# Seney

*National Wildlife Refuge*

# Comprehensive Conservation Plan Approval

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*National Wildlife Refuge*

# Comprehensive Conservation Plan

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# Chapter 1: Introduction and Background

## Introduction

The wild land that today is the Seney National Wildlife Refuge (Seney NWR) has not always appeared so wild. This is a land that was once heavily logged, burned, ditched, drained, and cultivated. Despite repeated attempts, the soils and harsh conditions of this country would not provide a hospitable environment for sustained settlement and agriculture. So, nature claimed it once again. What was viewed as a loss by early 20th century entrepreneurs became a huge gain for the wildlife, natural resources, and the people of Michigan's Upper Peninsula.

Seney NWR is located in the east-central portion of Michigan's Upper Peninsula, halfway between Lake Superior and Lake Michigan (Figure 1). The Refuge encompasses 95,238 acres; the Seney Wilderness Area, which contains the Strangmoor Bog National Natural Landmark, comprises 25,150 acres, or 26 percent of the Refuge. Located in northeastern Schoolcraft County, the Refuge is removed from major population centers; the three nearest major communities are each more than 80 miles away.

## The U.S. Fish and Wildlife Service

Seney NWR is administered by the U.S. Fish and Wildlife Service (Service). The Service is the primary federal agency responsible for conserving, protecting, and enhancing the nation's fish and wildlife populations and their habitats. It 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. The Service also manages the National Wildlife Refuge System.

*Seney NWR in winter. USFWS photo.*

## 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 550 refuges and wetland management districts covering more than 150 million acres of public lands and waters.

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, amphibians, reptiles, and insects. As a result of international treaties for migratory bird conservation and other legislation, such as the Migratory

**Figure 1: Location of Seney NWR, Upper Peninsula, Michigan**

Bird Conservation Act of 1929, many refuges have been established to protect migratory waterfowl and their migratory flyways.

Refuges also play a crucial role in preserving endangered and threatened species. Among the most notable is Aransas NWR in Texas, which provides winter habitat for the highly endangered Whooping Crane. Likewise, the Florida Panther NWR protects one of the nation's most endangered predators. Refuges also provide unique recreational and educational opportunities for people. When human activities are compatible with wildlife and habitat conservation, 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, nearly 35 million people visited national wildlife refuges in 2006.

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 Comprehensive Conservation Plans (CCPs) 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.

The goals of the National Wildlife Refuge System are to:

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

## Michigan's Eastern Upper Peninsula Ecoregion

The Eastern Upper Peninsula Ecoregion can be described as having relatively flat topography, with large expanses of open peatlands, forested lowland swamps and extensive upland forests. Today, the majority of the landscape is still forested, except for some agricultural or pastoral lands occurring on ground moraines and the Clay Lake Plain in the easternmost part of the ecoregion.

The ecoregion covers 17,114 square miles, including all of Chippewa, Mackinac, Luce, Schoolcraft, Delta and Alger Counties, and portions of Menominee, Dickinson and Marquette Counties. Landcover consists primarily of forest (67 percent), wetlands (20 percent), with scattered agricultural (4 percent) and urban (2 percent) areas. The remaining 7 percent landcover consists of open grasslands, sparsely vegetated areas, beaches and rock areas. The extensive forests of the region are managed as either national or state forest, with large areas of private and/or corporate forestland (Figure 2).

Ecologically significant communities within the ecoregion include alvar, a globally rare grassland plant community growing on thin soils over limestone or dolomite. Other state and globally significant communities include patterned fens, Great Lakes marsh, wooded dune and swale complex, caves of karst origin and cobble beaches.

One of the greatest threats in this region is invasive species, which includes both the spread of established species and introduction of new species (MDNR 2005). Slightly less severe threats include non-consumptive recreation, land subdivision and

**Figure 2: Conservation Lands of the Eastern Upper Peninsula, Michigan**

development, and some forestry practices. Altered hydrologic regimes and altered fire regimes have also been identified as growing resource threats.

## Seney National Wildlife Refuge

Seney NWR was established in 1935 by Executive Order under the Migratory Bird Conservation Act for the protection and production of migratory birds and other wildlife. The Refuge encompasses approximately 95,238 acres; 25,150 acres comprise the Seney Wilderness Area in which is contained the Strangmoor Bog National Natural Landmark. While management for migratory birds is paramount, the Refuge provides habitat for a diversity of wildlife species, both migratory and non-migratory. Approximately 20 species of reptiles and amphibians, 48 species of mammals, 26 species of fish, and over 200 species of birds have been documented on the Refuge. Many of these species are Conservation Priorities for the Midwest Region of the Service.

## Refuge Purposes

Seney NWR was established in 1935…

> "... as a refuge and breeding ground for migratory birds and other wildlife: ..." Executive Order 7246, dated Dec. 10, 1935
>
> "... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. ¤ 715d (Migratory Bird Conservation Act)
>
> "... conservation, management, and restoration of the fish, wildlife, and plant resources and their habitats for the benefit of present and future generations of Americans..." 16 U.S.C. ¤ 668dd(a)(2) (National Wildlife Refuge System Administration Act)

## Refuge Vision

The planning team considered the past vision statements and emerging issues and drafted the following vision statements as the desired future state for the Refuge:

> Seney National Wildlife Refuge will continue to be a place of excitement and wonder where wildlife comes first. It will be a place where management decisions are made in the best interest of wildlife and their habitats, and people are encouraged to explore and learn about the natural world.
>
> The Refuge's rich mosaic of habitats and ecosystems will be viewed as part of the greater eastern Upper Peninsula of Michigan ecoregion. Priority will be given to managing for those species, habitats, and ecosystems of regional concern that are best suited to Seney's unique environment. Management will maintain Refuge-level biological diversity while preserving ecological integrity. Habitats will be managed for an array of ecological conditions, including the preservation of Wilderness character. When and where appropriate, an emphasis will be placed on preserving or restoring historic habitat conditions and ecosystem functions.
>
> As part of a holistic approach to natural resource stewardship, people will be welcomed to use the Refuge to learn about the natural world. The public will be invited to participate in wildlife-dependent experiences that are in concert with the relatively undeveloped nature of the Refuge. Students and researchers will be encouraged to use the Refuge as an outdoor laboratory for biological and ecological research that focuses on understanding natural patterns and processes and developing habitat management techniques.
>
> Seney NWR will continue to be a source of pride for the staff, those who visit, and the local community. It will showcase biological and ecological diversity, habitat management, and wildlife-dependent public use. It will add to the richness of the broader community by holding in trust a portion of the natural heritage of the eastern Upper Peninsula of Michigan for the continuing benefit of the American people.

## Purpose and Need for Plan

This CCP articulates the management direction for Seney NWR 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. Several legislative mandates within 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 refuges will only be allowed when determined appropriate and compatible with refuge purposes and mission of the refuge system.

This CCP will guide the management of Seney NWR by:

- Providing a clear statement of direction for the future management of the Refuge.
- Making a strong connection between Refuge activities and conservation activities that occur in the surrounding area.
- Providing Refuge neighbors, users, and the general public with an understanding of the Service's land acquisition and management actions on and around the refuge.
- Ensuring that Refuge 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 of Refuge Establishment and Management

Before its establishment, the forests and soils of the Seney NWR area and surrounding Schoolcraft County were exploited to a considerable degree starting in the late 1800s. Early timber cutting favored the best stands of white pine, followed by "high-grading" in the red pine and hardwood-eastern hemlock stands. Slash fires fueled by logging debris occurred annually, with most areas burning time and time again. These fires burned deep into the rich organic soil, damaging its quality and killing the seeds that would have produced a new forest. On many areas of the Refuge, the scars from these lumbering operations remain visible to this day.

As the amount of sawtimber diminished, efforts were shifted to cutting of poles, posts, ties and pulp. At this time, an attempt was made to settle cut-over lands and develop farming communities. By 1912, drainage of the Seney Swamp was underway. A land development company dug many miles of drainage ditches throughout the Seney area. This drained acreage was then sold using extravagant promises of agricultural productivity. The new owners quickly learned that these promises were unfounded. The farms were abandoned one-by-one, and the exploited lands reverted to state ownership.

*Trumpeter Swans. USFWS photo.*

## Figure 3: Location of Whitefish Point Unit, Seney NWR

Poor drainage of peat soils, poor soil fertility, and the short growing season made the farming venture a disaster and most lands were tax-reverted to the State of Michigan by the early 1930s. In 1934, the Michigan Conservation Department recommended to the Federal Government that the Seney area be protected for wildlife. Seney NWR was then established in 1935 by Executive Order under the Migratory Bird Conservation Act for the protection and production of migratory birds and other wildlife.

Physical development of the Refuge land began soon after establishment. With the aid of the Civilian Conservation Corps, an intricate system of dikes, water control structures, ditches, and roads was built. Most of these are still in use today.

## Whitefish Point Unit

Under the Coast Guard Authorization Act of 1996, the USFWS received 33 acres of the former Coast Guard Station at Whitefish Point, in Chippewa County. The remaining 11 acres were split between the Great Lakes Shipwreck Historical Society (GLSHS), which received 8.3 acres and the Michigan Audubon Society (MAS), which received 2.8 acres.

