarchidae | *Lepomis* | *cyanellus* | Y |
| Rock Bass | Centrarchidae | *Ambloplites* | *rupestris* | Y |
| Black Crappie | Centrarchidae | *Poxomis* | *nigromaculatus* | Y |
| Bluegill | Centrarchidae | *Lepomis* | *macrochirus* | Y |
| Smallmouth Bass | Centrarchidae | *Micropterus* | *dolomieu* | Y |
| Pumpkinseed | Centrarchidae | *Lepomis* | *gibbosus* | Y |
| Largemouth Bass | Centrarchidae | *Micropterus* | *salmides* | Y |
| Spottail Shiner | Cyprinidae | *Notropis* | *hudsonius* | Y |
| Common Carp | Cyprinidae | *Cyprinus* | *carpio* | Y |
| Brassy Minnow | Cyprinidae | *Hybognathus* | *hankinsoni* | Y |
| Common Shiner | Cyprinidae | *Notropis* | *cornutus* | Y |
| Creek Chub | Cyprinidae | *Semotilus* | *atromaculatus* | Y |
| Golden Shiner | Cyprinidae | *Notemigonus* | *crysoleucas* | Y |
| Bigmouth Shiner | Cyprinidae | *Notropis* | *dorsalis* | Y |
| Bluntnose Minnow | Cyprinidae | *Pimephales* | *notatus* | y |
| Hornyhead Chub | Cyprinidae | *Nocomis* | *biguttatus* | Y |
| Blacknose Shiner | Cyprinidae | *Notropis* | *heterolepis* | Y |
| Fathead Minnow | Cyprinidae | *Pimephales* | *promelas* | Y |
| Blacknose Dace | Cyprinidae | *Rhinicthys* | *atratulus* | Y |
| Longnose Dace | Cyprinidae | *Rhinicthys* | *cataractae* | Y |
| River Shiner | Cyprinidae | *Notropis* | *blennius* | Y |
| Spotfin Shiner | Cyprinidae | *Notropis* | *spilopterus* | Y |
| Redfin Shiner | Cyprinidae | *Notropis* | *umbratilis* | Y |
| Mimic Shiner | Cyprinidae | *Notropis* | *volucellus* | Y |
| Northern Redbelly Dace | Cyprinidae | *Phoxinus* | *eos* | Y |
| Northern Pike | Esocidae | *Esox* | *lucius* | Y |
| Brook Stickleback | Gasterosteidae | *Culaea* | *inconstans* | Y |
| Yellow Bullhead | Ictaluridae | *Ictalurus* | *natalis* | Y |
| Black Bullhead | Ictaluridae | *Ictalurus* | *melas* | Y |
| Brown Bullhead | Ictaluridae | *Ictalurus* | *nebulosus* | Y |
| Tadpole Madtom | Ictaluridae | *Noturus* | *gyrinus* | Y |
| Yellow Perch | Percidae | *Perca* | *flavescens* | Y |
| Johnny Darter | Percidae | *Etheostoma* | *nigrum* | Y |
| Iowa Darter | Percidae | *Etheostoma* | *exile* | Y |
| Logperch | Percidae | *Perca* | *caprodes* | Y |
| Blackside darter | Percidae | *Perca* | *maculata* | Y |
| Walleye | Percidae | *Sander* | *vitreus* | Y |
| Central Mudminnow | Umbridae | *Umbra* | *limi* | y |

## Birds of Sherburne NWR

| Species | S | s | F | W |
|---|---|---|---|---|
| Symbols used in this table are as follows:<br>Season<br>S - Spring March-May<br>s - Summer June-July<br>F - Fall August-November<br>W - Winter December-February<br>Note: Shorebird "fall" migration starts in the summer period as defined here.<br>Status<br>c - common: certain to be seen in suitable habitat<br>u - uncommon: present, but not always seen<br>o - occasional: usually present, but seldom seen<br>r - rare: seen at irregular intervals<br>* - birds which currently nest on the Refuge. | | | | |
| LOONS | | | | |
| Common Loon | c | c | o | |
| GREBES | S | s | F | W |
| Pied-billed Grebe* | c | c | c | - |
| Horned Grebe | r | - | u | - |
| Eared Grebe | r | - | - | - |
| Red-necked Grebe | o | - | r | - |
| PELICANS, CORMORANTS | | | | |
| American White Pelican | o | o | o | - |
| Double-crested Cormorant | c | c | c | - |
| BITTERNS, HERONS | | | | |
| American Bittern* | o | o | o | - |
| Least Bittern* | o | o | - | - |
| Great Blue Heron | c | c | c | - |
| Great Egret | u | u | u | - |
| Green Heron* | c | c | c | - |
| Black-crowned Night-Heron | u | u | - | - |
| SWANS, GEESE, DUCKS | | | | |
| Tundra Swan (Whistling Swan) | u | - | u | - |
| Trumpeter Swan* | u | u | u | - |
| Snow Goose | o | o | u | - |
| Canada Goose* | c | c | c | r |
| Wood Duck* | c | c | c | o |
| Green-winged Teal* | c | o | c | o |
| American Black Duck | u | o | u | - |
| Mallard* | c | c | c | o |
| Northern Pintail | c | o | c | - |

## Birds of Sherburne NWR (Continued)

| Species | S | s | F | W |
|---|---|---|---|---|
| Blue-winged Teal* | c | c | c | - |
| Northern Shoveler | u | o | u | - |
| Gadwall | u | - | c | - |
| American Wigeon | c | r | c | - |
| Canvasback | r | r | r | - |
| Redhead | o | r | u | - |
| Ring-necked Duck* | c | u | c | - |
| Greater Scaup | u | - | u | - |
| Lesser Scaup | c | o | c | - |
| Common Goldeneye | c | - | u | - |
| Bufflehead | c | - | u | - |
| Hooded Merganser* | c | c | c | - |
| Common Merganser | c | - | o | - |
| Red-breasted Merganser | u | - | - | - |
| Ruddy Duck | o | o | o | - |
| VULTURES | | | | |
| Turkey Vulture | u | u | u | - |
| HAWKS, EAGLES | | | | |
| Osprey | u | u | u | - |
| Bald Eagle* | c | c | c | o |
| Northern Harrier (Marsh Hawk)* | c | c | c | o |
| Sharp-shinned Hawk | u | o | u | - |
| Cooper's Hawk* | u | u | u | - |
| Northern Goshawk | - | - | o | o |
| Red-shouldered Hawk* | o | o | o | - |
| Broad-winged Hawk* | o | o | o | - |
| Red-tailed Hawk* | c | c | cu | |
| Rough-legged Hawk | u | - | u | u |
| FALCONS | | | | |
| American Kestrel* | c | c | c | o |
| Merlin | o | - | o | - |
| Peregrine Falcon | o | o | o | - |
| PHEASANT, GROUSE | | | | |
| Ring-necked Pheasant* | u | u | u | u |
| Ruffed Grouse* | c | c | c | c |

## Birds of Sherburne NWR (Continued)

| Species | S | s | F | W |
|---|---|---|---|---|
| Wild Turkey | u | u | u | u |
| RAILS | | | | |
| Virginia Rail* | u | u | u | - |
| Sora* | u | u | u | - |
| Common Moorhen | r | r | r | - |
| American Coot* | c | c | c | - |
| CRANES | | | | |
| Sandhill Crane* | c | c | c | - |
| PLOVERS | | | | |
| Black-bellied Plover | - | o | o | - |
| American Golden-Plover | - | o | o | - |
| Semipalmated Plover | o | o | o | - |
| Killdeer* | c | c | c | - |
| SHOREBIRDS, PHALAROPES | | | | |
| Greater Yellowlegs | u | u | c | - |
| Lesser Yellowlegs | c | u | c | - |
| Solitary Sandpiper | u | u | u | - |
| Spotted Sandpiper* | c | c | c | - |
| Upland Sandpiper* | r | r | - | - |
| Sanderling | o | o | o | - |
| Semipalmated Sandpiper | o | - | o | - |
| Least Sandpiper | u | u | u | - |
| White-rumped Sandpiper | o | - | - | - |
| Baird's Sandpiper | o | o | o | - |
| Pectoral Sandpiper | u | u | r | - |
| Dunlin | o | o | o | - |
| Long-billed Dowitcher | o | - | o | - |
| Short-billed Dowitcher | o | o | - | - |
| Common Snipe* | c | u | c | - |
| American Woodcock* | c | c | c | - |
| Wilson's Phalarope | o | - | - | - |
| GULLS, TERNS | | | | |
| Franklin's Gull | o | - | o | - |
| Bonaparte's Gull | o | - | o | - |
| Ring-billed Gull | u | u | c | - |

## Birds of Sherburne NWR (Continued)

| Species | S | s | F | W |
|---|---|---|---|---|
| Herring Gull | u | - | u | - |
| Caspian Tern | u | - | u | - |
| Forster's Tern | c | u | u | - |
| Black Tern* | c | c | c | - |
| DOVES | | | | |
| Rock Dove | o | o | o | o |
| Mourning Dove* | c | c | c | o |
| CUCKOOS | | | | |
| Black-billed Cuckoo* | u | u | u | - |
| Yellow-billed Cuckoo | o | o | o | - |
| OWLS | | | | |
| Eastern Screech Owl* | o | o | o | o |
| Great Horned Owl* | c | c | c | c |
| Snowy Owl | - | - | - | r |
| Barred Owl* | c | c | c | c |
| Long-eared Owl* | o | o | o | - |
| Short-eared Owl | r | r | r | - |
| Northern Saw-whet Owl | o | - | o | - |
| GOATSUCKERS | | | | |
| Common Nighthawk | u | c | u | - |
| Whip-poor-will* | o | o | - | - |
| SWIFTS | | | | |
| Chimney Swift | c | c | c | - |
| HUMMINGBIRDS | | | | |
| Ruby-throated Hummingbird* | u | u | u | - |
| KINGFISHERS | | | | |
| Belted Kingfisher* | c | c | c | r |
| WOODPECKERS | | | | |
| Red-headed Woodpecker* | u | u | u | u |
| Red-bellied Woodpecker* | u | u | u | u |
| Yellow-bellied Sapsucker* | u | o | u | - |
| Downy Woodpecker* | c | c | c | c |
| Hairy Woodpecker* | c | c | c | c |
| Northern Flicker (Common Flicker)* | c | c | c | u |
| Pileated Woodpecker* | c | c | c | c |

## Birds of Sherburne NWR (Continued)

| Species | S | s | F | W |
|---|---|---|---|---|
| FLYCATCHERS | | | | |
| Olive-sided Flycatcher | u | o | r | - |
| Eastern Wood-Pewee* | c | c | - | - |
| Yellow-bellied Flycatcher | r | - | r | - |
| Willow Flycatcher* | - | u | - | - |
| Alder Flycatcher* | u | o | u | - |
| Least Flycatcher* | c | c | u | - |
| Eastern Phoebe* | c | c | c | - |
| Great Crested Flycatcher* | c | c | u | - |
| Eastern Kingbird* | c | c | c | - |
| Western Kingbird | r | r | - | - |
| LARKS | | | | |
| Horned Lark* | c | o | o | c |
| SWALLOWS | | | | |
| Purple Martin | u | u | u | - |
| Tree Swallow* | c | c | c | - |
| Northern Rough-winged Swallow* | u | u | u | - |
| Bank Swallow* | u | o | u | - |
| Cliff Swallow* | c | c | c | - |
| Barn Swallow* | c | c | c | - |
| JAYS, MAGPIES, CROWS | | | | |
| Blue Jay* | c | c | c | c |
| Common Raven | r | - | - | r |
| American Crow* | c | c | c | c |
| CHICKADEES | | | | |
| Black-capped Chickadee* | c | c | c | c |
| NUTHATCHES | | | | |
| Red-breasted Nuthatch | u | - | u | o |
| White-breasted Nuthatch* | c | c | c | c |
| CREEPERS | | | | |
| Brown Creeper | u | u | u | u |
| WRENS | | | | |
| House Wren* | c | c | c | - |
| Winter Wren | o | - | o | - |
| Sedge Wren* | u | u | u | - |

## Birds of Sherburne NWR (Continued)

| Species | S | s | F | W |
|---|---|---|---|---|
| Marsh Wren* | c | c | c | - |
| KINGLETS, THRUSHES | | | | |
| Golden-crowned Kinglet | u | - | u | o |
| Ruby-crowned Kinglet | u | - | u | - |
| Blue-gray Gnatcatcher* | c | c | o | - |
| Eastern Bluebird* | c | c | c | - |
| Veery* | u | c | - | - |
| Gray-cheeked Thrush | o | - | o | - |
| Swainson's Thrush | u | - | u | - |
| Hermit Thrush | u | - | u | - |
| Wood Thrush | o | r | - | - |
| American Robin* | c | c | c | o |
| THRASHERS | | | | |
| Gray Catbird* | c | c | c | - |
| Brown Thrasher* | c | c | c | - |
| WAXWINGS | | | | |
| Cedar Waxwing* | u | c | c | u |
| SHRIKES | | | | |
| Northern Shrike | o | - | o | u |
| Loggerhead Shrike | r | r | r | - |
| STARLINGS | | | | |
| European Starling* | c | c | c | u |
| VIREOS | | | | |
| Solitary Vireo | u | - | r | - |
| Yellow-throated Vireo* | u | u | u | - |
| Warbling Vireo* | c | c | - | - |
| Philadelphia Vireo | o | - | o | - |
| Red-eyed Vireo* | c | c | c | - |
| WOOD WARBLERS | | | | |
| Blue-winged Warbler | o | - | - | - |
| Golden-winged Warbler* | u | u | o | - |
| Tennessee Warbler | c | u | c | - |
| Orange-crowned Warbler | u | - | u | - |
| Nashville Warbler | c | u | c | - |
| Northern Parula | o | o | o | - |

## Birds of Sherburne NWR (Continued)

| Species | S | s | F | W |
|---|---|---|---|---|
| Yellow Warbler* | c | c | c | - |
| Chestnut-sided Warbler* | u | u | u | - |
| Magnolia Warbler | u | - | u | - |
| Cape May Warbler | u | - | u | - |
| Yellow-rumped Warbler | c | r | c | - |
| Black-throated Green Warbler | u | - | o | - |
| Blackburnian Warbler | u | - | u | - |
| Pine Warbler | r | r | r | - |
| Palm Warbler | c | - | c | - |
| Bay-breasted Warbler | u | - | u | - |
| Blackpoll Warbler | u | - | u | - |
| Cerulean Warbler | o | o | o | - |
| Black-and-white Warbler* | c | r | c | - |
| American Redstart* | c | c | c | - |
| Ovenbird* | c | c | - | - |
| Northern Waterthrush | u | - | u | - |
| Connecticut Warbler | o | o | o | - |
| Mourning Warbler | o | o | o | - |
| Common Yellowthroat* | c | c | c | - |
| Hooded Warbler | r | r | - | - |
| Wilson's Warbler | u | - | u | - |
| Canada Warbler | o | - | o | - |
| Scarlet Tanager* | c | c | c | - |
| Northern Cardinal* | u | u | u | u |
| Rose-breasted Grosbeak* | c | c | c | - |
| Indigo Bunting* | c | c | u | - |
| Dickcissel | o | o | - | - |
| Eastern Towhee | u | u | u | - |
| American Tree Sparrow | u | - | c | c |
| Chipping Sparrow* | c | c | c | - |
| Clay-colored Sparrow* | u | u | u | - |
| Field Sparrow* | c | c | c | - |
| Vesper Sparrow* | c | c | c | - |
| Lark Sparrow* | u | c | - | - |
| Savannah Sparrow* | u | u | u | - |