The USFWS property is administered as part of Seney NWR and managed as a stop-over location for migratory birds (Figure 3). Currently there are no permanent buildings or designated trails on the property and the USFWS does not administer any programs on site. However, MAS conducts migratory bird research and provides natural resource programs at the Whitefish Point Bird Observatory, which is adjacent to the Refuge's property. Parking and restroom facilities are provided by the GLSHS, which administers the former Coast Guard buildings, including the lighthouse, and interprets the maritime significance of Whitefish Point.

Management of USFWS property at Whitefish Point is governed by the "Human Use/ Natural Resource Management Plan for Whitefish Point" (Michigan Land Use Institute 2002), which is the result of a 2002 U.S. District Court settlement that binds the Service to the provisions of the plan. This document provides a good historical background and explains the roles and responsibilities of each partner in managing the former Coast Guard Property. The CCP reader should refer to that plan (http://www.fws.gov/midwest/planning/seney) for more detailed information.

The primary natural features of Whitefish Point are the gravel beaches, sandy beach dunes and stunted jack pine-dominated forest. Soils consist of excessively drained Deer Park soil on ridges and side slopes, while poorly drained Kinross soil is found in depressions and swales. In addition to the abundant jack pine, other tree species include northern white cedar, Eastern white pine, white spruce, black spruce, paper birch, tag alder, and trembling aspen. Many of the jack pines are stunted at an average height of 8 to 10 feet. Some taller specimens of jack pine, white pine, and birch compose the overstory in the forested areas. Tag alder and scrub conifers, such as juniper, are associated with marsh areas. Dunes are dominated primarily by American beachgrass.

Some of the species and plant communities that particularly attract attention are lady-slippers, starflower, bunchberry, and others that can be found on dry, sandy areas and purple bog-laurel and white Labrador-tea, which grow in interdunal swales.

Another important habitat on Whitefish Point described by the Michigan Natural Features Inventory is the "Wooded Dune and Swale Complex," a "distinctive natural community composed of upland

and wetland features." This complex only forms under the conditions that exist in the Great Lakes region, and thus cannot be found elsewhere. The varied topography of the complex itself, along with the unique geologic conditions that formed the dune-swale, supports a diversity of species.

Whitefish Point is renown for it concentrations of birds during migration. Each year thousands of raptors, passerines and waterbirds funnel up the point to cross Lake Superior. They are followed by hundreds of birders. The Whitefish Point Bird Observatory was established by the Michigan Audubon Society in 1997 to document and study migratory birds and their habitats in the Great Lakes. Every year they count and band birds during both the spring and fall migrations. Their data has led to Whitefish Point being recognized as a Globally Important Bird Area. The bird list for Whitefish Point includes 273 species (Appendix C). On April 30, 2001 the USFWS finalized its designation of Critical Habitat for the Piping Plover. All of the property at Whitefish Point was included in that designation.

## Legal Context

In addition to the Executive Order establishing the Refuge, and the National Wildlife Refuge System Improvement Act of 1997, several federal laws, executive orders, and regulations govern administration of Seney NWR. Appendix F contains a partial list of the legal mandates that guided the preparation of this plan and those that pertain to Refuge management.

# Chapter 2: The Planning Process

The Seney NWR CCP has been written with input and assistance from citizens, universities, other non-governmental organizations (NGOs), and staff from other federal, state, and local agencies. The participation of these stakeholders is vital, and all of their ideas have been valuable in determining the future direction of the Refuge. Refuge and Service planning staff are grateful to all of those who have contributed time, expertise, and ideas throughout the CCP process. We appreciated the enthusiasm and commitment expressed by many for the lands and living resources administered by Seney NWR.

## Internal Agency Scoping

The CCP process began in March 2006 with a meeting between Refuge staff and regional planners from the Service's office in the Twin Cities, Minnesota. The participants in this "internal scoping" exercise reviewed the Refuge's Vision Statement, goals, existing baseline resource data, planning documents, and other pertinent information. In addition, the group identified a preliminary list of issues, concerns, and opportunities facing the Refuge that would need to be addressed in the CCP.

A list of required CCP elements (e.g., maps, photos, and GIS data layers) was also developed at this meeting and during subsequent e-mail and telephone communications between Refuge staff and the Service's office in the Twin Cities. Concurrently, the group studied federal and state mandates plus applicable local ordinances, regulations, and plans for their relevance to this planning effort. Finally, the group agreed to a process and sequence for obtaining public input and a tentative schedule for completion of the CCP. A Public Involvement Plan was drafted and distributed to participants immediately after the meeting.

*Refuge pool, Seney NWR. USFWS photo.*

## Open Houses

Public input was encouraged and obtained using several methods, including an open house, written comments during a public scoping period, and personal contacts.

Initial public scoping for the Seney NWR CCP began in August 2006 with an open house event held at the Refuge Visitor Center. Despite widespread notification in area newspapers, radio and television, the event drew only about 15 people. Comment forms were available at the event and made available at the Refuge Headquarters and Visitor Center during the following weeks.

Those interested in making written comments had until October 2006 to submit them. Comments could be sent by U.S. mail, e-mail, or via the Seney

planning website on the Internet. Approximately 30 comment forms and other written comments were submitted to the Refuge during the scoping process.

## Refuge Program Reviews

On August 28-30, 2006, a Biology Program Review was held to obtain detailed input on the issues and opportunities concerning the habitat and biological monitoring program at the Refuge. Thirty people, representing Michigan DNR, U.S. Geological Survey – Biological Resource Division, universities, NGOs, Refuge staff, conservation organizations, and others attended these discussions.

During July 2006, two agency Visitor Service Specialists met with Refuge staff to review the Visitor Service program. The review team toured the Refuge facilities and made a number of recommendations for improving the quality of visitor experiences, environmental education and outreach.

Both of these program reviews were scheduled to coincide with the CCP scoping process and to help formulate objectives and strategies in the plan.

*Seney NWR. USFWS photo.*

## Summary of Issues, Concerns and Opportunities

The following list of issue topics was generated by internal Refuge scoping, the public open house sessions, and program reviews. Each topic will be described in more detail in the following chapters of this plan.

*Habitat Management:*

- Wetland and upland habitat preservation, conservation, and restoration
- Invasive plant species management
- Prescribed burning and the Refuge's Fire Use Program
- Stream restoration
- Wilderness management
- Role of the Refuge in the landscape

*Aquatic Resources:*

- Protection of waterbodies from human disturbances and invasive species
- Predator and native fish populations

*Wildlife Management:*

- Wildlife research
- Carrying capacity for Trust species

*Visitor Services:*

- Hunting
- Fishing
- Visitor capacity
- Outreach
- Access
- A developed picnic area
- Horseback riding and a snowmobile route

## Preparation, Publishing, Finalization and Implementation of the CCP

The Seney 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 competitive submissions for funding at the national level. Most importantly, it lays out the general approach to managing habitat, wildlife, and people at Seney NWR that will direct day-to-day decision-making and actions.

## Public Comments on the Draft CCP

The Draft CCP/EA was released for public review on September 3, 2008; the comment period lasted 35 days and ended October 8, 2008. During the comment period the Refuge hosted an open house event to obtain comments. By the conclusion of the comment period we received 14 written responses by organizations and individuals. In response to these comments we made a number of minor edits to the final document.

All respondents who expressed an opinion endorsed the selection of Alternative 2 and the general approach of the proposed future management of the Refuge. In fact, many comments emphasized the shortcomings of the Alternative 3, the alternate "action" scenario that was not selected for implementation, in favor of the preferred alternative. We were able to incorporate all of the specific technical and grammatical changes suggested in the written comments. Consequently, we did not produce a formal Response to Comments Appendix for this CCP.

# Chapter 3: Refuge Environment

## Seney National Wildlife Refuge

### Introduction

Seney NWR is located in Schoolcraft County in Michigan's eastern Upper Peninsula (U.P.) equidistant from Lakes Superior and Michigan. The Refuge encompasses 95,238 acres; the Seney Wilderness Area, where the Strangmoor Bog National Natural Landmark is located, covers 25,150 acres or 26 percent of the Refuge. The Refuge is removed from major population centers; the three nearest major communities are each more than 80 miles away.

Before its establishment, the forests and soils of the Seney area were exploited to a considerable degree starting in the late 1800s. Early timber cutting favored the best stands of white pine, followed by "high-grading" in the red pine and northern hardwood stands. Slash fires fueled by logging debris occurred repeatedly in the region after the "Great Cutover", with most areas burning time and time again. As the amount of sawtimber diminished, efforts were shifted to cutting of poles, posts, ties and pulp. Following this extensive logging, an attempt was made to settle lands on which forests had been degraded and develop farming communities.

By 1912, drainage of the Seney Swamp was under way. However, poor drainage of peat soils, poor soil fertility and a short growing season made the farming venture a disaster. Many lands were tax-reverted to the State of Michigan by the early 1930s.

Seney NWR was established in 1935 by Executive Order under the Migratory Bird Conservation Act for the protection and production of migratory birds and other wildlife.

### Figure 4: Land Ownership in the Eastern Upper Peninsula of Michigan (MDNR)

## Climate

The climate of Seney NWR is considerably lacustrine-influenced by its close proximity to Lakes Superior and Michigan. The most common spring through early fall winds are from the southwest to northwest, and average approximately 10 m.p.h. Average daily humidity during spring and fall varies from 50 to 60 percent. Temperature extremes range from approximately minus 35 degrees Fahrenheit to 98 degrees Fahrenheit. Precipitation occurs throughout the year, with June being the wettest month and March the driest on average. Average annual precipitation is approximately 32 inches and average annual snowfall is approximately 123 inches. During spring and summer months, onshore breezes cause frequent afternoon thunderstorms. Lightning strikes are common during such storms. Growing season evaporation averages 25 inches. It is expected that only during 5 percent of the time will drought indices (e.g., Keetch-Byram Drought Index) reach extreme severity levels. The growing season averages 119 days.

*Seney NWR. USFWS photo.*

## Climate Change Impacts

The U.S. Department of the Interior issued an order in January 2001 requiring federal agencies under its direction that have land management responsibilities to consider potential climate change impacts as part of long range planning endeavors.

The increase of carbon dioxide within the Earth's atmosphere has been linked to the gradual rise in surface temperature commonly referred to as global warming. In relation to comprehensive conservation planning for national wildlife refuges, carbon sequestration constitutes the primary climate-related impact that refuges can affect in a small way. The U.S. Department of Energy's "Carbon Sequestration Research and Development" defines carbon sequestration as "...the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere."

Vegetated land is a tremendous factor in carbon sequestration. Terrestrial biomes of all sorts – grasslands, forests, wetlands, tundra, and desert – are effective both in preventing carbon emission and acting as a biological "scrubber" of atmospheric carbon dioxide. The Department of Energy report's conclusions noted that ecosystem protection is important to carbon sequestration and may reduce or prevent loss of carbon currently stored in the terrestrial biosphere.

Conserving natural habitat for wildlife is the heart of any long-range plan for national wildlife refuges. The actions proposed in this CCP would conserve or restore land and habitat, and would thus retain existing carbon sequestration on the Refuge. This in turn contributes positively to efforts to mitigate human-induced global climate change.

One Service activity in particular – prescribed burning – releases carbon dioxide directly to the atmosphere from the biomass consumed during combustion. However, there is actually no net loss of carbon, since new vegetation quickly germinates and sprouts to replace the burned-up biomass and sequesters or assimilates an approximately equal amount of carbon as was lost to the air (Dai et al. 2006). Overall, there should be little or no net change in the amount of carbon sequestered at the Refuge from any of the proposed management alternatives.

Several impacts of climate change have been identified that may need to be considered and addressed in the future:

- Habitat available for cold water fish such as trout and salmon in lakes and streams could be reduced.
- Forests may change, with some species shifting their range northward or dying out, and other trees moving in to take their place.
- Ducks and other waterfowl could lose breeding habitat due to stronger and more frequent droughts.
- Changes in the timing of migration and nesting could put some birds out of sync with the life cycles of their prey species.
- Animal and insect species historically found farther south may colonize new areas to the north as winter climatic conditions moderate.

The managers and resource specialists on the Refuge need to be aware of the possibility of change due to global warming. When feasible, documenting long-term vegetation, species, and hydrologic changes should become a part of research and monitoring programs on the Refuge. Adjustments in Refuge management direction may be necessary over the course of time to adapt to a changing climate.

The following paragraphs are excerpts from the 2000 report, Climate Change Impacts on the United States: The Potential Consequences of Climate Vari-

ability and Change, produced by the National Assessment Synthesis Team, an advisory committee chartered under the Federal Advisory Committee Act to help the U.S. Global Change Research Program fulfill its mandate under the Global Change Research Act of 1990. These excerpts are from the section of the report focused upon the eight-state Midwest Region.

*Observed Climate Trends:* Over the 20th century, the northern portion of the Midwest, including the upper Great Lakes, has warmed by almost 4 degrees Fahrenheit (2 degrees Celsius), while the southern portion, along the Ohio River valley, has cooled by about 1 degree Fahrenheit (0.5 degrees Celsius). Annual precipitation has increased, with many of the changes quite substantial, including as much as 10 to 20 percent increases over the 20th century. Much of the precipitation has resulted from an increased rise in the number of days with heavy and very heavy precipitation events. There have been moderate to very large increases in the number of days with excessive moisture in the eastern portion of the basin.

*Scenarios of Future Climate:* During the 21st century, models project that temperatures will increase throughout the Midwest, and at a greater rate than has been observed in the 20th century. Even over the northern portion of the region, where warming has been the largest, an accelerated warming trend is projected for the 21st century, with temperatures increasing by 5 to 10 degrees Fahrenheit (3 to 6 degrees Celsius). The average minimum temperature is likely to increase as much as 1 to 2 degrees Fahrenheit (0.5 to 1 degrees Celsius) more than the maximum temperature. Precipitation is likely to continue its upward trend, at a slightly accelerated rate; 10 to 30 percent increases are projected across much of the region. Despite the increases in precipitation, increases in temperature and other meteorological factors are likely to lead to a substantial increase in evaporation, causing a soil moisture deficit, reduction in lake and river levels, and more drought-like conditions in much of the region. In addition, increases in the proportion of precipitation coming from heavy and extreme precipitation are very likely.

## Midwest Key Issues

### Reduction in Lake and River Levels

Water levels, supply, quality, and water-based transportation and recreation are all climate-sensitive issues affecting the region. Despite the projected increase in precipitation, increased evaporation due to higher summer air temperatures is likely to lead to reduced levels in the Great Lakes. Of 12 models used to assess this question, 11 suggest significant decreases in lake levels while one suggests a small increase. The total range of the 11 models' projections is less than a 1-foot increase to more than a 5-foot decrease. A 5-foot reduction would lead to a 20 to 40 percent reduction in outflow to the St. Lawrence Seaway. Lower lake levels cause reduced hydropower generation downstream, with reductions of up to 15 percent by 2050. An increase in demand for water across the region at the same time as net flows decrease is of particular concern. There is a possibility of increased national and international tension related to increased pressure for water diversions from the Lakes as demands for water increase. For smaller lakes and rivers, reduced flows are likely to cause water quality issues to become more acute. In addition, the projected increase in very heavy precipitation events will likely lead to increased flash flooding and worsen agricultural and other non-point source pollution as more frequent heavy rains wash pollutants into rivers and lakes. Lower water levels are likely to make water-based transportation more difficult with increases in the costs of navigation of 5 to 40 percent. Some of this increase will likely be offset as reduced ice cover extends the navigation season. Shoreline damage due to high lake levels is likely to decrease 40 to 80 percent due to reduced water levels.

*Adaptations:* A reduction in lake and river levels would require adaptations such as re-engineering of ship docks and locks for transportation and recreation. If flows decrease while demand increases, international commissions focusing on Great Lakes water issues are likely to become even more important in the future. Improved forecasts and warnings of extreme precipitation events could help reduce some related impacts.

### Agricultural Shifts

Agriculture is of vital importance to the Midwest region, the nation and the world. It has exhibited a capacity to adapt to moderate differences in growing season climate, and it is likely that agriculture would be able to continue to adapt. With an increase in the length of the growing season, double cropping, the practice of planting a second crop after the first is harvested, is likely to become more prevalent. The CO2 fertilization effect is likely to enhance plant growth and contribute to generally higher

yields. The largest increases are projected to occur in the northern areas of the region, where crop yields are currently temperature limited. However, yields are not likely to increase in all parts of the region. For example, in the southern portions of Indiana and Illinois, corn yields are likely to decline, with 10-20 percent decreases projected in some locations. Consumers are likely to pay lower prices due to generally increased yields, while most producers are likely to suffer reduced profits due to declining prices. Increased use of pesticides and herbicides are very likely to be required and to present new challenges.

*Adaptations:* Plant breeding programs can use skilled climate predictions to aid in breeding new varieties for the new growing conditions. Farmers can then choose varieties that are better attuned to the expected climate. It is likely that plant breeders will need to use all the tools of plant breeding, including genetic engineering, in adapting to climate change. Changing planting and harvest dates and planting densities, and using integrated pest management, conservation tillage, and new farm technologies are additional options. There is also the potential for shifting or expanding the area where certain crops are grown if climate conditions become more favorable. Weather conditions during the growing season are the primary factor in year-to-year differences in corn and soybean yields. Droughts and floods result in large yield reductions; severe droughts, like the drought of 1988, cause yield reductions of over 30 percent. Reliable seasonal forecasts are likely to help farmers adjust their practices from year to year to respond to such events.

### Changes in Semi-natural and Natural Ecosystems

The Upper Midwest has a unique combination of soil and climate that allows for abundant coniferous tree growth. Higher temperatures and increased evaporation will likely reduce boreal forest acreage, and make current forestlands more susceptible to pests and diseases. It is likely that the southern transition zone of the boreal forest will be susceptible to expansion of temperate forests, which in turn will have to compete with other land use pressures. However, warmer weather (coupled with beneficial effects of increased CO2), are likely to lead to an increase in tree growth rates on marginal forestlands that are currently temperature-limited. Most climate models indicate that higher air temperatures will cause greater evaporation and hence reduced soil moisture, a situation conducive to forest fires. As the 21st century progresses, there will be an increased likelihood of greater environmental stress on both deciduous and coniferous trees, making them susceptible to disease and pest infestation, likely resulting in increased tree mortality.