## Birds of Sherburne NWR (Continued)

| Species | S | s | F | W |
|---|---|---|---|---|
| Grasshopper Sparrow* | u | u | u | - |
| Fox Sparrow | u | - | u | - |
| Song Sparrow* | c | c | c | - |
| Lincoln's Sparrow | u | - | u | - |
| Swamp Sparrow* | c | c | c | - |
| White-throated Sparrow | c | - | c | - |
| White-crowned Sparrow | u | - | u | - |
| Harris' Sparrow | u | - | u | - |
| Dark-eyed Junco | c | - | c | c |
| Snow Bunting | o | - | o | u |
| MEADOWLARKS, BLACKBIRDS, ORIOLES | | | | |
| Bobolink* | u | u | u | - |
| Red-winged Blackbird* | c | c | c | o |
| Eastern Meadowlark* | c | c | c | - |
| Western Meadowlark* | u | u | u | - |
| Yellow-headed Blackbird* | u | c | u | - |
| Rusty Blackbird | u | - | u | - |
| Brewer's Blackbird* | u | u | u | - |
| Common Grackle* | c | c | c | r |
| Brown-headed Cowbird* | c | c | c | r |
| Orchard Oriole | r | r | r | - |
| Baltimore Oriole* | c | c | c | - |
| FINCHES | | | | |
| Pine Grosbeak | - | - | - | r |
| House Finch* | u | u | u | u |
| Purple Finch | u | - | r | u |
| Red Crossbill | - | - | r | r |
| White-winged Crossbill | - | - | - | r |
| Common Redpoll | - | - | - | r |
| Hoary Redpoll | - | - | - | r |
| Pine Siskin | o | - | u | c |
| American Goldfinch* | c | c | c | c |
| Evening Grosbeak | o | - | r | o |
| OLD WORLD SPARROWS | | | | |
| House Sparrow | r | r | r | r |

ACCIDENTAL BIRDS

The following birds have been seen at Sherburne NWR but are either no longer present, not normally found in this area, or do not ordinarily stop here during migration.

Western Grebe
Snowy Egret
Greater White-fronted Goose
Swainson's Hawk
American Avocet
Willet
Ruddy Turnstone
N. Hawk Owl
Great Gray Owl
Boreal Owl
Bohemian Waxwing
Lapland Longspur
Prothonotary Warbler
Henslow's Sparrow