As water temperatures in lakes increase, major changes in freshwater ecosystems will very likely occur, such as a shift from cold water fish species, such as trout, to warmer water species, such as bass and catfish. Warmer water is also likely to create an environment more susceptible to invasions by non-native species. Runoff of excess nutrients (such as nitrogen and phosphorus from fertilizer) into lakes and rivers is likely to increase due to the increase in heavy precipitation events. This, coupled with warmer lake temperatures, is likely to stimulate the growth of algae, depleting the water of oxygen to the detriment of other living things. Declining lake levels are likely to cause large impacts to the current distribution of wetlands. There is a small chance that some wetlands could gradually migrate, but in areas where their migration is limited by the topography, they would disappear. Changes in bird populations and other native wildlife have already been linked to increasing temperatures and more changes are likely in the future. Wildlife populations are particularly susceptible to climate extremes due to the effects of drought on their food sources.

## Seney NWR and Climate Change

Climate change is rarely discussed in most management plans because its effects are often assumed to occur more slowly than even the federal planning process. However, for many taxa, recent shifts in phenologic and distribution patterns have been strongly correlated with climate change, and for some species these changes have occurred over a relatively short time frame (Root and Schneider 1995, Stevenson and Bryant 2000, Root et al. 2003). Based on a model assuming a doubling of carbon dioxide, Price (2000) suggests that the distribution patterns of 42 non-game bird species found at the Refuge and in Michigan in general will likely be influenced over an undetermined period of time by climate change: 33 (79 percent) will be extirpated in Michigan, six (14 percent) will experience range expansion, and three (7 percent) will show range contraction. For most species, the influence of climate change is thought to be correlated to changes

**Figure 5: Seney Sand Lake Plain**

in habitat distribution and abundance. Ongoing research at the Refuge is evaluating how climate change may influence small mammal distribution and abundance patterns (Phil Myers, University of Michigan). Lowland coniferous forests comprised of black spruce, tamarack, and balsam fir are most likely to be affected habitat type at the Refuge since these boreal tree species (especially balsam fir) are near the southern edge of their distribution (Iverson et al. 1999).

## Geology and Glaciation

According to the regional landscape classification system of Albert (1995), Seney NWR lies within the Seney Sand Lake Plain (Sub-Subsection VIII.2.1, Figure 5). This unit is characterized by landforms of lacustrine origin with broad, poorly drained embayments containing beach ridges, swales, dunes, and sandbars.

The lands comprising Seney NWR present an area of seemingly little geological variation in comparison with more scenic areas along the shores of Lake Superior and Lake Michigan. Although relatively little topographic relief exists on the Refuge (elevation varies from approximately 803 feet in the northwest to 640 feet in the southeast), the broad, flat lands of the Refuge reflect a subtle, but highly complex, geologic history.

Between 10,000 and 10,500 years ago, the "Valders" pro-glacial lakes in the Superior basin drained southward across the Upper Peninsula. At about the latter date, the Valders ice border was located along the southern shore of Lake Superior allowing meltwater to drain southward across what is now the Refuge. During this period of time, the present land surface appears to have been sculptured. At least two phases of drainage seem to be visible in the surface patterns of the area. The first of these is a broad channel eroded into earlier outwash deposits that carried meltwaters from the area of Long Lake southward through what is now termed the "Strangmoor Bog" (Heinselman 1965). Throughout the length of this channel now occur linear landforms composed of sandy sediments. A second generation of outwash channels is visible as linear peat-filled depressions trending northwest-southeast across Seney NWR. These landforms are now considered unique patterned bog topography

and are prominently visible near Creighton and in the Refuge lands west of the Driggs River (Seney Wilderness Area). Finally, the current natural drainage patterns present a still different orientation and one that transects the above peat-filled channels. In the Seney area, the Driggs River best exhibits this pattern.

Since 10,500 years ago, the Seney area has been a site for marsh development. At present, from 3 to 9 feet of peat blanket most of the area. Among the more conspicuous landforms in the area are parabolic sand dunes, which have spread from northwest to southeast across the Refuge in a disjointed pattern. These landforms indicate arid conditions in the area, which allowed for the disruption of vegetation that had developed upon the surrounding sand and gravel deposits. At the same time, prevailing northwest winds winnowed the exposed fine to medium grained sands from the earlier outwash sediments and gave rise to the present dune topography.

## Soils

Within the Seney Sand Lake Plain, 100 to 200 feet of glacial drift generally cover the bedrock. The soils on the Refuge are generally level to somewhat sloping mucks, peats, and sands. The dominant mucks are interspersed with sand ridges and knolls in such an intricate pattern that the two soils have been mapped together as a complex of Carbondale muck and Rubicon sand (dune phase). The muck has accumulated on the wet sandy plain at a depth of 3 to 9 feet. The material is a dark brown, spongy, felt-like muck, which is more decomposed than peat soils and in general contains a higher percentage of mineral matter. The natural drainage is very poor in the mucks and excessive in the sands on the ridges and knolls. This complex covers the majority of the Refuge.

A large area of Dawson and Greenwood peats exists in the central portion of the Refuge. These level, very poorly drained soils are composed of brown or yellow-brown mixed fibrous and woody material. At depth of 1 to 2 feet, raw yellow peat or muck underlies the peat. Very little decomposition has taken place in the areas of yellow peat. The water table is at the surface most of the year. Areas of Carbondale and Tawas mucks interrupt the peats on the Refuge. Wet sands underlie the entire area.

Along the Manistique River Valley, Driggs River, and the other tributaries draining the Refuge, the soils are predominately sands and sandy loams (see Figure 6). These soils are well or excessively drained and lie on slopes that are level to steeply sloping. The soil surface consists of forest litter, underlain by gray sandy loam or fine sandy loam, with coarser sand beneath the loam. Under the former Soil Conservation Service Capability Class system, most of the Refuge would be Class V, wet soils. The wet sandy areas are Class II, VI, and VIII, while the better-drained areas are Class II and III. Only small areas along the Manistique River and along the western border of the Refuge are suitable for farming.

Soils associated with each Forest Management Unit are shown in Appendix J.

According to the habitat typing system of Burger and Kotar (2003), a total of 31 soil types at the Refuge (61 percent) have either primary or secondary habitat types (Table 1 on page 19). Of these, 18 (58 percent) have white pine as a climax species and 13 (42 percent) have maple (sugar or red) as climax species (Appendix J). This system does not (at present) provide primary or secondary successional pathways for wetland soils.

## Surface Hydrology

Seney NWR lies within the Manistique River watershed, which encompasses portions of Alger, Delta, Luce, Mackinac, and Schoolcraft Counties. The watershed drains approximately 1,465 square miles before emptying into the northeast corner of Lake Michigan (Madison and Lockwood 2004). General land slopes are approximately 10 feet per mile and southeasterly in direction. Water enters the Refuge from the north-northwest through the following creeks, from west to east: Marsh Creek, Ducey Creek, Walsh Creek, Driggs River, Holland Ditch and Clarks Ditch. Water then flows to the south-southeast to the Manistique River (Figure 7 on page 21 and Table 2 on page 22). The Manistique River then flows into Lake Michigan.

Annual precipitation averages approximately 32 inches per year. This precipitation accounts for approximately 60 percent of the Refuge water intake. The remaining 40 percent of the Refuge water supply comes from the ditches, rivers and creeks. Sheet flow (overland flow) is quite substan-

## Figure 6: Soils of Seney NWR

## Table 1: Ranked Order of Acres of Soils at Seney NWR

| Soil Name | Approximate Acreage | Percent of Refuge | Primary/Secondary Habitat Types[1] |
|---|---|---|---|
| Markey Mucky Peat | 43,751 | 46 | None/None |
| Deford-AuGres-Rubicon Complex, Deep Water Table, 0-15% Slopes | 7,392 | 8 | None/PArV |
| Water | 5,977 | 6 | - |
| Loxley-Carbondale Complex | 5,908 | 6 | None/None |
| Neconish-Kinross-Wainola Complex, 0-6% Slopes | 3,549 | 4 | PVE/None |
| Deford Muck | 3,327 | 3 | None/None |
| Dawson-Greenwood-Loxley Peats | 3,279 | 3 | None/None |
| Markey-Deford Mucks, Drained | 1,951 | 2 | None/None |
| Rousseau-Neconish-Spot Complex, 0-25% Slopes | 1,882 | 2 | PVE/None |
| Histosols and Aquents, Ponded | 1,639 | 2 | None/None |
| Kinross-AuGres-Rubicon Complex, Deep Water Table, 0-15% Slopes | 1,501 | 2 | None/PArV |
| Carbondale-Lupton-Tawas Mucks | 1,452 | 2 | None/None |
| Deford-AuSable-Tawas Mucks | 1,316 | 1 | None/None |
| Pelkie (Occassionally Flooded)-Deford (Frequently Flooded) Complex, 0-6% Slopes | 1,302 | 1 | None/None |
| Proper Fine Sand, 0-6% Slopes | 1,266 | 1 | PVE/None |
| Rousseau-Proper-Deford Complex, 0-25% Slopes | 1,189 | 1 | PVE/None |
| Meehan-Deford-Seney Complex, 0-3% Slopes | 1,057 | 1 | PArVAa/None |
| Finch-Spot Complex, 0-3% Slopes | 888 | 1 | PArVAa/None |
| Duck-Rubicon, 0-15% Slopes | 827 | 1 | PArVAa/PArV |
| Clemons-Deford Complex, Very Rarely Flooded, 0-15% Slopes | 738 | 1 | None/None |
| Rousseau Fine Sand, 15-35% Slopes | 600 | 1 | PVE/PArV |
| Markey-Deford Mucks, Drained | 548 | 1 | None/None |
| Rousseau Fine Sand, 6-15% Slopes | 430 | 0 | PVE/PArV |
| Graveraet Very Fine Sandy Loam, 1-6% Slopes | 410 | 0 | AFOAs/AFPo |
| Hendrie-Anninias Complex, 0-3% Slopes | 278 | 0 | None/None |
| AuGres Sand, 0-3% Slopes | 247 | 0 | PArVAa/None |
| Kinross Muck | 237 | 0 | None/None |
| Liminga Fine Sand, 15-35% Slopes | 224 | 0 | ATFD/None |
| Cathro and Lupton Mucks | 212 | 0 | None/None |
| Rubicon Sand, 15-35% Slopes | 204 | 0 | PArV/PVE |
| Rousseau Fine Sand, 0-6% Slopes | 187 | 0 | PVE/PArV |
| Noseum Fine Sandy Loam, 0-4% Slopes | 181 | 0 | ATFD/None |