## Plants of Sherburne NWR

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Abelmoschus | *esculentus (L.) Moench* | | okra | N |
| Abies | *balsamea (L.) Mill.* | | fir, balsam | N |
| Abutilon | *theophrasti Medik.* | | velvet-leaf | N |
| Acer | *negundo L.* | | box elder | Y |
| Acer | *platanoides L.* | | maple, Norway | N |
| Acer | *rubrum L.* | | maple, red | Y |
| Acer | *saccharinum L.* | | maple, silver | Y |
| Achillea | *millefolium L.* | (occidentalis D.C.) | yarrow, common | Y |
| Achillea | *nobilis L.* | | yarrow, noble | Y |
| Acorus | *calamus L.* | | sweet flag (calamus) | Y |
| Actaea | *rubra (Ait.) Willd.* | | baneberry, red | Y |
| Agalinis | *tenuifolia (Vahl.) Raf.* | (parviflora Nutt.) | gerardia, small-flowered | Y |
| Agastache | *foeniculum (Pursh) Kuntz* | | hyssop, blue giant | Y |
| Agrimonia | *striata Michx.* | | agrimony, tall hairy | Y |
| Agrostis | *gigantea Roth* | | grass, redtop | N |
| Agrostis | *hyemalis (Walt.) B.S.P.* | | grass, tickle (hair) | Y |
| Agrostis | *scabra Willd.* | | grass, tickleYPAGSC1 | |
| Alisma | *plantago-aquatica L.* | | plantain, water | |
| Alisma | *triviale Pursh* | | plantain large-flowered | Y |
| Allium | *canadense L.* | | garlic, wild | Y |
| Allium | *stellatum Nutt.ex Ker-Gawl.* | | onion, wild | Y |
| Allium | *tricoccum Ait.* | | leek, wild | Y |
| Alnus | *incana (L.) Moench* | | alder, European white | Y |
| Alnus | *viridis (Vill.) Lam. & DC.* | | alder, sitka | Y |
| Alopecurus | *aequalis Sobol.* | | foxtail, short-awned | Y |
| Althea | *rosea L.* | | hollyhock | N |
| Amaranthus | *albus L.amaranth,* | | prostrate (tumbleweed) | Y |
| Amaranthusret | *roflexus L.* | | amaranth, green | N |
| Ambrosia | *artemisiifolia L.* | | ragweed, common | Y |
| Ambrosia | *coronopifolia Torr.&Gray* | | ragweed, western | Y |
| Ambrosia | *trifida L.* | trifida | ragweed, giant/entire-leaved | Y |
| Amelanchier | *alnifo-lia(Nutt)Nutt.exM.Roemer* | | juneberry, alderleaf | Y |
| Amelanchier | *humilis Wieg.* | | juneberry, low | Y |
| Amelanchier | *interior Nielsen* | | juneberry, inland | Y |
| Amelanchier | *laevis Wieg.* | | juneberry, smooth | Y |
| Amorpha | *canescens Pursh* | | indigo bush, downy | Y |
| Amorpha | *fruticosa L.* | | indigo bush, dull-leaf | Y |
| Amphicarpaea | *bracteata (L.)* | | Fern.hog-peanut | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Anaphalis | *margarita-cea(L.)Benth.&Hook.F.* | | everlasting, pearly | Y |
| Andromeda | *glaucophylla* | | bog-rosemary | Y |
| Andropogon | *gerardii Vitman* | | bluestem, big | Y |
| Andropogon | *hallii Hack.* | | bluestem, sand | Y |
| Anemone | *canadensis L.* | | anemone, Canada | Y |
| Anemone | *cylindrica Gray* | | thimble weed, long-headed | Y |
| Anemone | *quinquefolia L.* | | anemone, wood | Y |
| Anemone | *virginiana L.* | | thimbleweed | Y |
| Antennaria | *neglecta Greene* | | pussytoes, field | Y |
| Antennaria | *parlinii Fern.* | | pussytoes, smooth | Y |
| Antennaria | *plantaginifolia (L.) Richards* | | pussytoes, plantain-leaved | Y |
| Apocynum | *androsaemifolium L.* | | dogbane, spreading | Y |
| Apocynum | *cannabinum L.* | | Indian hemp, intermediate | Y |
| Apocynum | *floribundun Greene (x)* | androsaemifolium X cannabinum | dogbane, intermediate | Y |
| Aquilegia | *canadensis L.* | | columbine | Y |
| Arabis | *divaricarpa A.Nels.* | | cress, pink rock | Y |
| Arabis | *glabra (L.) Bernh.* | | mustard, tower | Y |
| Arabis | *hirsuta (L.) Scop.* | Pycnocarpa | cress, hairy rock | Y |
| Arabis | *laevigata* | | smooth rock cress | Y |
| Aralia | *nudicaulis L.* | | sarsaparilla, wild | Y |
| Aralia | *racemosa L.* | | spikenard | Y |
| Arctium | *minus Bernh.* | | burdock, common | N |
| Arctostaphylos | *uva-ursi (L.) Spreng* | | bearberry, evergreen | Y |
| Arenaria | *serpyllifolia L.* | | sandwort, thyme-leaved | N |
| Arisaema | *triphyllum (L.) Schoet* | | Jack-in-the-pulpit, swamp or small | Y |
| Aristida | *basiramea Engelm. ex. Vasey* | | grass, forked 3-awned | Y |
| Aristida | *oligantha Michx.* | | grass, prairie three-awn | Y |
| Aristida | *tuberculosa Nutt.* | | grass, sea-beach 3-awned | Y |
| Aronia | *melanocarpa (Michx.) Ell.* | | chokecherry, black | Y |
| Artemisia | *absinthium L.wormwood,* | | absinthe | N |
| Artemisia | *campestris L.* | caudate | wormwood, tall (tall sage) | Y |
| Artemisia | *dracunculus L.* | dracunculina (S.Wats.) Fern. | wormwood, silky | Y |
| Artemisia | *ludoviciana Nutt.* | | sage, white or western mugwort | Y |
| Artemisia | *serrata Nutt.* | | sage, toothed | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Asclepias | *exaltata L.* | | milkweed, poke | Y |
| Asclepias | *incarnata L.* | | milkweed, swamp | Y |
| Asclepias | *ovalifolia Dcne* | | milkweed, oval-leaved | Y |
| Asclepias | *syriaca L.* | | milkweed, common | Y |
| Asclepias | *tuberosa L.* | | butterfly-weed | Y |
| Asparagus | *officinalis L.* | | asparagus | N |
| Aster | *borealis (Torr & Gray) Prov.* | | aster, Northern bog | Y |
| Aster | *ciliolatus Lindl. ex. Hook* | | aster, Lindley's | Y |
| Aster | *cordifolius L.* | sagittifolius (Wedemeyer ex | aster, heart-leaved | Y |
| Aster | *ericoides L.* | | aster, heath | Y |
| Aster | *laevis L.* | | aster, smooth | Y |
| Aster | *lanceolatus Willd* | lanceolatus | aster, panicled | Y |
| Asclepias | *lanuginosa Nutt.* | | milkweed, woolly | Y |
| Asclepias | *verticillata L.* | | milkweed, whorled | Y |
| Aster | *lateriflorus (L.) Britt.* | | aster, calico (starved) | Y |
| Aster | *macrophyllus L.aster,* | | large-leaved | Y |
| Aster | *novae-angliae L.* | forma roseusaster, | New England | Y |
| Aster | *oolentangiensis Riddell* | | aster, sky-blue | Y |
| Aster | *puniceus L.* | firmus (Nees) Torr & Gray | aster, purple-stemmed | Y |
| Aster | *sericeus Vent.* | | aster, western silky | Y |
| Aster | *umbellatus P.Mill.* | | aster, flat-topped white | Y |
| Astragalus | *canadensis L.* | | vetch, milk | Y |
| Athyrium | *filix-femina (L.) Roth* | | fern, lady | Y |
| Avena | *sativa (L.)* | | oats | N |
| Baptisia | *alba (L.) Vent.* | Macrophylla | indigo, white wild | Y |
| Barbarea | *vulgaris Ait.f.* | | cress, winter | N |
| Berteroa | *incana (L.) DC.* | | alyssum, hoary | N |
| Betula | *alleghaniensis Britt.* | Alleghaniensis | birch, yellow | Y |
| Betula | *papyrifera Marsh.* | | birch, paper | Y |
| Betula | *pumila L.* | glandulifera Regal | birch, swamp | Y |
| Betula | *sandbergii Britt.* | (x)papyrifera X pumila | birch, Sandberg | Y |
| Bidens | *cernua L.* | | marigold, nodding bur | Y |
| Bidens | *connata Muhl. ex Willd.* | (pinnata S. Wats.) | beggar-ticks, swamp | Y |
| Bidens | *coronata (L.) Britt.* | | sunflower, tickseed | Y |
| Bidens | *frondosa L.* | | beggar-ticks, sticktight | Y |
| Bidens | *laevis (L.) B.S.P.* | | bur-marigolds, larger | Y |
| Biden | *stripatita L.* | | beggar-ticks, European or trifid | N |
| Bidens | *vulgata Greene* | | beggar-ticks, tall | Y |
| Blephilia | *ciliata (L.) Benth.* | | mint, downy wood | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Boehmeria | *cylindrica (L.) Sw.* | | nettle, false (bog-hemp) | Y |
| Botrychium | *multifidum (Gmel.) Rupr.* | | fern, grape, leathery | Y |
| Botrychium | *virginianum (L.) SW* | europaeum Angstr. | fern, rattlesnake | Y |
| Bouteloua | *curtipendula (Michx.) Torr.* | | grama, side-oats | Y |
| Bouteloua | *graci-lis(Willd.exKunth)Lag.ex* | | grama, blue | Y |
| Bouteloua | *hirsuta Lag.* | | grama, hairy | Y |
| Brasenia | *schreberi J.F. Gmel* | | watershield | Y |
| Brassica | *nigra (L.) W.D.J. Koch* | | mustard, black | N |
| Brassica | *rapa L.* | | mustard, field (rape) | N |
| Bromus | *ciliatus L.* | | brome, fringed | Y |
| Bromus | *inermis Leyss.* | | brome, smooth | N |
| Bromus | *kalmii A. Gray* | | wild chess | Y |
| Calamagrostis | *canadensis (Michx.)Beauv* | | bluejoint | Y |
| Calamagrostis | *stricta (Timm) Koel.* | | grass, slim-stem reed | Y |
| Calamovilfa | *longifolia (Hook.) Scribn.* | | grass, sand reed | Y |
| Calla | *palustris L.* | | calla, wild (water-arum) | Y |
| Callitriche | *palustris L.* | | starwort, spiny water | Y |
| Caltha | *palustris L.* | | marigold, marsh- (cow-slip) | Y |
| Calystegios | *sepium (L.) R.Br.* | | bindweed, hedge | Y |
| Campanula | *aparinoides Pursh.* | | bellflower, bedstraw | Y |
| Campanula | *rapunculoides L.* | | bellflower, creeping | N |
| Campanula | *rotundifolia L.* | | harebell | Y |
| Cannabis | *sativa L.* | | hemp | N |
| Capsella | *bursa-pastoris (L.) Medik* | | shepherd's purse | N |
| Caragana | *arborescens Lam.Siberian* | | pea tree | N |
| Cardamine | *pensylvanica Muhl. ex Willd.* | | bittercress, Pennsylva-nia | Y |
| Carex | *bebbii Olney ex Fern* | | sedge, Bebb's | Y |
| Carex | *brevior (Dewey) Mackenzie* | | fescue sedge | Y |
| Carex | *comosa Boott* | | sedge, bristly | Y |
| Carex | *crawfordii Fern.* | | sedge, Crawford's | Y |
| Carex | *foenea Willd.* | | sedge, hay | Y |
| Carex | *gracillima Schwein.* | | sedge, gracefull | Y |
| Carex | *interior Bailey* | | sedge, inland | Y |
| Carex | *intumescens Rudge* | (Fernaldii L.H. Barley) | sedge, bladder | Y |
| Carex | *lacustris Willd.* | | sedge, lake-bank | Y |
| Carex | *lanuginosa Michx.* | | sedge, woolly | Y |
| Carex | *lasiocarpa Ehrh.* | americana Fern | sedge, slender | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Carex | *Muehlenbergii Schkuhr ex Willd* | | sedge, Muhlenberg's | Y |
| Carex | *pensylvanica Lam.* | | sedge, Pennsylvania | Y |
| Carex | *radiata (Wahlenb.) Small* | | sedge, radiate | Y |
| Carex | *retrorsa Schwein.* | | sedge, retrorse | Y |
| Carex | *rosea Schkuhr ex Willd.* | | sedge, stellate | Y |
| Carex | *scoparia Schkuhr ex Willd.* | | sedge, pointed broom | Y |
| Carex | *stipata Muhl. ex Willd.* | | sedge, awl-fruited | Y |
| Carex | *stricta Lam.* | | sedge, tussock | Y |
| Carex | *sychnocephala Carey* | | sedge, dense long-beaked | Y |
| Carex | *tenera Dewey* | | sedge, narrow-leaved oval | Y |
| Carex | *tetanica Schkuhr* | | sedge, Wood's | Y |
| Carex | *tribuloides Wahlenb* | | sedge, blunt broom | Y |
| Carex | *utriculata Boott* | | sedge, beaked | Y |
| Carex | *vesicaria L.* | | sedge, inflated | Y |
| Carex | *vulpinoidea Michx.* | | sedge, soft fox | Y |
| Castilleja | *coccinea (L.) Spreng.* | | Indian paint brush (painted-cup) | Y |
| Catalpa | *speciosa (Warder)Warder ex* | | catalpa, common | N |
| Ceanothus | *americanus L.* | | New Jersey tea | Y |
| Celastrus | *scandens L.* | | bittersweet, American or climbing | Y |
| Celtis | *occidentalis L.* | | hackberry | Y |
| Cenchrus | *longispinus (Hack.) Fern* | | sandbur | Y |
| Centaurea | *biebersteinii D.C.* | | knapweed, spotted | N |
| Centaurea | *cyanus L.* | | cornflower, bachelor's button | N |
| Cerastium | *arvense L.* | | chickweed, field | Y |
| Cerastium | *vulgatum L.* | | mouse-ear chickweed | N |
| Ceratophyllum | *demersum L.* | | coontail (hornwort, common) | Y |
| Chamaedaphne | *calyculata (L.) Moench* | | leatherleaf | Y |
| Chamaesyce | *geyeri (Engelm.) Small* | | spurge, dune | Y |
| Chamaesyce | *glyptosperma (Engelm.) Small* | | spurge, ridge-seed | Y |
| Chamaesyce | *maculata (L.) Small* | | spurge, milk purslane (spotted) | Y |
| Chamaesyce | *serpyllifolia (Pers.) Small* | | spurge, thyme-leaved | Y |
| Chamerion | *angustifolium (L.) Holub* | | narrow-leaf fireweed | Y |
| Chelone | *glabra L.* | | turtlehead | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Chenopodium | *album L.* | | lamb's-quarters (pig-weed) | N |
| Chenopodium | *berlandieri Moq.* | | pitseed goosefoot | Y |
| Chenopodium | *leptophyllum (Moq.)Nut.ex S.* | | goosefoot, narrow-leaved | Y |
| Chenopodium | *simplex (Torr.) Raf.* | gigantospermum (Aellen)Rouleau | goosefoot, maple-leaved | Y |
| Chimaphila | *umbellata (L.) W.Bart* | cisatlantica Blake | pipsissewa | Y |
| Cicuta | *bulbifera L.* | | water-hemlock, bulb-bearing | Y |
| Cicuta | *maculata L.* | | water-hemlock, spotted cowbane | Y |
| Cinna | *arundinacea L.* | | woodreed, stout | Y |
| Circaea | *lutentiana L.* | canadensis (L)Hara Franch&Sav | nightshade, enchanter's | Y |
| Cirsium | *arvense (L.) Scop.* | Albiflorum | thistle, Canada | N |
| Cirsium | *discolor(Muhl.ex Willd.)Spreng* | | thistle, field | Y |
| Cirsium | *flodmanii (Rydb.) Arthur* | | thistle, prairie | Y |
| Cirsium | *muticum Michx.* | | thistle, swamp | Y |
| Cirsium | *vulgare (Savi) Ter.* | | thistle, bull | N |
| Clintonia | *borealis (Ait.) Raf.* | | clintonia (corn-lily) | Y |
| Comandra | *umbellata (L.) Nutt.* | | toadflax, bastard | Y |
| Comarum | *palustre L.* | | cinquefoil, marsh | Y |
| Commelina | *communis L.* | | dayflower, Asiatic | N |
| Convallaria | *majalis L.* | | lily of the valley | Y |
| Convolvulus | *arvensis L.* | | bindweed, field | N |
| Conyza | *canadensis (L.) Cronq.* | | Horseweed | Y |
| Coptis | *trifolia (L.) Salisb.* | | three-leaf goldthread | Y |
| Coreopsis | *palmata Nutt.* | | coreopsis, stiff | Y |
| Coreopsis | *tinctoria Nutt.* | | coreopsis, garden | N |
| Corispermum | *hyssopifolium L.* | | tickseed, hyssopleaf | N |
| Cornus | *alternifolia L.f.* | | dogwood, alternate-leaf | Y |
| Cornus | *canadensis L.* | | bunchberry, dwarf cornel | Y |
| Cornus | *racemosa Lam.* | | dogwood, red-panicle | Y |
| Cornus | *rugosa Lam.* | | dogwood, round-leaf | Y |
| Cornus | *sericea L.* | | dogwood, red-osier | Y |
| Coronilla | *varia L.* | | crown-vetch | N |
| Corydalis | *flavula (Raf.) DC.* | | corydalis, yellow | Y |
| Corylus | *americana Walt.* | | hazelnut, American | Y |
| Corylus | *cornuta Marsh.* | | hazelnut, beaked | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Crataegus | *calpodendron (Ehrh.) Medik.* | | hawthorn, pear | Y |
| Crataegus | *chrysocarpa Ashe* | | hawthorn, fireberry | Y |
| Crepis | *tectorum L.* | | hawksbeard, narrow-leaved | N |
| Cryptotaenia | *canadensis (L.) DC* | | honewort | Y |
| Cycloloma | *atriplicifolium(Sreng) Coult.* | | pigweed, winged | Y |
| Cynoglossum | *officinale L.* | | hound's-tongue | N |
| Cyperus | *diandrus Torr.* | | cyperus, low | Y |
| Cyperus | *lupulinus (Spreng) Marcks* | | cyperus, slender | Y |
| Cyperus | *schweinitzii Torr.* | | cyperus, Schweinitz's | Y |
| Cyperus | *squarrosus L.* | | cyperus, incurved flat | Y |
| Cyperus | *strigosus L.* | | cyperus, straw-colored | Y |
| Cystopteris | *fragilis (L.) Bernh.* | | fern, fragile (brittle bladderfern) | Y |
| Dactylis | *glomerata L.* | | grass, orchard | N |
| Dalea | *candida Willd.* | | clover, white prairie | Y |
| Dalea | *purpurea Vent.* | | clover, purple prairie | Y |
| Dalea | *villosa (Nutt.) Spreng.* | | clover, silky prairie | Y |
| Danthonia | *spicata (L.)Beauv.ex Roemer &* | | grass, poverty oat | Y |
| Delphinium | *carolinianum Walt.* | | larkspur, prairie | Y |
| Desmodium | *canadense (L.) DC* | | trefoil, showy tick | Y |
| Desmodium | *glutinosum (Muhl. ex Willd.)* | | trefoil, pointed-leaved tick-Y | |
| Desmodium | *paniculatum (L.) DC* | | trefoil, panicled tick- | Y |
| Dianthus | *armeria L.* | | deptford pink | N |
| Dicanthelium | *depauperatum Muhl.* | | grass, panic | Y |
| Dichanthelium | *acuminatum (SW) Gould&CA.Clark* | fasciculatum (Torr.) | | |
| Freckmann | *grass, hairy panic* | | | Y |
| Dichanthelium | *boreale (Nash.) Freckmann* | | grass, Northern panic | Y |
| Dichanthelium | *clandestinum (L.) Gould* | | grass, deer tongue panic | N |
| Dichanthelium | *linearifolium(Scribr. ex Nash)* | | grass, long stalked panic | Y |
| Dichanthelium | *oligosanthes (J.A.Schultes)* | scribnerianum (Nash.) Gould | grass, Scribner's panic | Y |
| Dichanthelium | *ovale (Ell.) Gould & C.A. Clark* | | grass, panic | Y |
| Dichanthelium | *sabu-lorum(Lam)Gould&CAClark* | thinium (Hitchc&Chase)Gould&Clrk | grass, American panic- | Y |
| Diervilla | *lonicera Mill.* | | honeysuckle, Northern bush | Y |
| Digitaria | *cognata (J. A. Schultes) Pilger* | cognata (J. A. Schultes) Chase | grass, fall witch- | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Digitaria | *ischaemum (Schreb.) Muhl.* | | grass, smooth crab- | N |
| Digitaria | *sanguinalis (L.) Scop.* | | grass, crab- | N |
| Dioscorea | *villosa L.* | | yamroot, wild (colic root) | Y |
| Dryopteris | *carthusiana (Vill.) H.P. Fuchs* | | fern, toothed wood | Y |
| Dryopteris | *cristata (L.) A. Gray* | | fern, crested wood | Y |
| Dulichium | *arundinaceum (L.)Britton* | | dulichium | Y |
| Echinochloa | *crus-galli (L.) Beauv.* | Frumentaceae | grass, barnyard | N |
| Echinochloa | *muricata (Beauv.) Fern.* | Muricata | grass, American barn-yard | Y |
| Echinocystis | *lobata (Michx.) Torr. & Gray* | | cucumber, wild (balsam apple) | Y |
| Eleocharis | *acicularis (L) Roem & J.Schul* | | spikerush, needle (least) | Y |
| Eleocharis | *erythropoda Steud.* | | spikerush, marsh | Y |
| Eleocharis | *obtusa (Willd.) J.A.Schultes* | | spikerush, blunt | Y |
| Eleocharis | *ovata(Roth)Roe-mer&J.A.Schultes* | | spikerush, ovoid | Y |
| Eleocharis | *palustris* | | rush, creeping spike | Y |
| Eleocharis | *smallii Britt.* | | spikerush, Small's | Y |
| Elodea | *nuttallii (Planch.) St. John* | | waterweed, free-flow-ered | Y |
| Elymus | *canadensis L.* | | wild rye, Canada | Y |
| Elymus | *hystrix L.* | | grass, spreading bottle-brush | Y |
| Elymus | *trachycaulus(Link)Gould* | (trachycaulum) | grass, slender wheat | Y |
| Elymus | *virginicus L.* | | wild rye | Y |
| Elytrigia | *repens (L.) Desv. Ex* | | quackgrass | N |
| Epilobium | *ciliatum Raf.* | adenocaulon (Haussk) | Fern.willow-herb, Amer-ican | Y |
| Epilobium | *coloratum Biehler* | | willow-herb, purple leaved | Y |
| Epilobium | *leptophyllum Raf.* | | willow-herb, narrow-leaved | Y |
| Equisetum | *arvense L.* | | horsetail | Y |
| Equisetum | *fluviatile L.* | | horsetail, water | Y |
| Equisetum | *hyemale L.* | affine (Engelm.) A.A.Eat. | rush, scouring | Y |
| Equisetum | *laevigatum A.Braun* | | rush, smooth scouring- | Y |
| Equisetum | *sylvaticum L.* | | horsetail, wood | Y |
| Eragrostis | *cilianensis (All.) Lutt.* | | grass, stink | N |
| Eragrostis | *pectinacea (Michx.) Nees. ex Steud* | | grass, Pursch's love | Y |
| Eragrostis | *spectabilis (Pursh.) Steud* | | grass, purple love | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Erechtites | *hieraciifolia (L.) Raf. ex DC* | | pilewort (fireweed) | Y |
| Erigeron | *philadelphicus L.* | | fleabane, Philadelphia (common) | Y |
| Erigeron | *strigosus Muhl. ex Willd.* | | fleabane, lesser daisy | Y |
| Eriogonum | *annuum Nutt.* | | eriogonum, annual (umbrella plant) | N |
| Eriophhorum | *vaginatum L* | | tussock cotton-grass | Y |
| Erysimum | *cheiranthoides L.* | | mustard, treacle (worm-seed) | N |
| Eupatorium | *maculatum L.* | | Joe-pye weed, spotted | Y |
| Eupatorium | *perfoliatum L.* | | boneset, purple | Y |
| Euphorbia | *cyparissias L.* | | spurge, cypress | N |
| Euphorbia | *esula L.* | | spurge, leafy | N |
| Euthamia | *graminifolia (L.) Nutt.* | Gramminifolia | goldenrod, grass-leaved | Y |
| Fagopyrum | *esculentum Moench* | | buckwheat | N |
| Festuca | *rubra L.* | | fescue, red | Y |
| Festuca | *subverticillata(Pers.)Alexeev.* | | grass, nodding fescue | Y |
| Fragaria | *vesca L.* | americana Porter | strawberry, wood | Y |
| Fragaria | *vesca L.* | vesca | strawberry, wood | N |
| Fragaria | *virginiana Duchesne* | | strawberry, common | Y |
| Fraxinus | *nigra Marsh.* | | ash, black | Y |
| Fraxinus | *pennsylvanica Marsh.* | (subintegerrina (Vahl.) Fern.) | ash, green (red) | Y |
| Froelichia | *floridana (Nutt.) Moq.* | campestris (Small) Fern. | cottonweed, Common | Y |
| Galeopsis | *tetrahit L.* | | brittle-stem hemp-nettle | N |
| Galinsoga | *quadriradiata Ruiz & Pavon* | | galinsoga, common | N |
| Galium | *aparine L.* | | cleavers | Y |
| Galium | *asprellum Michx.* | | bedstraw, rough | Y |
| Galium | *boreale L.* | | bedstraw, Northern | Y |
| Galium | *brevipes Fern. & Wieg.* | | bedstraw, short-stalked | Y |
| Galium | *labradoricum (Wieg.) Wieg.* | | bedstraw, Labrador | Y |
| Galium | *obtusum Bigelow* | | bedstraw, blunt-leaved | Y |
| Galium | *tinctorium (L.) Scop.* | | bedstraw, Clayton's | Y |
| Galium | *trifidum L.* | | bedstraw, small | Y |
| Galium | *triflorum Michx.* | | bedstraw, fragrant | Y |
| Gentiana | *andrewsii Griseb* | | gentian, closed | Y |
| Gentiana | *puberulenta J. Pringle* | | gentian, downy | Y |
| Geranium | *bicknelli Britt.* | | crane's bill, Bicknell's | Y |
| Geranium | *columbinum L.* | | crane's bill, long-stalked | N |
| Geranium | *maculatum L.* | | geranium, wild | Y |
| Geranium | *robertianum L.* | | herb Robert | N |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Geum | *aleppicum Jacq.* | strictum (Ait.) Fern. | avens, yellow | Y |
| Geum | *canadense Jacq.* | | avens, white | Y |
| Geum | *macrophyllum Willd* | | avens, large-leaved | Y |
| Geum | *triflorum Pursh.* | | avens, long-plumed purple | Y |
| Glechoma | *hederacea L.* | hederacea | ground ivy (gill-over-the-ground) | N |
| Glyceria | *borealis (Nash) Batch* | | eldergrass, Northern manna | Y |
| Glyceria | *canadensis (Michx.) Trin.* | | grass, rattlesnake manna | Y |
| Glyceria | *grandis S. Wats.* | | grass, America manna | Y |
| Glyceria | *striata (Lam.) A.S.Hitchc.* | | grass, fowl manna | Y |
| Glycine | *max (L.) Merr.* | | soy-bean | N |
| Gnaphalium | *obtusifolium L.* | | everlasting, sweet (cat-foot) | Y |
| Gratiola | *neglecta Torr.* | | hyssop, clammy hedge | Y |
| Habenaria | *hyperborea R. Br.* | | orchis, green | N |
| Hackelia | *virginiana (L.) I.M.Johnston* | | stickseed, Virginia | Y |
| Hedeoma | *hispida Pursh.* | | pennyroyal, rough | Y |
| Helenium | *autumnale L.* | | sneezeweed | Y |
| Helianthemum | *bicknellii Fern.* | | frostweed, Bicknell's | Y |
| Helianthus | *angustifolius* | | sunflower, narrow leaved | Y |
| Helianthus | *annuus L.* | | sunflower, common | Y |
| Helianthus | *decapetalus L.* | | sunflower, thin leaved | Y |
| Helianthus | *giganteus L.* | | sunflower, giant or tall | Y |
| Helianthus | *grosseserratus Martens* | | sunflower, saw-toothed | Y |
| Helianthus | *hirsutus Raf.* | | sunflower, stiff-haired | Y |
| Helianthus | *maximiliani* | | Maximillian's sunflower | Y |
| Helianthus | *pauciflorus Nutt.* | (rigidus (Cass.) Fern.) | sunflower, prairie | Y |
| Helianthus | *petiolaris Nutt.* | | sunflower, prairie | Y |
| Helianthus | *rigidus (Cass.) Desf.* | | Sunflower | N |
| Helianthus | *strumosus L.* | | sunflower, pale-leaved wood | Y |
| Helianthus | *tuberosus L.* | | artichoke, Jerusalem | Y |
| Heliopsis | *helianthoides (L.) Sweet* | | ox-eye | Y |
| Hemerocallis | *fulva (L.) L.* | | day-lily | N |
| Hemerocallis | *liloasphodelus L.* | | day-lily, yellow | N |
| Hesperis | *matronalis L.* | | rocket, Dame's | N |
| Heteranthera | *dubia (Jacq.) MacM.* | | star-grass, water | N |
| Heterotheca | *villosa (Pursh.)Shinners* | villosa | aster, golden | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Heuchera | *richardsonii R.Br.* | (hispidior R.B.L. | alumroot | Y |
| Hibiscus | *trionum L.* | | flower-of-an-hour | Y |
| Hieracium | *aurantiacum L.* | | hawkweed, orange | N |
| Hieracium | *canadense Michx.* | | hawkweed, Canada | Y |
| Hieracium | *longipilum Torr.* | | hawkweed, long-bearded | Y |
| Hieracium | *scabrum Michx.* | | hawkweed, rough | Y |
| Hordeum | *jubatum L.* | | foxtail (barley) | Y |
| Houstonia | *longifolia Gaertn.* | | bluets, long-leaved | Y |
| Hudsonia | *tomentosa Nutt.* | intermedia Peck | hudsonia, woolly | Y |
| Humulus | *lupulus L.* | lupuloides E.Small | hop-vine, American | Y |
| Hydrophyllum | *virginianum L.* | | waterleaf, Virginia | Y |
| Hypericum | *ascyron L.* | | St. John's-wort, great | Y |
| Hypericum | *majus (A.Gray) Britt.* | | St. John's-wort, larger Canadian | Y |
| Hypericum | *perforatum L.* | | St. John's wort, common | N |
| Ilex | *verticillata (L.) Gray* | | winterberry holly, common | Y |
| Impatiens | *capensis Meerb.* | | touch-me-not, spotted | Y |
| Irisgermanica L. | | | iris, bearded (heritage type) | N |
| Iris | *versicolor L.* | | blue flag, larger | Y |
| Iva | *xanthifolia Nutt.* | | elder, big marsh | Y |
| Juglans | *cinerea L.* | | walnut, white | Y |
| Juglans | *nigra L.* | | walnut, black | Y |
| Juncus | *brevicaudatus (Engelm.) Fern.* | | rush, narrow-panicled | Y |
| Juncus | *canadensis J.Gay ex Laharpe* | | rush, Canada | Y |
| Juncus | *effusus L.* | | rush, soft | Y |
| Juncus | *greenei Oakes & Tucker* | | marush, Greene's | Y |
| Juncus | *tenuis Willd.* | | rush, path- | Y |
| Juniperus | *chinensis L.* | parsonii Horni | brookjuniper, Parson's | Y |
| Juniperus | *communis L.* | depressa Pursh. | juniper, dwarf | Y |
| Juniperus | *horizontalis Moench* | | juniper, trailing | Y |
| Juniperus | *virginiana L.* | | cedar, Eastern red cedar | Y |
| Koeleria | *macrantha (Leleb) J.A.Schultes* | | grass, June (crested hair) (Koeleria) | Y |
| Krigia | *biflora (Walt.) Blake* | | dandelion, dwarf | Y |
| Lactuca | *biennis (Moench) Fern.* | | lettuce, tall blue | Y |
| Lactuca | *canadensis L.* | | lettuce, wild | Y |
| Lactuca | *ludoviciana (Nutt.) Riddell* | | lettuce, prairie | Y |
| Lactuca | *serriola L.* | | lettuce, prickly | N |
| Lappula | *squarrosa (Retz.) Dumort.* | | bristly sheepburr | N |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Larix | *laricina (DuRoi) Koch* | | tamarack | Y |
| Lathyrus | *ochroleucus Hook.* | | vetchling, cream-colored or pale | Y |
| Lathyrus | *palustris L.* | | vetchling | Y |
| Lathyrus | *venosus Muhl. ex Willd* | (intonsus Butt. & St. John) | pea, veiny wild | Y |
| Lechea | *stricta Leggett ex Britt* | | pinweed | Y |
| Lechea | *tenuifolia Michx.* | | Pinweed | Y |
| Ledum | *groenlandicum Oeder* | | Labrador tea | Y |
| Leersia | *oryzoides (L.) Sw.* | | grass, rice cut | Y |
| Leersia | *virginica Willd.* | | grass, white | Y |
| Lemna | *minor L.* | | duckweed, lesser | Y |
| Lemna | *trisulca L.* | | duckweed, star- | Y |
| Leonurus | *cardiaca L.* | | motherwort | N |
| Lepidium | *densiflorum Schrad.* | | pepperweed, prairie | Y |
| Lespedeza | *capitata Michx.* | | bush-clover, round headed | Y |
| Leucanthemumm | *vulgare Lam.* | pinnatifidum Lecoq. & Lamotte | daisy, ox-eye | N |
| Liatris | *aspera Michx.* | Aspera | blazing star, rough | Y |
| Liatris | *cylindraceae Michx.* | | blazing star, cylindric | Y |
| Liatris | *lingulistylis* | | blazing-star | Y |
| Liatris | *punctata Hook.* | | blazing star, dotted | Y |
| Liatris | *pycnostachya Michx.* | | blazing star, prairie | Y |
| Lilium | *lancifolium Thunb.* | | lily, tiger | N |
| Lilium | *michigansense Farw.* | | lily, Michigan | Y |
| Lilium | *philadelphicum L.* | andinum (Nutt.) Ker-Gawl. | lily, wood | Y |
| Linaria | *vulgaris P. Mill.* | | butter-and-eggs (toadflax) | N |
| Lindernia | *dubia (L.) Pennell* | anagallidea (Michx.)Cooperider | pimpernel, false | Y |
| Linnaea | *borealis L.* | americana (Forbes) Rehder | twin-flower | Y |
| Linum | *rigidum Pursh.* | | flax, stiffstem yellow | Y |
| Linum | *sulcatum Riddell* | | flax, grooved yellow | Y |
| Lithospermum | *canescens (Michx.) Lehm.* | | puccoon, hoary | Y |
| Lithospermum | *caroliniense (Walt ex J.F. Gmel) MacM* | | puccoon, rough or hairy | Y |
| Lithospermum | *latifolium Michx.* | | gromwell, American | N |
| Lobelia | *siphilitica L.* | ludoviciana A. DC. | lobelia, great | Y |
| Lobelia | *spicata Lam.* | hirtella Gray | lobelia, pale-spike | Y |
| Lonicera | *Canadensis* | | honeysuckle, Canada | Y |
| Lonicera | *dioica L.* | glaucescens (Rydb.) Butters | honeysuckle, mountain | Y |
| Lonicera | *tatarica L.* | | honeysuckle, tartarian | N |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Lonicera | *villosa (Michx.) J.A. Schultes* | solonis (Eat.) Fern. | honeysuckle, Northern | Y |
| Lotus | *corniculatus L.* | | trefoil, birdfoot | N |
| Ludwigia | *palustris (L.) Ell.* | americana (DC) Fern, & Griscon | purslane, water | Y |
| Ludwigia | *polycarpa Short & Peter* | | loosestrife, many-fruited false | Y |
| Lupinus | *perennis L.* | occidentalis S. Wats. | lupine, wild | Y |
| Luzula | *multiflora (Ehrh.) Lej.* | | woodrush, common | Y |
| Lycopodium | *complanatum L.* | | groundcedar, Northern | Y |
| Lycopodium | *hickeyi W.H.Wagner Beitel &* | | club-moss, tree, ground pine | Y |
| Lycopus | *americanus Muhl. ex W.Bart.* | | hoarhound,cut-leaved water | Y |
| Lycopus | *uniflorus Michx.* | | bugleweed, Northern | Y |
| Lygodesmia | *juncea (Pursh) D.Don* | | skeleton weed | Y |
| Lysimachia | *ciliata L.* | | loosestrife, fringed | Y |
| Lysimachia | *hybrida Michx.* | | loosestrife, hybrid | Y |
| Lysimachia | *quadriflora Sims* | | loosestrife, prairie | Y |
| Lysimachia | *terrestris (L.) B.S.P.* | | loosestrife, yellow (swamp candles) | Y |
| Lysimachia | *thyrsiflora L.* | | loosestrife, tufted | Y |
| Lythrum | *salicaria L.* | | loosestrife, purple or spiked | N |
| Maianthemum | *canadense Desf.* | | lily of the valley, wild (Canada Mayflwr) | Y |
| Maianthemum | *racemosum (L.) Link* | | Solomon's seal, false | Y |
| Maianthemum | *stellatum (L.) Link* | | Solomon's seal, starry-false | Y |
| Maianthemum | *trifolia (L.) Sloboda* | | Solomon's seal, 3 lvd fls | Y |
| Malus | *pumila Mill. x baccata (L.) Borkh.* | | crab apple | N |
| Malus | *pumila P.Mill.* | | apple | N |
| Malus | *species* | | apple, heritage variety | N |
| Malva | *neglecta Wallr.* | | mallow, common (cheeses) | N |
| Malva | *rotundifolia L.* | | mallow, dwarf | N |
| Marrubium | *vulgare L.* | | horehound | N |
| Matricaria | *discoidea D.C.* | | pineapple weed | Y |
| Matteuccia | *struthiopteris (L.) Todaro* | | fern, ostrich | Y |
| Medicago | *lupulina L.* | | black medic | N |
| Medicago | *sativa L.* | | alfalfa, (lucerne) | N |
| Melilotus | *alba White.* | | sweetclover, white (melilot) | N |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Melilotus | *officinalis (L.) Lam.* | | sweetclover, yellow | N |
| Menispermum | *canadense L.* | | moonseed, Canada | Y |
| Mentha | *arvensis L.* | villosa | mint, wild | Y |
| Menyanthes | *trifoliata L.* | minor | buckbean | Y |
| Mimulus | *ringens L.* | | monkey flower, square-stemmed | Y |
| Mirabilis | *hirsuta (Pursh.) MacM.* | | umbrellawort, hairy | Y |
| Mirabilis | *linearis (Pursh) Heimerl* | | narrow-leaf four-o'-clock | Y |
| Mirabilis | *nyctaginea (Michx.) MacM.* | | four-o'clock | Y |
| Mitella | *nuda L.* | | milterwort, naked | Y |
| Moehringia | *lateriflora (L.) Fenzl* | | sandwort, grove | Y |
| Mollugo | *verticillata L.* | | carpetweed | N |
| Monarda | *didyma L.* | | oswego-tea (bee-balm) | N |
| Monarda | *fistulosa L.* | mollis (L.) Benth. | bergamot, wild | Y |
| Monotropa | *uniflora L.* | | indian pipe | Y |
| Morus | *rubra L.* | | mulberry, red | N |
| Muhlenbergia | *glomerata Willd.* | | grass, glomerate satin | Y |
| Muhlenbergia | *mexicana (L.) Trin* | | grass, Mexican satin | Y |
| Muhlenbergia | *racemosa (Michx.) B.S.P.* | | grass, muhly | Y |
| Myosoton | *aquaticum (L.) Moench* | | chickweed, giant | N |
| Myriophyllum | *sibiricum Komarov* | | common water-milfoil | Y |
| Najas | *flexilis (Willd)Rost.& Schmidt* | | Northern water-nymph | Y |
| Nepeta | *cataria L.* | | catnip | N |
| Nicotiana | *longiflora Cav.* | | tobacco, long flowered | N |
| Nuphar | *lutea (L.) Sm.* | | Spatterdock | Y |
| Nuttallanthus | *canadensis (L.) D.A.Sutton* | | toadflax, Canada | Y |
| Nymphaea | *odorata Ait.* | Odorata | lily, fragrant water | Y |
| Oenothera | *biennis L.* | | primrose, common evening | Y |
| Oenothera | *clelandii W. Dietr., Raven* | | primrose, longspike evening | Y |
| Oenothera | *parviflora L.* | | primrose, small-flowered evening | Y |
| Oenothera | *rhombipetala Nutt.* | | primrose, longspike evening | Y |
| Onoclea | *sensibilis L.* | | fern, sensitive (bead fern) | Y |
| Opuntia | *fragilis (Nutt.) Haw.* | | prickly pear, brittle | Y |
| Orthilia | *secunda (L.) House* | | pyrola, one-sided | Y |
| Oryzopsis | *asperifolia Michx.* | | rice, mountain | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Oryzopsis | *pungens (Torr ex Spreng)Hitchc.* | | ricegrass, mountain | Y |
| Osmorhiza | *claytonii (Michx.) C.B. Clarke* | | sweet cicely | Y |
| Osmorhiza | *longistylis (Torr.) DC.* | | sweet cicely, long-styled | Y |
| Osmunda | *cinnamomea L.* | cinnamomea Gray | fern, cinnamon | Y |
| Osmunda | *claytoniana L.* | | fern, interrupted | Y |
| Osmunda | *regalis L.* | spectabilis (Willd.) Gray | fern, royal | Y |
| Ostrya | *virginiana (P.Mill) K.Koch* | | Eastern hophornbeam | Y |
| Oxalis | *stricta L.* | | wood-sorrel, yellow | Y |
| Panax | *quinquefolius L.* | | ginseng | Y |
| Panicum | *capillare L.* | | grass, witch | Y |
| Panicum | *virgatum L.* | | grass, switch | Y |
| Parietaria | *pensylvanica Muhl. ex Willd.* | | pellitory, Pensylvanica | Y |
| Parnassia | *palustris L.* | (neogaea Fern.) | marsh grass of Parnassus | Y |
| Parthenocissus | *quinquefolia (L.) Planch* | | Virginia creeper | Y |
| Paspalum | *setaceum Michx.* | | grass, bead (thin papalum) | Y |
| Pedicularis | *canadensis L.* | | lousewort (wood-betony) | Y |
| Pedicularis | *lanceolata Michx.* | | lousewort, swamp | Y |
| Penstemon | *gracilis Nutt.* | | beard-tongue, slender | Y |
| Penstemon | *grandiflorus Nutt.* | | beard-tongue, large-flowered | Y |
| Penthorum | *sediodes L.* | | ditch-stonecrop | Y |
| Phalaris | *arundinacea L.* | | grass, reed canary | Y |
| Philadelphus | *coronarius L.* | | mock orange, common | N |
| Phleum | *pratense L.* | | Timothy | N |
| Phlox | *paniculata L.* | | phlox, garden or fall | Y |
| Phlox | *pilosa L.* | fulgida Wherry | phlox, downy | Y |
| Phlox | *subulata L.* | | phlox, moss (moss-pink) | Y |
| Phragmites | *australis (Cav.)Trin.& Steud* | berlandieri (Fournier) Fern. | grass, reed | Y |
| Phryma | *leptostachya L.* | | lopseed | Y |
| Phyla | *lanceolata (Michx.) Greene* | | fogfruit | Y |