## Table 1: Ranked Order of Acres of Soils at Seney NWR (Continued)

| Soil Name | Approximate Acreage | Percent of Refuge | Primary/Secondary Habitat Types[1] |
|---|---|---|---|
| AuGres-Deford Complex, 0-3% Slopes | 178 | 0 | PArVAa/None |
| Rubicon Sand, 6-15% Slopes | 133 | 0 | PArV/PVE |
| Hiawatha Fine Sandy Loam, 0-6% Slopes | 130 | 0 | ATFD/None |
| McMillan-Greylock Complex, 1-6% Slopes | 127 | 0 | AFPo/AFOAs |
| Hiawatha-Rubicon Complex, 0-15% Slopes | 122 | 0 | PArVAa/PArV |
| Rubicon-Deford Complex, 0-35% Slopes | 114 | 0 | PArV/None |
| Brevort-Iosco Complex, 0-3% Slopes | 110 | 0 | None/None |
| Halfaday Sand, 0-6% Slopes | 110 | 0 | ATFD/None |
| Pelkie-Moquah-Arnheim Complex, 0-6% Slopes | 95 | 0 | AFPo/None |
| Duck Fine Sandy Loam, 0-4% Slopes | 83 | 0 | ATFD/None |
| Rubicon Sand, Deep Water Table, 0-6% Slopes | 58 | 0 | PArV/None |
| Paquin Sand, 0-3% Slopes | 38 | 0 | ATFD/None |
| Minocqua Muck | 38 | 0 | None/None |
| Dawson-Kinross Mucks | 38 | 0 | None/None |
| Spot Peat | 32 | 0 | None/None |
| Kalkaska Sand, 6-15% Slopes | 32 | 0 | ATFD/None |
| McMillan-Greylock Complex, 6-15% Slopes | 10 | 0 | AFPo/AFOAs |
| McMillan-Stutts Complex, 15-35% Slopes | 7 | 0 | AFPo/ATFD |
| Angelica Muck | 4 | 0 | None/None |
| Total | 95,406 | 100 | - |

1. *Habitat types:* ***AFOAs*** *= Acer saccharum – Fagus grandifolia/Osmorhiza claytoni – Arisaema atrorubens;* ***AFPo*** *= Acer saccharum - Fagus grandifolia/Polygonatum pubescens;* ***ATFD*** *= Acer saccharum – Tsuga canadensis – Fagus grandifolia/ Dryopteris spinulosa;* ***PArV*** *= Pinus strobus – Acer rubrum/Vaccinium angustifolium;* ***PArVAa*** *= Pinus strobus – Acer rubrum/Vaccinium angustifolium-Aralia nudicaulis;* ***PVE*** *= Pinus strobus/Vaccinium angustifolium-Epigaea repens*

tial each spring as a result of winter snow and ice stores melting. Ground water is discharged into the peat and streams and flows under streambeds as hyporheic flow. Peak flows through the Refuge marsh and water system normally occur during spring. Snowmelt, frozen ground, and rain can combine to create destructive floods, although such events are rare. Stream flow data for water entering the Refuge is limited to early U.S. Geological Survey gauging station data for the period 1939-50 (Table 2 on page 22). Recent stream flow data (1999 -2000) is available for the western half of the Refuge from Marsh Creek east to Driggs River. Overall the discharges are relatively low due to the large amount of wetland and depression storage located in the watershed.

Seney NWR includes 27 man-made pools, with water control capability on 21 pools. Along with associated potholes, beaver ponds, and ditches, the 27 pools account for approximately 7,456 surface acres of impounded water, or 7.8 percent of the total Refuge acreage.

## Figure 7: Surface Hydrology of the Seney NWR

### Table 2: Average Peak Inflow of Water into Seney NWR

| Flowage | Drainage Area (acres)[1] | Inflow (cubic feet/second) |
|---|---|---|
| Marsh Creek[2] | 12,800 | 122 |
| Walsh Ditch | 7,680 | 156 |
| Driggs River | 44,800 | 512 |
| Holland Ditch | 8,320 | 128 |
| Clark Ditch | 5,120 | 98 |

1. *Drainage area north of the Refuge.*
2. *Includes Ducey Creek drainage.*

Historically much of the land in and near what is now Seney NWR in Michigan's eastern Upper Peninsula was an expansive, ground-water-supported sedge fen. In support of agricultural development, the largest wetland drainage project in Michigan's history was begun in 1912 (Wilcox et al. 2006). The Walsh Ditch was constructed to redirect Walsh and Marsh Creeks and to lower the water tables. Despite this effort, agriculture proved unsustainable and was soon abandoned. The unintended consequences of the wetland drainage project were far reaching and will be discussed in another section of the document.

## Archeological and Cultural Values

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 institutions." Schoolcraft County contains four properties on the National Register of Historic Places. On the Refuge there are 40 recorded cultural resource sites, three of which have been determined ineligible for the National Register. These sites include the several buildings in the Refuge Headquarters area, structures constructed by the Civilian Conservation Corps, logging camps, cabins, a farm, a ditch, and other types. No prehistoric sites have been identified on the Refuge. Five Indian tribes have an interest in Schoolcraft County and may be concerned about traditional cultural properties and sacred sites if any exist on the Refuge. During a "Master Planning" process in 1976, Commonwealth Associates, Inc. identified areas along the Manistique River as having the best potential for such sites. To date no resources have been found at these areas.

## Social and Economic Context

Seney NWR is located in northern Schoolcraft County. One of 15 counties in Michigan's Upper Peninsula, it stretches from the shores of Lake Michigan north to within 4 miles of Lake Superior. Its poor soils and cold climate contribute to a low human population and limited economic activities. Only 8,903 people live in the 1,178-square-mile county (7.5 people per square mile). The population decreased slightly between 2000 and 2005.

The two nearest towns, Germfask and Seney, host 491 and 108 people, respectively. The closest towns with a population greater that 2,000 people are Manistique, Munising and Newberry, all of which are 40 miles away from the Refuge. The racial makeup of the county is 89 percent white, 6 percent Native American, 2 percent African American with Asians, Hispanic and other races contributing 3 percent. Interestingly, 16 percent of Upper Peninsula residences claim Finnish ancestry, making it the largest concentration of Finns outside of Europe (Table 3).

The median income for a household in Schoolcraft County was $32,306 in 2005, with about 12 percent of the population living below the poverty line. This compares to $46,291 and 11 percent for the State of Michigan in the same year. In Schoolcraft County, government agencies provide 23 percent of the jobs, followed by service industry at 22 percent, retail at 20 percent, manufacturing at 10 percent and construction at 7 percent. Much of the area is forested and attracts summer recreationists who enjoy hunting, hiking, camping and fishing. In the winter, snowmobiling is a big attraction. (U.S. Census Bureau 2005).

Seney NWR was one of the sample Refuges investigated in a national study of the economic benefits to local communities of national wildlife refuge visitation (Laughland and Caudill, 2004). This study found that in 2004 resident and non-resident visitors to Seney NWR spent about $547,300 in the Refuge (Table 4). When this spending had cycled through

## Table 3: Socioeconomic Characteristics of Schoolcraft County, Michigan

| Characteristic | Schoolcraft County | Michigan |
|---|---|---|
| Population, 2005 estimate | 8,819 | 10,120,860 |
| Population, percent change, April 1, 2000 to July 1, 2005 | -0.9% | 1.8% |
| Population, 2000 | 8,903 | 9,938,444 |
| Land area (square miles) | 1,178 | 56,803 |
| Persons per square mile, 2000 | 7.6 | 175 |
| White persons, percent, 2005 (a) | 90.0% | 81.3% |
| Black persons, percent, 2005 (a) | 2.0% | 14.3% |
| American Indian and Alaska Native persons, percent, 2005 (a) | 5.4% | 0.6% |
| Asian persons, percent, 2005 (a) | 0.5% | 2.2% |
| Persons of Hispanic or Latino origin, percent, 2005 (b) | 1.0% | 3.8% |
| White persons not Hispanic, percent, 2005 | 89.2% | 77.9% |
| Foreign born persons, percent, 2000 | 1.0% | 5.3% |
| Language other than English spoken at home, pct age 5+, 2000 | 3.0% | 8.4% |
| High school graduates, percent of persons age 25+, 2000 | 79.4% | 83.4% |
| Bachelor's degree or higher, pct of persons age 25+, 2000 | 11.3% | 21.8% |
| Persons with a disability, age 5+, 2000 | 1,695 | 1,711,231 |
| Households, 2000 | 3,606 | 3,785,661 |
| Persons per household, 2000 | 2.36 | 2.56 |
| Median household income, 2003 | $32,306 | $46,291 |
| Per capita money income, 1999 | $17,137 | $22,168 |
| Persons below poverty, percent, 2003 | 11.7% | 11.0% |
| Source: US Census Bureau State & County QuickFacts (2005) | | |

## Table 4: Recreation-related Expenditures of Visitors to Seney NWR

| Activity | Resident | Non-resident | Total ($ in thousands) |
|---|---|---|---|
| Non-consumptive | $29.0 | $442.1 | $471.1 |
| Hunting | $11.0 | $48.6 | $59.6 |
| Fishing | $8.0 | $8.6 | $16.6 |
| Total | $48.0 | $499.3 | $547.3 |
| Source: Laughland and Caudill, 2004 | | | |

the economy, the Refuge had generated $671,800 in fiscal demand, $235,000 in job income, 11 jobs, and $112,600 in total tax revenue.