| Physalis | *heterophylla Nees.* | | ground cherry, clammy | Y |
| Physalis | *virginiana P.Mill.* | | ground cherry, Virginia | Y |
| Physostegia | *virginiana (L.) Benth.* | | dragonhead, false | Y |
| Picea | *abies (L.) Karst.* | | spruce, Norway | N |
| Picea | *glauca (Moench) Voss* | | spruce, white | N |
| Picea | *mariana (P.Mill.) B.S.P.* | | spruce, black | Y |
| Picea | *pungens Engelm.* | | spruce, blue | N |
| Pilea | *fontana (Lunell) Rydb.* | | clearweed, black-fruited | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Pilea | *pumila (L.) Gray* | | clearweed | N |
| Pinus | *banksiana Lamb.* | | pine, Jack | N |
| Pinus | *mugo* | | mugo pine | N |
| Pinus | *resinosa Soland* | | pine, Norway or red | N |
| Pinus | *strobus L.* | | pine, Eastern white | Y |
| Pinus | *sylvestris L.* | | pine, scotch | N |
| Plantago | *major L.* | | plantain, common | N |
| Plantago | *patagonica Jacq.* | | plantain, woolly | N |
| Plantago | *rugelii Dcne.* | | plantain, Rugel's | N |
| Platanthera | *flava (L.) Lindl.* | | orchis, pale green | Y |
| Platanthera | *psychodes (L.) Lindl.* | | orchis, small purple fringed | Y |
| Poa | *annua L.* | | grass, annual blue- | N |
| Poa | *compressa L.* | | grass, Canada blue- | N |
| Poa | *palustris L.* | | grass, fowl blue- | Y |
| Poa | *pratensis L.* | angustifolia | grass, Kentucky blue- | N |
| Polygala | *polygama Walt.* | | milkwort, racemed | N |
| Polygala | *sanguinea L.* | | milkwort, field | Y |
| Polygonatum | *biflorum (Walt.) Ell.* | | Solomon's seal | Y |
| Polygonum | *achoreum Blake* | | knotweed, blue | Y |
| Polygonum | *amphibium L.* | stipulaceam (& emersum) | smartweed, water | Y |
| Polygonum | *arifolium L.* | | tear-thumb, halberd-leaved | Y |
| Polygonum | *aviculare L.* | | knotweed, prostrate | Y |
| Polygonum | *convolvulus L.* | | bindweed, black | N |
| Polygonum | *cuspidatum Sieb & Zucc.* | | knotweed, Japanese | N |
| Polygonum | *hydropiperoides Michx.* | | water-pepper, mild | Y |
| Polygonum | *lapathifolium L.* | | smartweed, pale | Y |
| Polygonum | *pensylvanicum L.* | | smartweed, Pennsylva-nia | Y |
| Polygonum | *persicaria L.* | | lady's thumb (redleg) | N |
| Polygonum | *punctatum Ell.* | | smartweed, dotted | Y |
| Polygonum | *Sagittatum L.* | | tear-thumb, arrow-leaved | Y |
| Polygonum | *scandens L.* | | buckwheat, climbing false | Y |
| Polygonum | *tenue Michx.* | | knotweed, slender | Y |
| Populus | *balsamifera L.* | | poplar, balsam | Y |
| Populus | *deltoides Bartr. ex Marsh.* | | cottonwood, Eastern | Y |
| Populus | *grandidentata Michx.* | | aspen, bigtooth | Y |
| Populus | *tremuloides Michx.* | | aspen, quaking | Y |
| Portulaca | *oleracea L.* | | purslane | N |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Potamogeton | *amplifolius Tuckerman* | | pondweed, big leaf | Y |
| Potamogeton | *gramineus L.* | | pondweed, variable | Y |
| Potamogeton | *natans L.* | | pondweed, floating | Y |
| Potamogeton | *nodosus Poir.* | | pondweed, longleaf | Y |
| Potamogeton | *obtusifolius Mert. & Koch.* | | pondweed, bluntleaf | Y |
| Potamogeton | *pectinatus L.* | | pondweed, sago | Y |
| Potamogeton | *praelongus Wulfen* | | pondweed, white stemmed | Y |
| Potamogeton | *pusillus L.* | | pondweed, slender or small | Y |
| Potamogeton | *zosteriformis Fern* | | pondweed, flatstem | Y |
| Potentilla | *argentea L.* | | cinquefoil, silvery | N |
| Potentilla | *arguta Pursh* | | cinquefoil, tall | Y |
| Potentilla | *fruiticosa* | | cinquefoil, shrubby | Y |
| Potentilla | *norvegica L.* | hirsuta (Michx.) Lehm. | cinquefoil, rough | Y |
| Potentilla | *palustris* | | marsh cinquefoil | Y |
| Potentilla | *recta L.* | | cinquefoil, rough fruited | N |
| Potentilla | *simplex Michx.* | | cinquefoil, common | Y |
| Prenanthes | *alba L.* | | rattlesnake-root (white lettuce) | Y |
| Prunella | *vulgaris L.* | | selfheal (heal-all) | Y |
| Prunus | *americana Marsh.* | | plum, American | Y |
| Prunus | *pensylvanica L.F.* | | cherry, pin | Y |
| Prunus | *pumila L.* | | cherry, Northern dwarf | Y |
| Prunus | *serotina Ehrh.* | | cherry, black | Y |
| Prunus | *virginiana L.* | | chokecherry | Y |
| Pteridium | *aquilinum (L.) Kuhn.* | latiusculum (Desn) | fern, bracken | Y |
| Pulsatilla | *patens(L.) P.Mill* | | pasque flower | Y |
| Pycnanthemum | *virginianum(L.)T.Dur.& B.D.Jackson ex BL* | | mint, Virginia mountain | Y |
| Pyrola | *americana Sweet* | (americana (Sweet) Fern. | wintergreen, American | Y |
| Pyrola | *asarifolia Michx.* | | pyrola, pink | Y |
| Pyrola | *elliptica Nutt.* | | Shinleaf | Y |
| Quercus | *alba L.* | | oak, white | Y |
| Quercus | *ellipsoidalis E.J.Hill* | | oak, Northern pin | Y |
| Quercus | *macrocarpa Michx.* | | macrocarpa or olivae-formisoak, bur | Y |
| Quercus | *rubra L.* | | oak, Northern red | Y |
| Ranunculus | *abortivus L.* | | buttercup, kidney leaf | Y |
| Ranunculus | *flabellaris Ref.* | | buttercup, yellow water | Y |
| Ranunculus | *gmelini DC.* | hookeri (D.Don) Benson | crowfoot, yellow water | Y |
| Ranunculus | *hispidus Michx.* | nitidus (Chapman) T.Duncan | buttercup, hispid | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Ranunculus | *pensylvanicus L.F.* | | buttercup, bristly | Y |
| Ranunculus | *recurvatus Poir.* | | buttercup, hooked | Y |
| Ranunculus | *rhomboideus Goldie* | | buttercup, prairie | Y |
| Raphanus | *sativus L.* | | radish | N |
| Ratibida | *columnifera (Nutt.) Woot. & Standl.* | | cone flower, columnar | Y |
| Ratibida | *pinnata (Vent.) Barnh.* | | coneflower, gray headed | Y |
| Rhamnus | *alnifolia L. Her.* | | buckthorn, alderleaf | Y |
| Rhamnus | *cathartica L.* | | buckthorn, common | N |
| Rheum | *rhaponticum L.* | | rhubarb | N |
| Rhus | *glabra L.* | | sumac, smooth | Y |
| Rhus | *hirta (L.) Sudworth* | | sumac, staghorn | Y |
| Ribes | *alpinum L.* | | currant, alpine | Y |
| Ribes | *americanum P.Mill.* | | currant, American black | Y |
| Ribes | *hirtellum Michx.* | | gooseberry, smooth | Y |
| Ribes | *missouriense Nutt.* | | gooseberry, Missouri | Y |
| Ribes | *triste Pallas* | | currant, swamp red | Y |
| Robinia | *pseudoacacia L.* | | locust, black | Y |
| Rorippa | *nasturtium-aquaticum (L.) Hayek* | | cress, water- | N |
| Rorippa | *palustris (L.) Bess* | fernaldiana or hispida | cress, common yellow | Y |
| Rosa | *acicularis Lindl.* | | rose, bristly | Y |
| Rosa | *arkansana Porter* | suffulta (Greene) Cockerell | rose, dwarf prairie | Y |
| Rosa | *blanda Ait.* | | rose, smooth | Y |
| Rosa | *rugosa Thunb.* | | rose, Japanese | N |
| Rubus | *allegheniensis Porter* | | blackberry | Y |
| Rubus | *flagellaris Willd* | | dewberry, prickly | Y |
| Rubus | *idaeus L.* | (strigosus (Michx.) Focke) | raspberry, wild red | Y |
| Rubus | *occidentalis L.* | | raspberry, black | Y |
| Rubus | *pensilvanicus Poir.* | | blackberry, Pennsylva-nia | Y |
| Rubus | *pubescens Raf.* | | blackberry, dwarf | Y |
| Rubus | *vermontanus Blanch.* | | blackberry, Vermont | Y |
| Rudbeckia | *hirta L.* | pulcherrima Farw. | black-eyed susan | Y |
| Rudbeckia | *laciniata L.* | hortensis | coneflower, cutleaf | Y |
| Rumex | *acetosella L.* | | sorrel, common or sheep | N |
| Rumex | *altissimus Wood* | | dock, pale | Y |
| Rumex | *crispus L.* | | dock, curled | N |
| Rumex | *orbiculatus Gray* | | dock, water | Y |
| Rumex | *patientia L.* | | dock, patience | N |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Rumex | *salicifolius Weinm.* | mexicanus (Meisn.) C.L.Hitchc. | dock, willow | Y |
| Sagittaria | *latifolia Willd.* | | arrowhead, broad-leaved | Y |
| Sagittaria | *rigida Pursh* | | arrowhead, sessile-fruited | Y |
| Salix | *alba L.* | vitellina (L.) Stokes | willow, white | N |
| Salix | *amygdaloides Anderss.* | | willow, peach-leaf | Y |
| Salix | *bebbiana Sarg.* | | willow, bebb | Y |
| Salix | *discolor Muhl.* | | willow, pussy | Y |
| Salix | *exigua Nutt.* | | willow, sandbar | Y |
| Salix | *humilis Marsh.* | | willow, tall prairie | Y |
| Salix | *lucida Muhl.* | | willow, shining | N |
| Salix | *nigra Marsh.* | | willow, black | Y |
| Salix | *pedicellaris Pursh.* | (hypoglauca Fern.) | willow, bog | Y |
| Salix | *petiolaris Sm.* | | willow, meadow | Y |
| Salix | *pyrifolia Anderss.* | | willow, balsam | Y |
| Salsola | *kali L.* | tragus or tenuifolia | saltwort | Y |
| Salvia | *reflexa Hornem.* | | sage, lance-leaved | Y |
| Salvia | *splendens Sellow ex Roemer& J.A.Schultes* | | sage, scarlet | Y |
| Sambucus | *canadensis L.* | | elderberry, common | Y |
| Sambucus | *racemosa L.* | pubens (Michx.)Koehne | elder, red-berried | Y |
| Sanguinaria | *canadensis L.* | | bloodroot | Y |
| Sanicula | *marilandica L.* | | snakeroot, black | Y |
| Saponaria | *officinalis L.* | | bouncing bet | N |
| Saxifraga | *pensylvanica L.* | | eastern swamp saxifrage | Y |
| Schizachne | *purpurascens (Torr.) Swallen* | | melic, false | Y |
| Schizachyrium | *scoparium (Michx.) Nash* | | bluestem, little | Y |
| Scirpus | *acutus Muhl. ex Bigelow* | | bulrush, hardstem | Y |
| Scirpus | *atrocinctus Fern.* | | grass, black-bracted wool | Y |
| Scirpus | *cyperinus (L.) Kunth* | | woolgrass | Y |
| Scirpus | *fluviatilis (Torr.) Gray* | | bulrush, river | Y |
| Scirpus | *tabernaemontani K.C.Gmel.* | | bulrush, softstem | Y |
| Scrophularia | *lanceolata Pursh* | | figwort | Y |
| Scutellaria | *galerieulata L.* | | skullcap, marsh | Y |
| Scutellaria | *lateriflora L.* | | skullcap, mad-dog | Y |
| Scutellaria | *parvula Michx.* | leonardii (Epling) Fern. | skullcap, smaller | Y |
| Secale | *cereale L.* | | rye | N |
| Sedum | *spectabile Boreau* | | sedum, "autumn joy" | N |
| Sedum | *telephium L.* | | orpine, live-forever | N |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Selaginella | *rupestris (L.) Spreng* | | spikemoss, rock | Y |
| Senecio | *pauperculus Michx* | | ragwort, balsam | Y |
| Senecio | *plattensis Nutt.* | | prairie ragwort | Y |
| Setaria | *faberi Herrm.* | | foxtail, Faber's | N |
| Setaria | *glauca (L.) Beauv.* | | foxtail, yellow | N |
| Setaria | *viridis (L.) Beauv.* | | grass, green bristle- | N |
| Silene | *antirrhina L.* | | catchfly, sleepy | Y |
| Silene | *armeria L.* | | catchfly, sweet-william | N |
| Silene | *dichotoma Ehrh.* | | catchfly, forking | N |
| Silene | *latifolia Poir.* | | campion, starry | N |
| Silene | *vulgaris (Moench) Garcke* | | bladder-campion | N |
| Silphium | *trifoliatum L.* | | rosinweed, whorled | Y |
| Sinapis | *arvensis L.* | | mustard, wild (charlock) | N |
| Sisymbrium | *altissimum L.* | | mustard, tumble or tall | N |
| Sisymbrium | *officinale (L.) Scop.* | | mustard, hedge | N |
| Sisyrinchium | *campestre Bickn.* | (pinnatifida (Stokes)L.C.Wheel | grass, prairie blue-eyed | Y |
| Sium | *suave Walt.* | | water parsnip | Y |
| Smilax | *ecirrata (Engelm ex Kunth) S.Watts.* | | carrion-flower, upright | Y |
| Smilax | *herbacea L.* | lasioneuron (Hook) A.D.C. | carrion-flower | Y |
| Solanum | *americanum P.Mill* | | ground cherry night-shade (blayberry) | Y |
| Solanum | *dulcamara L.* | | nightshade, bittersweet | N |
| Solidago | *caesia L.* | | goldenrod, blue-stemmed | Y |
| Solidago | *canadensis L.* | scabra Torr. & Gray | goldenrod, Canada | Y |
| Solidago | *flexicaulis L.* | | goldenrod, zigzag or board-leaved | Y |
| Solidago | *gigantea Ait.* | gigantea or leiophylla | goldenrod, late | Y |
| Solidago | *hispida Muhl. ex Willd.* | | goldenrod, hairy | Y |
| Solidago | *missouriensis Nutt.* | fasciculata Holz. | goldenrod, Missouri | Y |
| Solidago | *nemoralis Ait.* | longipetiolata or decemflora | goldenrod, gray | Y |
| Solidago | *ptarmicoides (Nees) Boivin* | | aster, upland white | Y |
| Solidago | *ridiga L.* | | goldenrod, hard-leaved | Y |
| Solidago | *speciosa Nutt.* | rigidiuscula or angustata | goldenrod, showy | Y |
| Solidago | *ulmifolia Muhl. ex Willd.* | | goldenrod, elm-leaf | Y |
| Sonchus | *arvensis L.* | (glabrescens G.G.&W.) | thistle, field sow | N |
| Sorghastrum | *nutans L.* | | grass, Indian | Y |
| Sparganium | *erectum L.* | (acaule (Beby) Fern.) | bur-reed, short green-fruited | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Sparganium | *eurycarpum Engelm. ex Gray* | | bur-reed, giant | Y |
| Spartina | *pectinata Link* | | grass, prairie cord- | Y |
| Sphagnum | *girgensohnii* | | moss, sphagnum | Y |
| Sphenopholis | *intermedia (Rydb.) Rydb.* | | grass, slender wedge- | Y |
| Spiraea | *alba DuRoi* | rosea | spirea, narrowleaf (meadow sweet) | Y |
| Spiraea | *tomentosa L.* | rosea (Raf.) Fern. | spirea, steeple bush | Y |
| Spiraea | *vanhouttei (Briot.) Carr.* | cantoniensis x trilobata | spiraea, VanHoutte's | N |
| Spiranthes | *cernua (L.) L.C.Rich* | | nodding ladies' tresses | Y |
| Spirodela | *polyrrhiza (L.) Schleid* | | duckweed, greater | Y |
| Sporobolus | *cryptandrus (Torr.) Gray* | | drop-seed, sand | Y |
| Sporobolus | *vaginiflorus (Torr. ex Gray) Wood* | | grass, poverty | Y |
| Stachys | *hyssopifolia Michx.* | ambigua Gray | hedge nettle, hyssop | Y |
| Stachys | *palustris L.* | | woundwort | Y |
| Stachys | *tenuifolia Willd.* | tenuifolia or platyphylla | hedge nettle, Smooth | Y |
| Stellaria | *longifolia Muhl. ex Willd.* | (atrata J.W.Moore) | chickweed, long-leaved | Y |
| Stellaria | *media (L.) Vill.* | | chickweed, common | N |
| Stipa | spartea Trin. | | grass, needle or porcu-pine | Y |
| Strophostyles | *leiosperma (Torr.&Gray) Piper* | | bean, small flowered woolly | Y |
| Symphoricarpos | *albus (L.) Blake* | | snowberry | Y |
| Symphoricarpos | *occidentalis Hook* | | wolfberry or buckbrush | Y |
| Syringa | *vulgaris L.* | | lilac, common | N |
| Tamarix | *gallica L.* | | tamarisk | N |
| Tanacetum | *parthenium (L.) Schultz-Bip.* | | Feverfew | N |
| Tanacetum | *vulgare L.* | | tansy, common | N |
| Taraxacum | *laevigatum (Willd.) DC* | | dandelion, red-seeded | N |
| Taraxacum | *officinale G.H.Weber ex Wig-gers* | | dandelion, common | N |
| Thalictrum | *dasycarpum Fisch. & Ave-Lall.* | | meadow rue, purple | Y |
| Thalictrum | *dioicum L.* | | meadow rue, early | Y |
| Thelesperma | *megapotamicum (Spreng.) Kunt* | | beggar-tick | N |
| Thelypteris | *palustris Schott* | pubescens (Lawson) Fern. | fern, marsh | Y |
| Thuja | *occidentalis L.* | | cedar, Northern white | Y |
| Tilia | *americana L.* | | basswood, American | Y |
| Toxicodendron | *rydbergii (Small ex Rydb.) Greene* | rydbergii (Sm. &Rydb.) Rehd. | poison ivy | Y |
| Toxicodendron | *vernix (L.) Kuntze* | | sumac, poison | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Tradescantia | *occidentalis (Britt.) Smyth* | | spiderwort, prairie | Y |
| Tragopogon | *dubius Scop.* | | goatsbeard, fistulous | N |
| Triadenum | *fraseri (Spach) Gleason* | | St. John's-wort, marsh | Y |
| Triadenum | *virginicum (L.) Raf.* | (fraseri (Spach) Fern.) | St. John's-wort, marsh | Y |
| Trientalis | *borealis Raf.* | | Starflower | Y |
| Trifolium | *arvense L.* | | clover, rabbit-foot | N |
| Trifolium | *campestre Schreb.* | | clover, pinnate hop | N |
| Trifolium | *hybridum L.* | | clover, alsike | N |
| Trifolium | *pratense L.* | | clover, red | N |
| Trifolium | *repens L.* | | clover, white | N |
| Trillium | *cernuum L.* | (macranthum Eames & Wieg) | trillium, nodding | Y |
| Triticum | *aestivum L.* | | wheat | N |
| Typha | *angustifolia L.* | | cat-tail, narrow-leaved | Y |
| Typha | *glauca Godr.* | langustifolia x domingensis x | cat-tail, broad-leaved | Y |
| Typha | *latifolia L.* | | cat-tail, common | Y |
| Ulmus | *americana L.* | | elm, American | Y |
| Ulmus | *pumila L.* | | elm, Siberian | N |
| Urtica | *dioica L.* | | nettle, stinging | N |
| Utricularia | *intermedia Hayne* | | bladderwort, flat-leaved | Y |
| Utricularia | *macrorhiza LeConte* | | bladderwort, greater | Y |
| Uvularia | *sessilifolia L.* | | bellwort, large-flowered | Y |
| Vaccinium | *angustifolium Ait.* | | blueberry, late low | Y |
| Vaccinium | *macrocarpon Ait.* | | Cranberry | Y |
| Verbascum | *thapsus L.* | | mullein, common | N |
| Verbena | *bracteata Lag. & Rodr.* | | vervain, blue | Y |
| Verbena | *hastata L.* | | vervain, blue | Y |
| Verbena | *stricta Vent.* | | vervain, hoary | Y |
| Verbena | *urticifolia L.* | | vervain, white | Y |
| Vernonia | *fasciculata Michx.* | | ironweed, western | Y |
| Veronica | *peregrina L.* | (xalipensis (H.B.K.) St. John | purslane speedwell | Y |
| Veronica | *scutellata L.* | | speedwell, marsh | N |
| Veronicastrum | *virginicum (L.) Farw.* | | Culver's-root | Y |
| Viburnum | *lentago L.* | | nannyberry | Y |
| Viburnum | *opulus L.* | americanum Ait. | highbush-cranberry | Y |
| Viburnum | *rafinesquianum J.A.Schultes* | | arrow-wood, shortstalk | Y |
| Vicia | *americana Muhl. ex Willd.* | | vetch, purple | Y |
| Vicia | *villosa Roth.* | | vetch, hairy | N |
| Viola | *blanda Willd.* | palustriformis Gray | violet, sweet white | Y |
| Viola | *canadensis L.* | rugulosa (Greene) C.L.Hithc. | violet, Canada | Y |

## Plants of Sherburne NWR (Continued)

| GENUS | SPECIES | VARIETY | COMMON | NATIVE |
|---|---|---|---|---|
| Viola | *conspersa Reichenb.* | | violet, dog | N |
| Viola | *macloskeyi Lloyd* | | violet, wild white | Y |
| Viola | *palmata L.* | | violet, wood or early blue | Y |
| Viola | *pedatifida G.Don* | | violet, prairie | Y |
| Viola | *pubescens Ait.* | | violet, downy yellow | Y |
| Viola | *sagittata Ait.* | | violet, arrow-leaved | Y |
| Viola | *sororia Willd.* | | violet, woolly blue | Y |
| Vulpia | *octoflora (Walt.) Rydb.* | | grass, six weeks fescue | Y |
| Viola | *tricolor L.* | | Johnny jump up | N |
| Vitis | *riparia Michx.* | | grape, frost | Y |
| Wolffia | *columbiana Karst.* | | wolffia, Columbia | Y |
| Zanthoxylum | *americanum P.Mill.* | | prickly-ash | Y |
| Zea | *mays L.* | | maize (Indian corn) | N |
| Zizania | *palustris L.* | interior Fassett | rice, broad-leaved wild | Y |
| Zizia | *aurea (L.) W.D.J.Koch* | | alexanders, golden | Y |
| Zizia | *aptera (Gray) Fern.* | | heart-leaved golden alexanders | Y |

# Appendix D: Compatibility Determinations

The following compatibility determinations were presented for public review in the Draft CCP/EA. copies of the signed documents are available at the Sherburne NWR Headquarters:

- Fishing
- Recreational picking of berries, fruits, nuts and mushrooms
- Hunting
- Trapping of furbearers
- Wildlife observation and photography (including the means of access)
- Firewood cutting/timber harvest

# Appendix E:  Compliance Requirements

# Appendix E / Compliance Requirements

*Rivers and Harbor Act (1899) (33 U.S.C. 403)*: Section 10 of this Act requires the authorization by the U.S. Army Corps of Engineers prior to any work in, on, over, or under a navigable water of the United States.

*Antiquities Act (1906)*: Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

*Migratory Bird Treaty Act (1918)*: Designates the protection of migratory birds as a Federal responsibility. This Act enables the setting of seasons, and other regulations including the closing of areas, Federal or non Federal, to the hunting of migratory birds.

*Migratory Bird Conservation Act (1929)*: Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

*Fish and Wildlife Coordination Act (1934),* as amended: Requires that the Fish and Wildlife Service and State fish and wildlife agencies be consulted whenever water is to be impounded, diverted or modified under a Federal permit or license. The Service and State agency recommend measures to prevent the loss of biological resources, or to mitigate or compensate for the damage. The project proponent must take biological resource values into account and adopt justifiable protection measures to obtain maximum overall project benefits. A 1958 amendment added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. It also authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

*Migratory Bird Hunting and Conservation Stamp Act (1934)*: Authorized the opening of part of a refuge to waterfowl hunting.

*Historic Sites, Buildings and Antiquities Act (1935)*, as amended: Declares it a national policy to preserve historic sites and objects of national significance, including those located on refuges. Provides procedures for designation, acquisition, administration, and protection of such sites.

*Refuge Revenue Sharing Act (1935)*, as amended: Requires revenue sharing provisions to all fee-title ownerships that are administered solely or primarily by the Secretary through the Service.

*Transfer of Certain Real Property for Wildlife Conservation Purposes Act (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 Interior if the land has particular value for migratory birds, or to a State agency for other wildlife conservation purposes.

Federal Records Act (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.

Fish and Wildlife Act (1956): Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

Refuge Recreation Act (1962): Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient funds are available to manage the uses.

Wilderness Act (1964), as amended: Directed the Secretary of 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.

Land and Water Conservation Fund Act (1965): Uses the receipts from the sale of surplus Federal land, outer continental shelf oil and gas sales, and other sources for land acquisition under several authorities.

National Wildlife Refuge System Administration Act (1966), as amended by the National Wildlife Refuge System Improvement Act (1997)16 U.S.C. 668dd668ee. (Refuge Administration Act): Defines the National Wildlife Refuge System and authorizes the Secretary to permit any use of a refuge provided such use is compatible with the major purposes for which the refuge was established. The Refuge Improvement Act 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, or environmental education and interpretation); establishes a formal process for determining compatibility; established the responsibilities of the Secretary of Interior for managing and protecting the 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.

National Historic Preservation Act (1966), as amended: Establishes as policy that the Federal Government is to provide leadership in the preservation of the nation's prehistoric and historic resources.

Architectural Barriers Act (1968): Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

National Environmental Policy Act (1969): Requires the disclosure of the environmental impacts of any major Federal action significantly affecting the quality of the human environment.

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

Endangered Species Act (1973): Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

Rehabilitation Act (1973): Requires programmatic accessibility in addition to physical accessibility for all facilities and programs funded by the Federal government to ensure that anybody can participate in any program.