# Environmental Contaminants

A Contaminant Assessment Process (CAP) was conducted for Seney NWR in 2005. A CAP is an information gathering process and initial assessment of a national wildlife refuge in relation to environmental contaminants.

## Past Activities Contamination

During the process, soils, groundwater, and biota were collected from areas where past activities (oiling of roads to control dust and wood treatment of fence posts with pentachlorphenol) occurred. Soils were found to have low concentrations of dioxin-like contaminants. Groundwater results indicated that Refuge impoundments were not compromised by hydrocarbon contamination via shallow groundwater discharge. Overall, contamination resulting from previous activities is not at a level great enough in the soil, water or biota to cause adverse affects to Trust resources.

## Wildlife Contamination

The Michigan Department of Community Health has issued a fish consumption advisory for all inland lakes. The advisory applies to all the pools at Seney NWR. The advisory provides guidelines regarding the size and frequency of which fish species can be eaten safely. The advisory states that no one should eat more than one meal a week of rock bass, yellow perch, or black crappie over 9 inches in length or any size largemouth bass, smallmouth bass, walleye, northern pike, or muskellunge. Women of childbearing age and children under age 15 should not eat more than one meal per month of these fish.

In 1999 a study was conducted to better assess the presence of mercury in fish collected from the Refuge. Four species (northern pike, yellow perch, white sucker, and pumpkinseed) were collected for mercury analysis (Best 1999). Results from the study confirmed the consumption advisory.

The lack of fish passage prevents fish from Lake Michigan, which have greater poly-chlorinated biphenyls (PCB) concentrations than inland fish, from being a food source to Refuge wildlife. Mink and river otter on the Refuge were tested in 1995 for mercury and PCB contamination. Results indicated that mercury and PCB concentrations found in the livers were substantially less than concentrations associated with adverse effects (Dansereau et al. 1999). Common Loons, which also feed on fish on the Refuge, are not currently being adversely affected by their exposure to mercury on a population basis (McCormick et al. 2006).

## Air Contamination

The National Atmospheric Deposition Program/ National Trends Network (NADP/NTN) is a nationwide network of precipitation monitoring sites. The purpose of the network is to collect data on the chemistry of precipitation for monitoring of geographical and temporal long-term trends. In 2000, Seney NWR became a monitoring site for the NADP/NTN. Precipitation is collected weekly and analyzed for hydrogen (acidity as pH), sulfate, nitrate, ammonium, chloride, calcium, magnesium, potassium, and sodium.

In 2003, Seney NWR also became a monitoring site for the Mercury Deposition Network. The objective of the network is to develop a national database of weekly concentrations of total mercury in precipitation and the seasonal and annual flux of total mercury in wet deposition. The data is being used to develop information on spatial and seasonal trends in mercury deposited to surface waters, forested watersheds, and other sensitive receptors.

In many of the national maps, Seney NWR is not located in an area of high deposition of many substances (pH, mercury, noxious oxides, NOx) that are elevated further south and east in the Great Lakes Basin.

Due to its remote location, Seney NWR is not near any point-sources of pollution. Therefore, the Refuge is not at risk from spills or other releases from facilities. Instead, the Refuge is more likely to be impacted from air pollution that may originate from other industrialized areas of the Great Lakes basin and beyond.

### Table 5: Ranked Order of Pre-European Settlement Cover Types of Seney NWR by Acres[1] and Percent of Total

| Cover Type | Acres | Percent (%) of Total |
|---|---|---|
| Muskeg-Bog | 64,678 | 68.1 |
| Mixed Conifer Swamp | 11,699 | 12.3 |
| White Pine-Red Pine | 5,354 | 5.6 |
| Jack Pine-Red Pine | 4,462 | 4.7 |
| Hemlock-White Pine | 2,479 | 2.6 |
| Beech-Sugar Maple-Hemlock | 1,785 | 1.9 |
| Spruce Fir-Cedar | 1,719 | 1.8 |
| Hemlock-Yellow Birch | 859 | 0.9 |
| Shrub Swamp-Emergent Marsh | 661 | 0.7 |
| Aspen-Birch | 595 | 0.6 |
| Lake or River | 264 | 0.3 |
| Mixed Hardwood Swamp | 165 | 0.2 |
| Black Ash | 132 | 0.1 |
| Cedar Swamp | 66 | 0.07 |
| Sugar Maple-Hemlock | 33 | 0.03 |
| Total | 94,851 | 99.9 |

1. *Above information derived from pre-European cover type layer supplied by the Michigan Department of Natural Resources (MDNR). This information is based on General Land Office Notes (see Comer et al. 1995). Refuge boundary GIS layer does not correspond exactly to present-day ownership size of 95,238.*

# Natural Resources

## Habitats

### Historic Vegetation

The plant species that presently dominate Seney NWR are primarily the result of two major events: (1) species migration in response to climate change after the retreat of the Wisconsin glacier, and (2) human intervention during the last two centuries (Zhang et al. 2000). General Land Office notes depict the Seney area prior to European settlement as consisting of a mosaic of upland and wetland cover types (Table 5, Comer et al. 1995). The scrub-shrub matrix was interspersed by herbaceous species such as *Carex* and deciduous and coniferous forests of red and white pine, black spruce, balsam fir, American beech, eastern hemlock, sugar maple, and yellow birch (Figure 8).

In the eastern Upper Peninsula of Michigan, mixed-conifer forests comprised approximately 38 percent of the pre-European landscape (Zhang et al. 2000). The distribution of these forests across the landscape was regulated primarily by the interaction of topography, soil moisture, and fire. Generally speaking, wildfires tended to burn more erratically and less frequently on ice-contact landforms than on dry, sandy outwash plains. As a result, many areas of the Refuge were historically dominated by large, interspersed mature red pine and eastern white pine (Vogl 1970, Whitney 1986).

Prior to Refuge establishment, the forests and soils of the Seney area and surrounding Schoolcraft County were exploited to a considerable degree. Early timber cutting favored the best stands of white pine, followed by "high-grading" in the red pine and hardwood-eastern hemlock stands (Karamanski 1989). Slash fires fueled by logging debris occurred repeatedly, with most areas burning on numerous occasions. As sawtimber diminished, efforts were shifted to cutting of poles, posts, ties, and pulp. At this time, an attempt was made to settle cut-over lands and develop farming communities.

On excessively drained to well-drained ice-contact landforms with higher water-holding capacity and nutrient levels than outwash barrens, mixed-pine stands dominated by red pine and eastern white pine were common historically at Seney NWR, with jack pine, aspen, and other early successional hardwood species as typical associates (Comer et al. 1995). These mixed-conifer forests existed on primarily linear outwash channels and "pine islands" interspersed among a matrix of lowland swamp forests or patterned fens (Silbernagel et al. 1997). Now, it is estimated that less than 1 percent of the primary white and red pine forests exist in the regional landscape and much of the Refuge forests too have been structurally and compositionally altered due to past management actions (Frehlich and Reich 1996, Thompson et al. 2006, Drobyshev et al. In Press).

**Figure 8: Historic Landcover of Seney NWR**

## Table 6: Cross-classification of Disturbance by Frequency of Surface and Crown Fire for Common Cover Types, Seney NWR and Surrounding Area[1]

| Surface Fires | Crown/Severe Surface Fire | | | |
|---|---|---|---|---|
| | Frequent (25-100 yr) | Infrequent (100-500 yr) | Rare (500-1,000 yr) | Very Rare (>1,000 yr) |
| Very Frequent (<25 yr) | Jack Pine Barrens/ Aspen Parklands | — | — | — |
| Frequent (25-100 yr) | — | Red-White Oak/Red-White Pine | — | — |
| Infrequent (>100 yr) | Jack Pine-Black Spruce/Spruce-Fir-Birch | Black Spruce Peatlands | — | Sugar Maple-American Basswoood-Sugar Maple-Eastern Hemlock |

1. *Adapted from Frehlich 2002*

***Wildfire History***

Both biotic and abiotic natural disturbances have historically regulated composition and structure of Refuge forests and other habitats (Frehlich 2002, Drobyshev et al. In Press). Historically, fire occurred frequently in mixed pine-dominated landscapes, with relatively low-intensity surface fires occurring once every 5-40 years (Simard and Blank 1982, Engstrom and Mann 1991, Loope 1991). These low-intensity fires usually created small gaps or left the basic structure of the overstory unaltered while maintaining a relatively open understory. Over time, these disturbances tended to produce a mixed-conifer stand with an uneven age structure (Bergeron et al. 1991, Drobyshev et al. In Press). Under certain conditions (e.g., low fuel moisture, low humidity, high temperatures, and strong winds), these fires sometimes intensified and resulted in a stand-replacing fire. The frequency of stand-replacing fires ranged from 160 years for mixed-conifer stands dominated by jack pine, eastern white pine, and red pine, to 320 years for stands not dominated by jack pine (Zhang et al. 1999, Frehlich 2002, Table 6).

Major native biotic disturbances to forests included jack pine budworm (*Choristoneura pinus*) and spruce budworm (*C. fumiferana*). The eruptive and cyclical nature of the disturbance brought about by these species likely coincided with fire as induced tree mortality altered fuel loading and the connectivity of fuels.

# Current Habitat Conditions

At present, the vast majority of areas that were forested during pre-European times in the eastern Upper Peninsula of Michigan are still forested. Relative to most areas in the Midwest, the eastern Upper Peninsula is still comprised of native cover types and has a high degree of ecological integrity. That is, relative to many other parts of the Midwest, the Upper Peninsula of Michigan represents a region where: 1) many ecological processes are intact and within their natural range of variation; 2) for most species their distribution, composition and relative abundance are within their natural range of variation; and 3) the communities found are resilient, or able to recover from severe disturbance events. However, only 13 percent (562,125 acres) of the present landscape of the eastern Upper Peninsula is now dominated by mixed-conifer stands, and the structure of these forests on today's landscape is dramatically different than that on the pre-European landscape (Zhang et al. 2000; Drobyshev et al. In Press).

Based upon General Land Office (GLO) survey records, the mean stem density in the pre-European mixed-conifer forests of the eastern Upper Peninsula was significantly lower than in current mixed-conifer stands. With these presently higher stem densities and corresponding lower stand basal areas, sites that were originally mixed-conifer stands are presently dominated by jack pine and thus differ from their pre-European condition in both composition and structure (Table 7).

## Table 7: Acreage, Percent Total Area, and Three Dominant Forest Management Units (FMUs) by Cover Type at Seney NWR[1]

| Cover Type (Code Description) | Acres | Percent Total Area | Ranked Order Top Three FMUs (Acres) | Percent in Top Three FMUs |
|---|---|---|---|---|
| Scrub/Shrub (Lowland) | 26,354 | 27 | 20 (7720), 4 (2527), 10 (1932) | 46 |
| Sedge/Bluejoint Grass | 9,385 | 10 | 20 (1549), 13 (1301), 14 (1021) | 41 |
| Forested Broadleaf/Coniferous Mix (Lowland) | 5,915 | 6 | 20 (2799), 3 (434), 8 (284) | 59 |
| Aspen/Pine | 5,855 | 6 | 20 (1977), 1 (501), 12 (440) | 50 |
| Sphagnum/Leatherleaf | 4,162 | 4 | 20 (3453), 12 (446), 10 (209) | 99 |
| Water | 3,928 | 4 | 7 (1275), 9 (451), 8 (398) | 54 |
| Forested Coniferous Mix (Upland) | 3,238 | 3 | 17 (476), 20 (394), 9 (258) | 35 |
| Tamarack/Spruce | 3,156 | 3 | 20 (718), 13 (551), 16 (283) | 49 |
| Forested Broadleaf/Coniferous Mix (Upland) | 3,110 | 3 | 20 (844), 17 (428), 9 (297) | 51 |
| Mixed Emergents/Grasses/Forbs | 2,884 | 3 | 11 (480), 7 (344), 13 (322) | 40 |
| Forested Coniferous Mix (Lowland) | 2,399 | 2 | 4 (430), 20 (337), 9 (271) | 43 |
| Aspen/Birch/Fir/Spruce (Lowland) | 2,305 | 2 | 20 (709), 12 (330), 16 (199) | 54 |
| Red Pine/Jack Pine | 2,098 | 2 | 14 (265), 15 (199), 9 (182) | 31 |
| Northern Hardwoods/White Pine/Hemlock | 1,891 | 2 | 20 (803), 18 (261), 17 (221) | 68 |
| Aspen (Upland) | 1,891 | 2 | 20 (859), 12 (383), 17 (144) | 73 |
| Aspen (Lowland) | 1,681 | 2 | 20 (796), 12 (287), 1 (162) | 74 |
| Tag Alder | 1,634 | 2 | 20 (416), 12 (308), 11 (196) | 56 |
| Northern Hardwoods (Maple/Beech/Yellow Birch) | 1,576 | 2 | 20 (534), 17 (460), 18 (263) | 80 |
| Black Spruce | 1,133 | 1 | 19 (147), 16 (143), 13 (133) | 37 |
| Jack Pine | 1,066 | 1 | 15 (182), 16 (162), 17 (127) | 44 |
| Red Pine/White Pine | 935 | 1 | 4 (199), 8 (110), 20 (103) | 44 |
| Forested Broadleaf Mix (Upland) | 905 | 1 | 20 (597), 18 (139), 1 (52) | 87 |
| Grass/Ferns | 900 | 1 | 20 (329), 1 (124), 3 (88) | 60 |
| Tamarack | 821 | 1 | 20 (326), 12 (120), 13 (108) | 67 |
| Forested Broadleaf Mix (Lowland) | 810 | 1 | 1 (271), 20 (266), 2 (125) | 82 |
| Red Pine | 726 | 1 | 1 (203), 20 (115), 18 (83) | 55 |
| Willow | 711 | 1 | 20 (301), 11 (89), 12 (64) | 64 |

## Table 7: Acreage, Percent Total Area, and Three Dominant Forest Management Units (FMUs) by Cover Type at Seney NWR[1]

| Cover Type (Code Description) | Acres | Percent Total Area | Ranked Order Top Three FMUs (Acres) | Percent in Top Three FMUs |
|---|---|---|---|---|
| Submergent Vegetation | 691 | 1 | 19 (175), 8 (145), 9 (130) | 65 |
| Aspen/Birch/Fir/Spruce (Upland) | 540 | 1 | 20 (89), 16 (83), 15 (73) | 45 |
| Spruce/Fir | 509 | 1 | 15 (124), 19 (103), 17 (77) | 60 |
| Cattail | 493 | 1 | 5 (165), 13 (102), 6 (59) | 66 |
| Hayfields | 402 | <1 | 18 (120), 3 (117), 17 (102) | 84 |
| Developed | 308 | <1 | 20 (110), 6 (45), 1 (32) | 61 |
| Scrub/Shrub (Upland) | 255 | <1 | 20 (98), 3 (46), 1 (26) | 67 |
| Northern White Cedar (Lowland) | 189 | <1 | 18 (108), 1 (32), 10 (31) | 90 |
| Rooted-Floating Vegetation | 179 | <1 | 6 (67), 7 (51), 9 (19) | 77 |
| Hemlock (Upland) | 170 | <1 | 20 (119), 1 (35), 15 (9) | 96 |
| Hemlock (Lowland) | 127 | <1 | 3 (37), 17 (24), 8 (15) | 60 |
| White Pine | 104 | <1 | 13 (22), 20 (21), 8 (14) | 55 |
| Hardwoods (Lowland) | 25 | <1 | 20 (7), 18 (6), 9 (4) | 71 |
| No Photo Coverage | 24 | <1 | 19 (21), 20 (3) | 100 |
| Northern White Cedar (Upland) | 12 | <1 | 9 (10), 16 (2) | 100 |

*1. Cover types are shown in ranked order and are based on U. S. Geological Survey-interpreted 2004 aerial photos.*

For the purpose of this plan, we combined the resulting 41 vegetative cover types (not including "Developed" and "No Photo Coverage") into 10 habitat types. In ranked order by acreage, these 10 habitat types (Figure 9) are:

- Scrub-Shrub (28,954 acres)
- Open Wetlands (16,617 acres)
- Mixed Forest-Uplands (11,396 acres)
- Coniferous Forest-Uplands (8,857 acres)
- Mixed Forest-Lowlands (8,221 acres)
- Coniferous Forest-Lowlands (7,825 acres)
- Open Water (5,103 acres)
- Deciduous Forest-Uplands (4,372 acres)
- Deciduous Forest-Lowlands (2,515 acres)
- Upland Old Fields and Openland (1,302 acres)

*Scrub-Shrub Habitat Type* (28,954 acres): This habitat type includes scrub-shrub lowland, tag alder, willow, and scrub shrub upland cover types. This habitat type dominates the Refuge. Common species (and species groups) include alder, red osier dogwood, willow, meadowsweet, current, bedstraw, joe-pye-weed, goldenrod, and marsh fern.

*Open Wetland Habitat Type* (16,617 acres): This habitat type includes sedge-bluejoint grass, mixed emergents-grasses-forbs, cattail, and sphagnum-leatherleaf cover types. This habitat type contains many different herbaceous species, with composition related to moisture, exposure, and soil conditions.