Archaeological and Historic Preservation Act (1974): Directs the preservation of historic and archaeological data in Federal construction projects.

Clean Water Act (1977): Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

Surface Mining Control and Reclamation Act (1977) as amended (Public Law 95-87) (SMCRA): 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.

Executive Order 11988 (1977): Each Federal agency shall provide leadership and take action to reduce the risk of flood loss and minimize the impact of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 11990: Executive Order 11990 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): Directs the Service to send copies of the Environmental Assessment to State Planning Agencies for review.

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Fish and Wildlife Improvement Act (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 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.

Archaeological Resources Protection Act (1979), as amended: Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

Federal Farmland Protection Policy Act (1981), as amended: Minimizes the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

Emergency Wetlands Resources Act (1986): Promotes the conservation of migratory waterfowl and offsets or prevents the serious loss of wetlands by the acquisition of wetlands and other essential habitats.

Federal Noxious Weed Act (1990): Requires the use of integrated management systems to control or contain undesirable plant species, and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Native American Graves Protection and Repatriation Act (1990): Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

Americans With Disabilities Act (1992): Prohibits discrimination in public accommodations and services.

Executive Order 12898 (1994): Establishes environmental justice as a Federal government priority and directs all Federal agencies to make environmental justice part of their mission. Environmental justice calls for fair distribution of environmental hazards.

Executive Order 12996 Management and General Public Use of the National Wildlife Refuge System (1996): Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the 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.

National Wildlife Refuge System Improvement Act (1997): Considered the "Organic Act of the National Wildlife Refuge System. Defines the mission of the System, designates priority wildlife-dependent public uses, and calls for comprehensive refuge planning.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act (1998): Amends the Fish and Wildlife Act of 1956 to promote volunteer programs and community partnerships for the benefit of national wildlife refuges, and for other purposes.

National Trails System Act: Assigns responsibility to the Secretary of Interior and thus the Service to protect the historic and recreational values of congressionally designated National Historic Trail sites.

Treasury and General Government Appropriations Act of 2001 (Public Law 106-554): 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 (OMB) 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.

*Cultural Resources and Historic Preservation:* The National Wildlife Refuge System Improvement Act of 1997, Section 6, requires the Service to make a determination of compatibility of existing, new and changing uses of Refuge land; and Section 7 requires the Service to identify and describe the archaeological and cultural values of the refuge.

The National Historic Preservation Act (NHPA), Section 106, requires Federal agencies to consider impacts their undertakings could have on historic properties; 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.

The Archaeological Resources Protection Act of 1979 (ARPA) prohibits unauthorized disturbance of archeological resources on Federal and Indian land; and other matters. Section 10 requires establishing "a program to increase public awareness" of archeological resources. Section 14 requires plans to survey lands and a schedule for surveying lands with "the most scientifically valuable archaeological resources." This Act requires protection of all archeological 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 Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) imposes serious delays on a project when human remains or other cultural items are encountered in the absence of a plan.

The American Indian Religious Freedom Act (AIRFA) iterates the right of Native Americans to free exercise of traditional religions and use of sacred places.

EO 13007, Indian Sacred Sites (1996), directs Federal agencies to accommodate access to and ceremonial use, to avoid adverse effects and avoid blocking access, and to enter into early consultation.

# Appendix F: Refuge Operating Needs System (RONS)

# Appendix F. RONS and MMS Lists

The CCP directs an ambitious course for the future management of Sherburne National Wildlife Refuge. The following provides a brief description of the second-highest priority Refuge projects. The highest priority, or Tier 1, projects are described in Chapter 5 of the Comprehensive Conservation Plan. Each project description also includes the number of a corresponding strategy; linking it to the Goals/Objectives/Strategies section of Chapter 4.

Most of these projects are listed in the Refuge Operating Needs System (RONS); the Service's national database of unfunded operational activities. The RONS was established in 1990 as a planning, budgeting, and communication tool to enhance identification of funding and staffing needs for the National Wildlife Refuge System. RONS projects describe the need for new or expanded activities in order to implement plans, attain goals, or satisfy legal mandates. Data within RONS are used regularly in budget justifications presented to the Department of the Interior, the Office of Management and Budget, and Congress.

## Refuge Operating Needs System

| Project | Cost |
|---|---|
| Construction of Refuge visitor center | $3,009,000 |
| Develop environmental education curriculum | $60,000 |
| Increase Refuge law enforcement capabilities | $136,000 |
| Control of exotic, invasive plant species | $84,000 |
| Research prairie/ oak savanna restoration | $100,000 |
| Enhance public services | $134,000 |
| Restoring natural balance to prairie openings | $53,000 |
| Evaluate reptile and amphibian communities on the Complex | $51,000 |
| Cultural resources evaluation and plan | $40,000 |
| Acquire law enforcement equipment | $80,000 |
| Expand prescribed fire and wildfire suppression activities | $54,000 |
| Feasibility of reintroducing bison to Sherburne NWR | $32,000 |
| Ensure CCP Process involves and informs the public | $40,000 |
| Enhance the environmental education program | $112,000 |
| Impacts of prescribed burning on grassland birds | $33,000 |
| Improve visitor contact and office support | $114,000 |
| Native mussel and fish inventory | $78,000 |
| Impact of water management on invertebrates and vegetation | $57,000 |
| Water quality study of restored wetlands and river system | $77,000 |
| Impact of prescribed burning on insect populations | $31,000 |

## Maintenance Management System

The Maintenance Management System (MMS) is another database used by the Service to document needed equipment and construction projects. The MMS is structured around property items while RONS focuses on management activities. All large-scale (typically over $500,000) construction projects are housed in MMS. The following is a partial list of the projects proposed in the 2003 database.

| Project | Cost |
|---|---|
| Repair the Deteriorated Brand Trail | $25,000 |
| Replace High Mileage Chevrolet Compact Cargo Truck | $29,000 |
| Visitor Facilities - Centennial Legacy Project [d/cc] | $2,400,000 |
| Clark MLT-6 Forklift | $61,000 |
| Repair erosion on riverbank at Headquarters Building. | $0,000 |
| Clark 175A-M23 Scoop Loader, 4x4 | $40,000 |
| Reconstruct road base and resurface 8 mi of wildlife drive. | $725,000 |
| Chevrolet Cargo Truck | $25,000 |
| Replace worn-out John Deere 670A Motor Grader | $130,000 |
| Replace High Mileage Chevrolet Astro AWD Van | $29,000 |
| Tanker Truck, 6x6, 5Ton w/winch | $71,000 |
| Replace High Mileage Dodge Dakota Cargo Truck. | $30,000 |
| Replace worn-out no-till drill. | $16,000 |
| Replace High Mileage Dodge Ram 2500 Cargo Truck | $29,000 |
| Replace worn-out farm utility vehicle. | $11,000 |
| Replace High Mileage Chevrolet 3500 Crew Cab Truck | $0,000 |
| Replace Worn Out Birmingham Flatbed Trailer. | $48,000 |
| Replace LT900 Ford Dump Truck | $105,000 |
| Replace High Mileage Chevrolet K3500 Truck | $36,000 |
| John Deere 555A Tracked Loader | $91,000 |
| Ford F350 Maintenance Truck | $25,000 |
| John Deere JD302 Ag Tractor | $46,000 |
| Wajax- Pacific BB-4 Slip On Pumper | $15,000 |
| Alumitech 714 K Air Boat, 14' Aluminum, 260 hp | $24,000 |
| Forest Technology FWS 11 Weather Station, Auto Remote | $15,000 |
| John Deere 7700 Ag Tractor, 125 hp, w/cab | $71,000 |
| Wajax - Pacific BB-4 Slip On Pumper | $12,000 |
| Truax FLXII-812 Seed Drill, 8' no till, Trashplow | $18,000 |
| GMC Jeep 6D Stake Truck | $40,000 |
| Ford Aerostar Van | $22,000 |
| Ford F250 Cargo Truck | $25,000 |
| John Deere 650G Dozer, 90 hp | $111,000 |
| Chevrolet Cargo Truck | $25,000 |
| Standard Modern 11 x 20 Turning Lathe, Series 200 | $6,000 |
| Dodge Ram 1500 Cargo Truck | $25,000 |
| Ford F250 Cargo Truck | $28,000 |
| John Deere 1518 Rotary Mower | $11,000 |
| Dodge Dakota Cargo Truck, Extended Cab | $23,000 |
| Barko 885B Brushcutter, 215 HP, Enclosed Cab | $228,000 |
| John Deere 5410 Ag Tractor, 77hp, w/cab | $36,000 |
| Construct Pole Barn for Equipment Storage at Maintenance Site | $152,000 |
| Construct 5 Bay Vehicle Garage at Office Site. | $76,000 |
| Reconstruct Gravel Base and Surfacing on Brande Road. | $30,000 |
| Visitor Facilities - Phase II Office Component | $2,500,000 |
| CR4 Information Kiosk and Mahnomen Trailhead Kiosk | $38,000 |

| Project | Cost |
|---|---|
| Design and Construct a Seed Cleaning Facility | $0,000 |
| Restoration of Rice Lake | $0,000 |
| Install water control structure on Deer Pool | $27,000 |
| Restore the Hydrologic Flow to Areas on Sherburne NWR | $71,000 |
| Wetland Trail with Observation Deck and Floating Study Platform | $41,000 |
| Accessible Fishing Pier | $97,000 |
| Complete Wildlife Discovery Station | $103,000 |
| Mahnomen Trail interpretive signs, kiosk and spotting scope | $58,000 |
| Increase oak savanna education | $0,000 |
| Mahnomen Trail Boardwalk and Wildlife Observation Blind | $130,000 |
| Develop interpretive, regulatory, and directional signing | $112,000 |
| John Deere 450D Tracked Dozer | $100,000 |
| 2002 IHC Truck Tractor, 13 speed, diesel | $80,000 |
| Kalyn 12 Ton Flatbed Trailer. | $25,000 |
| Ford F-450 4x4 Tilt Bed | $40,000 |
| Dropneck Flatbed Trailer | $40,000 |
| Tractor, All Terrain, Full Tracked, w/400 Gal Fire Fighting Unit. | $130,000 |
| Ford Expedition Carryall | $27,000 |

# Appendix G:  Mailing List

# Mailing List

*Elected Federal Officials*

U.S. Sen. Mark Dayton
U.S. Sen. Norman Coleman
U.S. Rep. Mark Kennedy

*Elected State Officials*

Governor Tim Pawlenty
State Rep. Mark Olson
State Sen. Betsy Wergin

*Federal Agencies*

U.S. Geological Survey, Fort Collins Science Center, Fort Collins, Colorado
U.S. Geological Survey, Upper Midwest Science Center, LaCrosse, Wisconsin
U.S. Geological Survey, Northern Prairie Wildlife Research Station, Jamestown, North Dakota
U.S. Geological Survey, Cooperative Research Units, University of Minnesota, St. Paul, Minnesota
U.S. Fish and Wildlife Service, Ecological Services Office is Twin Cities FO, Bloomington, Minnesota
U.S. Fish and Wildlife Service Historic Preservation Officer

*Tribal Representatives*

Bad River Tribal Office
Bay Mills Indian Community
Fond du Lac Chippewa Tribe
Keweenaw Bay Indian Community
Lac Courte Oreilles Chippewa Tribe
Lac du Flambeau Chippewa Tribe
Lac Vieux Desert Chippewa Tribe
Mille Lacs Chippewa Tribe
Mole Lake Tribal Office
Red Cliff Tribal Office
St. Croix Chippewa Tribe

*State Agencies*

Minnesota Department of Natural Resources
University of Minnesota, Extension Services
State of Minnesota Historic Preservation Officer
Office of the State Archeologist
Indian Affairs Council
Advisory Council on Historic Preservation
Minnesota Archeological Society
Preservation Alliance of Minnesota

*City/County Governments*

Sherburne County
Sherburne County Historical Society

City of Zimmerman, Minnesota
City of Princeton, Minnesota
City of Big Lake, Minnesota
City of Becker, Minnesota
City of Elk River, Minnesota

*Public Libraries*

Zimmerman Public Library
Princeton Public Library
Elk River Public Library
Big Lake Public Library
Becker Public Library

*Organizations*

Sierra Club, Washington, D.C.
Ducks Unlimited
Wildlife Management Institute
American Rivers, Washington, D.C.
The Clean Water Fund, National Office, Washington, D.C.
Defenders of Wildlife, Washington, D.C.
National Wildlife Refuge Association, Washington, D.C.
The National Resources Council of America, Washington, D.C.
National Audubon Society, Washington, D.C.
The Nature Conservancy, Midwest Region and Central Minnesota Office
Minnesota Waterfowl Association
Audubon Society, Central Minnesota Chapter
Minnesota Deer Hunters Association
Pheasants Forever
Wild Turkey Federation
American Fisheries Society
The Wildlife Society – Minnesota Chapter

*Individuals*

Individuals who participated in open house sessions and technical working groups and meetings, or who requested to be on the Comprehensive Conservation Plan mailing list.

# Appendix H:  List of Preparers

# Appendix H: List of Preparers

Jan Eldridge, Ph.D.
Gary Muehlenhardt
Charles Blair
Jeanne Holler
Brad Ehlers
Gary Swanson
H. John Dobrovolny
Jane Hodgins
John Schomaker, Ph. D.
Dean Granholm
Gabriel DeAlessio
Onnie Byers, Ph. D.
Ulie Seal, Ph. D.
Moriya Rufer
Kevin Kenow, Ph.D.
Jason Rohweder
Murray Laubnan, Ph. D.
Rick Schroeder Ph. D.
David Hamilton Ph. D.
David Fulton Ph. D.

# Appendix I: Resource Conservation Priority Species

# Regional Conservation Species

In September 2001, in response to the Government Performance and Results Act (GPRA), Region 3 of the U.S. Fish & Wildlife Service published a document entitled Fish and Wildlife Resource Conservation Priorities, Region 3 (RCPs). The RCP document contains 182 species considered to be in the greatest need of attention under the Service's full span of authorities. The strategies identified in the document will contribute to the conservation, protection, and recovery of migratory birds, threatened and endangered species, and interjurisdictional fish as well as the habitats on which they depend, thus fulfilling the Service's mission. Benefits of identifying RCPs include:

Assisting employees in prioritizing workloads and opportunities.
Focusing application of the Service's many fish and wildlife conservation tools (authorities, programs, expertise, etc.)
Identifying research priorities and training needs.
Preparation of Refuge comprehensive conservation plans and ecosystem plans.
Developing budgets.

Consideration of RCPs in day-to-day activities will lead to protection, enhancement, and restoration of the most important Regional resources through the efficient and wise application of the Service's people and funding.

The following table presents the RCPs for the ecoregion within which Sherburne NWR lies and identifies the broad habitats associated with each species.

## Resource Conservation Priorities, Region 3 U.S. Fish & Wildlife Service

| Mississippi Headwaters/ Tallgrass Prairie Ecosystem RCPs | Forests | Grasslands | Wet meadow | Lacustrine | Reservoirs | Near shore | Palustrine | Riverine | Swamp | Barrens | Beaches | Dunes | Islands | Coniferous | Deciduous | Early successional | Mid successional | Mature bottom | Upland | Mature upland | Shrub/scrub | Shrublands |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gray Wolf | | | | | | | | | | | | | | | | | | | | | | |
| Common Loon | | | | X | | | | | | | | | | | | | | | | | | |
| Double-crested Cormorant | | | | | | | | X | | X | | | X | | | | | | | | | |
| American Bittern | | X | | | | | X | | | | | | | | | | | | | | | |
| Least Bittern | | | | | | | X | | | | | | | | | | | | | | | |
| Snow Goose | | | | X | | | X | | | | | | | | | | | | | | | |
| Canada Goose (Giants) | | | | X | | | X | | | | | | | | | | | | | | | |
| Canada Goose (urban giants) | | | | X | | | X | | | | | | | | | | | | | | | |
| Canada Goose (EPP) | | | | X | | | X | | | | | | | | | | | | | | | |
| Trumpeter Swan | | | | X | | | X | X | | | | | | | | | | | | | | |
| Wood Duck | X | | | | | | X | X | | | | | | | | | | X | | | | |
| Mallard | X | X | | | | | X | | | | | | | | | | | X | | | | |
| Northern Pintail | | X | | | | | X | | | | | | | | | | | | | | | |
| Blue-winged Teal | | X | | | | | X | | | | | | | | | | | | | | | |
| Canvasback | | | | X | | | X | X | | | | | | | | | | | | | | |
| Lesser Scaup | | | | X | | | X | X | | | | | | | | | | | | | | |
| Bald Eagle | X | | | X | | | | X | | | | | | | | | | | | | | |
| Peregrine Falcon | X | X | | | | | X | X | X | X | X | | X | | | | | | | | | |
| Northern Goshawk | X | | | | | | | | | | | | | | | | | | | X | | |
| Red-shouldered Hawk | X | | | | | | | | | | | | | | | | | X | | X | | |
| Northern Harrier | | X | | | | | X | | | | | | | | | | | | | | | |

## Resource Conservation Priorities, Region 3 U.S. Fish & Wildlife Service (Continued)

| Mississippi Headwaters/ Tallgrass Prairie Ecosystem RCPs | Forests | Grasslands | Wet meadow | Lacustrine | Reservoirs | Near shore | Palustrine | Riverine | Swamp | Barrens | Beaches | Dunes | Islands | Coniferous | Deciduous | Early successional | Mid successional | Mature bottom | Upland | Mature upland | Shrub/scrub | Shrublands |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Short-eared Owl | | X | | | | | | | | | | | | | | | | | | | | |
| Yellow Rail | | | X | | | | X | | | | | | | | | | | | | | | |
| Upland Sandpiper | | X | | | | | | | | | | | | | | | | | | | | |
| American Woodcock | X | | X | | | | X | | | | | | | | | X | | | | | X | |
| Common Tern (Great Lakes) | | | | X | | | | | | X | X | | X | | | | | | | | | |
| Black tern | | | | X | | | X | | | | | | | | | | | | | | | |
| Loggerhead Shrike | | X | | | | | | | | | | | | | | | | | | | | X |
| Sedge Wren | | | X | | | | X | | | | | | | | | | | | | | | |
| Wood Thrush | X | | | | | | | | | | | | | | | | | | X | | | |
| Veery | X | | | | | | | | | | | | | | | | X | | | | | |
| Golden-winged Warbler | X | | | | | | | | | | | | | | | X | | | | | | X |
| Chestnut-sided Warbler | X | | | | | | | | | | | | | | | X | | | | | | X |
| Bobolink | | X | | | | | | | | | | | | | | | | | | | | |
| Eastern Meadowlark | | X | | | | | | | | | | | | | | | | | | | | |
| Red-headed Woodpecker | X | | | | | | | | | | | | | | X | | | | | | | |
| Northern Flicker | X | | | | | | | | | | | | | | X | | | | | | | |
| Olive-sided Flycatcher | X | | | | | | | | | | | | | X | | | | | | | | |
| Dickcissel | | X | | | | | | | | | | | | | | | | | | | | |
| Field Sparrow | | X | | | | | | | | | | | | | | | | | | | | X |

## Resource Conservation Priorities, Region 3 U.S. Fish & Wildlife Service (Continued)

| Mississippi Headwaters/ Tallgrass Prairie Ecosystem RCPs | Forests | Grasslands | Wet meadow | Lacustrine | Reservoirs | Near shore | Palustrine | Riverine | Swamp | Barrens | Beaches | Dunes | Islands | Coniferous | Deciduous | Early successional | Mid successional | Mature bottom | Upland | Mature upland | Shrub/scrub | Shrublands |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Grasshopper Sparrow | | X | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| Brook trout (inland pop.) | | | | | | | | X | | | | | | | | | | | | | | |
| Lake sturgeon (inland pop.) | | | | | | | | X | | | | | | | | | | | | | | |
| Shovelnose sturgeon | | | | | | | | X | | | | | | | | | | | | | | |
| Walleye (1836 Ceded Territory) | | | | X | | X | | X | | | | | | | | | | | | | | |
| Muskellunge (1836) | | | | X | | | | X | | | | | | | | | | | | | | |
| Blue sucker | | | | | | | | X | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| Hellbender | | | | | | | | X | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| Black sandshell | | | | | | | | X | | | | | | | | | | | | | | |
| Elktoe | | | | | | | | X | | | | | | | | | | | | | | |
| Mapleleaf | | | | X | X | | | X | | | | | | | | | | | | | | |
| Monkeyface | | | | | | | | X | | | | | | | | | | | | | | |
| Round pigtoe | | | | | | | | X | | | | | | | | | | | | | | |
| Threeridge | | | | | | | | X | | | | | | | | | | | | | | |
| Winged mapleleaf | | | | | | | | X | | | | | | | | | | | | | | |
| Zebra mussel | | | | X | | | | X | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| Rusty crayfish | | | | X | | | | X | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |

## Resource Conservation Priorities, Region 3 U.S. Fish & Wildlife Service (Continued)

| Mississippi Headwaters/ Tallgrass Prairie Ecosystem RCPs | Forests | Grasslands | Wet meadow | Lacustrine | Reservoirs | Near shore | Palustrine | Riverine | Swamp | Barrens | Beaches | Dunes | Islands | Coniferous | Deciduous | Early successional | Mid successional | Mature bottom | Upland | Mature upland | Shrub/scrub | Shrublands |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Karner blue butterfly | X | | | | | | | | | X | | X | | | X | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| Prairie bush-clover | | X | | | | | | | | | | | | | | | | | | | | |
| Western prairie fringed orchid | | | | | | | X | | | | | | | | | | | | | | | |

# Appendix J: References

# Appendix J: References

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# Appendix K: Response to Comments on the Draft CCP

# Appendix K: Response to Comments on the Draft CCP

The following is a summary of the comments received on the Draft CCP and how the issues are addressed in the final plan.

**1. One organization opposes the expansion of hunting on the Refuge.**

Hunting is one of the six wildlife-dependent public uses of national wildlife refuges specifically encouraged by the National Wildlife Refuge System Improvement Act of 1997. Whenever a particular type of hunting is compatible with the Refuge's purposes, goals and objectives, and can be conducted in a sustainable manner, it may be permitted. Wildlife populations are monitored, and where a population is below target levels, hunting is suspended or reduced until the population recovers.

**2. One organization contends that trapping of furbearers poses a hazard to threatened and endangered species and that certain trapping methods are inhumane and thus inappropriate for facilities protection.**

Limited trapping is conducted at Sherburne NWR to control predators of ground-nesting birds; i.e., mink and raccoon. In addition, trapping is used to control the number of furbearers that damage Refuge infrastructure, namely muskrat and beaver. The trapping by several permittees is on a sustainable, relatively small scale. In addition, trapping is restricted to "conibear" type killing traps and water sets using leg-hold traps that incorporate drowning locks and with sufficient water depth to ensure rapid submergence and drowning of an animal. There are several additional special conditions within the trapping program that avoid potential negative impacts on non-target animals, including threatened and endangered species. A draft compatibility determination on trapping of furbearers, containing more detail, was published as part of Appendix D in the Draft CCP.

**3. One organization asserts that the Draft CCP for Sherburne does not meet the requirements of the National Wildlife Refuge System Improvement Act of 1997 because insufficient investigation of biological integrity, diversity and environmental health were undertaken prior to plan preparation. They state that rigorous biological analyses need to be conducted of wildlife populations to ensure that there is a surplus, before making any compatibility determinations about the killing of wildlife.**

The Draft CCP listed a number of wildlife surveys and censuses that are conducted at Sherburne NWR including those for deer, waterfowl, marsh birds, and furbearers. These studies, in sum, provide an adequate basis for making informed decisions on the compatibility of hunting and trapping. In addition, the year-to-year trapping records themselves, and long-term trends in these numbers, furnish valuable information that can be used in opening or closing seasons. Recognizing that it does not have limitless budgetary and personnel resources to conduct ideal surveys that would yield perfect information on wildlife population sizes, the Refuge and Service use adaptive resource management, several features of which are monitoring, feedback, flexibility, and making adjustments in midcourse whenever the data indicate the need for change.

**4. One commenter expressed concerns about the amount of time and money that may be dedicated to off-site programs. Specifically, the commenter believes that vital Refuge resources may be used during times of reduced budgets and staffing.**

The preferred management alternative, Alternative 4, calls for a modest expansion of the existing private lands program and new contacts with local governments, land developers and non-government organizations to encourage habitat conservation on lands surrounding the Refuge. The Refuge does not intend to divert staff and financial resources from on-site programs. However, habitat corridors and buffer areas around Sherburne NWR will complement the needs of many wildlife species and the conservation efforts occurring on-Refuge.

**5. One individual suggested some sort of record or memorial for the landowners who sold their land to establish the Refuge. Specifically, a public display of photographs of original farms was offered as an idea.**

The cultural history of the land and its inhabitants is an important part of Sherburne NWR's identity. The CCP outlines several new cultural resource strategies including development of an oral cultural history to preserve the "community memory" about the area prior to Refuge establishment. We also plan to incorporate cultural history messages into programs, exhibits and other media. Historical photographs and narratives will certainly be a vital part of this endeavor.

**6. One individual does not want to see an increase in hunting on the Refuge.**

Comment acknowledged. Please see previous response on the appropriateness of hunting on the Refuge. A spring Wild Turkey hunt for hunters with disabilities in the only new hunting opportunity proposed in the CCP.

**7. The Sherburne County Board of Commissioners suggested that the CCP should "identify, support, and place emphasis on the need for regional trail systems and to plan and collaborate with local units of government on the development of regional trails that link to, travel along side of, or perhaps travel through the Sherburne National Wildlife Refuge."**

Wildlife observation and photography are priority recreational uses of national wildlife refuges and properly placed trails can provide access for these activities.

The Refuge currently offers a 7.3-mile wildlife drive (auto tour and bicycle route) and 9 miles of hiking trails. The draft CCP identifies the need for some new interior trails in connection with the proposed visitor center.

The Service would certainly be interested in discussing proposed trails that would connect to the Refuge. However, some uses allowed on public trail systems, such as snowmobiling and horseback riding, are not compatible with the primary purpose of Sherburne NWR as a national wildlife refuge. The potential for filling wetlands and fragmenting wildlife habitat are additional concerns. Limited funding for construction and maintenance also play a part in trail decisions.

Based on this comment, we have added a trails coordination strategy to Objective 5.3 in Chapter 4.

**8. One national organization and several individuals commended the Refuge for the strong ecological emphasis placed on future habitat management.**

Comment acknowledged. The Service appreciates these statements of support for its comprehensive efforts to restore native biodiversity and vegetative communities on the Refuge.

**9. The Sherburne County Planning & Zoning Administration asked that staff address the prevalence of oak wilt disease on the Refuge and the potential for control measures.**

Oak wilt disease has been detected on the Sherburne NWR, throughout Sherburne County and central Minnesota. Many silviculturists believe that the disease is an endemic (native) pathogen that has long been a part of oak forests in the Midwest. The disease has likely served as a control measure for oak stands that become too dense or monotypic. The Refuge has not actively used any control measures for oak wilt infestations occurring in the interior of the Refuge. We believe that the disease is a natural part of the ecosystem and the historic disturbance regime of oak savanna.

However, the Refuge has actively participated in the control of oak wilt when it has been shown to be a threat to neighboring landowners and will continue to do so. Nonetheless, without a comprehensive county-wide strategy for managing oak wilt, control measures performed on the Refuge will be ineffective in stopping the spread of this disease on private and other public lands.

**10. One individual expressed concern over habitat manipulations such as the flooding and cutting of trees and prescribed fire. Specifically, the comments expressed a desire for a "natural" landscape by letting all trees grow and for fires to occur naturally.**

Comments acknowledged. The overarching mission for Sherburne NWR and other lands within the National Wildlife Refuge System is the conservation of wildlife. This requires active manipulation of the land to benefit wildlife. It is the goal at Sherburne NWR to restore the historic natural habitats and their associated wildlife. To achieve this, wetland and fire management actions are applied. Habitats in transition to their final state, such as large burned areas and newly flooded wetlands, are unsightly to some visitors and may appear unnatural. However, these actions, designed to mimic natural processes, will reap long term benefits to wildlife and their habitats.

**11. The Minnesota State Historic Preservation Office (SHPO) commended the Service on the strategy to complete a Cultural Resources Management Plan, or survey plan, as a step-down plan to the CCP and suggests stating a target date for initiating the survey.**

The Service appreciates this endorsement from a partnering State agency. We intend to initiate a management plan within 3 years of CCP approval. The target date of 2008 has been added to Table 13 in Chapter 5; a listing of step-down management plans. Toward this end, a baseline inventory of cultural resources on the Refuge was completed in 1994 and a summary of archaeological excavations was completed in 1997. Additionally, cultural resource surveys are completed whenever work is proposed on the Refuge that has the potential to impact archaeological sites.

**12. The Minnesota SHPO encouraged the Service to evaluate the old schoolhouse near the Refuge headquarters to see whether it meets National Register of Historic Places criteria and, if it does, include its cultural value in any discussion of future reprogramming of maintenance and/or usage of the building.**

Comment acknowledged. An evaluation of the eligibility of the schoolhouse for the National Register of Historic Places was conducted in 1994 by BRW, Inc. in conjuction with a Phase I and Phase II Archaeological Survey for the realignment of CSAH 9. This report deemed that the schoolhouse was not eligible for the following reasons: "1) the structure has been somewhat modified by additions and renovations, 2) no events or persons of national importance appear to be connected to the building, and 3) there are nearby examples of rural turn of the century school houses which would better illustrate and illuminate that slice of the American past.