**Figure 9: Current Landcover of Seney NWR (2007)**

*Mixed Forest-Upland Habitat Type* (11,396 acres): This habitat type contains aspen-pine, upland forested broadleaf-coniferous mix, northern hardwood-white pine, eastern-hemlock, and aspen-birch-fir-spruce upland cover types. Common overstory species include white pine, red pine, and jack pine, and deciduous species such as red maple, quaking and large-toothed aspen. Understory species include wild raisin, bracken fern, hazels, wild strawberry, princess pine, blueberry, and huckleberry.

*Coniferous Forest-Upland Habitat Type* (8,857 acres): This habitat type includes upland forested coniferous mix, red pine-jack pine, jack pine, red pine-white pine, red pine, upland spruce-fir; hemlock, white pine, and upland northern white cedar cover types. Understory species include wild raisin, bracken fern, hazels, wild strawberry, princess pine, blueberry, and huckleberry. Lichens, grasses and sedges are also represented, especially in the second growth aspen stands.

*Mixed Forest-Lowlands Habitat Type* (8,221 acres): includes forested broadleaf-coniferous mix, lowland and aspen-birch-fir-spruce, and other lowland cover types. Overstory species include coniferous species such as black spruce, balsam fir, and tamarack, as well as deciduous species such as black ash, quaking aspen, and red maple.

*Coniferous Forest-Lowland Habitat Type* (7,825 acres): Habitat includes tamarack-spruce, forested coniferous mix lowland; black spruce; tamarack; northern white cedar, lowland; and hemlock lowland cover types. This habitat type represents a combination of two basic forests types: the spruce-fir or boreal forest, and the northern lowland or swamp conifer forest. White spruce and balsam fir comprise the majority of tree species in the first forest type (with some eastern hemlock), while white cedar, black spruce and tamarack constitute the majority in the second forest type. Typical associates, in this habitat type, include paper birch, red maple, and alder. Common shrubs include round-leafed dogwood, hazel, honeysuckle, thimbleberry, and blueberries. Other understory plants include sweet gale, leatherleaf, bog rosemary, and cranberry. However, when the canopy is closed little understory exists.

*Open Water Habitat Type* (5,103 acres): Habitat includes water; rooted-floating vegetation; and submergent vegetation cover types. Open water consists of anthropogenic pools and natural stream channels. The pools were created by using dikes and channels to impound water on what was once scrub-shrub and lowland coniferous forest.

*Deciduous Forest-Upland Habitat Type* (4,372 acres): Habitat includes aspen upland, northern hardwoods (maple-beech-yellow birch), forested broadleaf mix, and other upland cover types. This habitat type is commonly referred to as the broadleaf forest, northern mesic, northern hardwood, or hardwood-hemlock forest, and is comprised of sugar maple, American beech, and yellow birch, with eastern hemlock as an important associate. Other associates include American basswood, black cherry, paper birch, white spruce, white ash, and balsam fir. When the tree canopy closes in, the herbaceous plants disappear. However, in suitable areas, several shrubs (e.g., Canada yew, elderberry, leatherwood, and hazel) and other plants (e.g., partridge berry, bunchberry, twinflower, baneberry, trillium) can occur. This forest type is scattered through the Refuge, usually on the most nutrient rich soils.

*Deciduous Forest-Lowland Habitat Type* (2,515 acres): Habitat includes aspen lowland, forested broadleaf mix lowland, and hardwoods lowland cover types. This habitat type is comprised of red maple, black and white ash, and American basswood and is scattered through the Refuge, usually next to riparian corridors.

*Upland Old Fields and Openland Habitat Type* (1,302 acres): This habitat type includes grass-ferns and hayfields cover types. This habitat type consists of primarily anthropogenic habitats created prior to the Refuge establishment in 1935. Many non-native grass species, such as Kentucky bluegrass and several brome species, characterize these areas.

# Wildlife

## Birds

Relative to pre-European times, it is likely that Seney NWR is presently richer in bird species due to anthropogenic habitats such as Refuge pools and upland old fields and openland. A total of 231 bird species comprise the Refuge's species list of migrants and residents, including breeding and stopover species (Appendix C). It comes as no surprise then that Seney NWR is an Important Bird Area (American Bird Conservancy) and has 46 USFWS R3 Priority Species, 23 of which utilize primarily terrestrial habitats. The Refuge also has

## Figure 10: Number of Bird Species Found at Seney NWR by Breeding Habitat[1]

1. According to Brewer et al. (1991)

many species that are listed on United States Forest Service and Michigan Department of Natural Resources conservation lists (Table 9 on page 42). Species of high public interest include Common Loon, Bald Eagle, Osprey, Yellow Rail, Sandhill Crane, Trumpeter Swan, Sharp-tailed and Spruce Grouse, Black-backed Woodpecker, Connecticut Warbler, Le Conte's Sparrow, and game species such as American Woodcock and Ruffed Grouse.

To better assess the Refuge's bird community and help prioritize habitat preservation, conservation, and restoration, Brosnan and Corace (2006) compiled a bird assessment for the Refuge that linked the Refuge's bird species list with (1) preferred breeding habitat types (Brewer et al. 1991) classified per the Refuge's USGS cover type map; (2) nest locations (Ehrlich et al. 1988); (3) global breeding population percentages estimates for Michigan (Rich et al. 2004); (4) Breeding Bird Survey (BBS) regional and national population trends (Sauer et al. 2005); and (5) Partners in Flight (PIF) Midwest conservation priority scores (PIF 2006).

Results indicated that most bird species at Seney NWR are associated with forested habitats. Sixty bird species of Seney NWR breed in wet coniferous forests alone (Figure 10). A significant number of birds also utilize open water and open wetlands for breeding habitat. On a finer spatial scale, there were 13 primary nest location types used by the bird species found on the Refuge. An estimated 40 percent of the Refuge bird species are ground-nesters, with tree, snag, and shrub structures also yielding a higher than average number of species.

A total of 135 species had percent global population scores, and 192 species had information on national population trend data from the BBS survey. A total of 171 bird species had information on regional population trend data within the Boreal Hardwood Transition zone. There were PIF Midwest priority scores for 151 of the bird species. A summary of these scores is shown in Figure 11.

Because of the spatial habitat heterogeneity at Seney NWR, the Refuge should continue to have a high degree of bird diversity, while providing for many species of conservation concern in most existing habitat types. In particular, because Seney NWR has more area in forest habitat types relative to other refuges in the Midwest (and even Lower 48 states), the Refuge has the opportunity to be a leader in forest habitat management for bird conservation.

## Figure 11: Average Conservation Value for Bird Species Found at Seney NWR by Habitat Type

## Mammals

There are approximately 50 extant mammal species at the Refuge, with other species (e.g., fox squirrel and opossum) likely to colonize the area in future years due to range expansion in light of climate change (Appendix C). Some of the mammals found at the Refuge are listed as USFWS Region 3 Priority Species (e.g., gray wolf), and many other species are listed on United States Forest Service and Michigan Department of Natural Resources conservation lists (Table 9 on page 42). Species of high public interest include gray wolf, fisher, American marten, river otter, beaver, snowshoe hare, and white-tailed deer. Seney NWR's mammal community composition is likely similar to what it was during pre-European times, and thus the predator-prey systems are likely not significantly altered at the Refuge. For instance, the predator-prey relationship that now exists between the small number of gray wolves on the Refuge and the white-tailed deer and beaver they prey upon seems to be in concert, with neither the predator nor the prey species causing considerable ecological concern. Moreover, as a site for the release of individuals, the Refuge has played an integral part, for instance, in the regional restoration of populations of species such as fisher and American marten.

## Fish

Seventeen species of fish have been known to occur in the pools on the Refuge. If the Manistique River, the southern boundary of the Refuge, is included the possible total number of fish species present increases to 43. Northern pike, yellow perch, black crappie, brown bullhead, and bluegill are five species of popular game fish in the pool system. Species of fish that are in the rivers and streams within the boundaries of the Refuge include the previous mentioned and walleye, smallmouth

bass, brook trout, and brown trout. The brook trout is listed as a Region 3 Conservation Priority Species.

Seney NWR's fish community composition is likely very different to what it was during pre-European times, primarily due to the large number of non-native salmonids and other species such as sea lamprey. Therefore, unlike the mammal community, the fish predator-prey systems are likely significantly altered at the Refuge.

### Reptiles and Amphibians

The herptofauna community at Seney NWR consists of approximately 22 extant species (Appendix C). Although none of these species are listed as USFWS Region 3 Conservation Priority Species, some are listed on United States Forest Service and Michigan Department of Natural Resources conservation lists (Table 9 on page 42). Of special interest in Michigan, for instance, is the Refuge's mink frog population. This species is at its southern range periphery in the Upper Peninsula of Michigan and is not widely distributed in the region.

### Resources of Concern

Resources of Concern were identified by literature review and expert opinion. Refuge resources of concern include special areas, habitats, ecosystems, and individual species. Lists of vertebrates occurring on the Refuge and surrounding area and their conservation status according to FWS Region 3, the USFS Regional Forester, and the State of Michigan are shown in Table 9 on page 42.

## Ecosystems of Concern

Ecosystems of greatest conservation concern at Seney NWR include patterned fens, rivers, old-growth-virgin deciduous forests, and mature-old growth red and white pine forests (Noss and Scott 1997). A number of specific parcels of land have been set-aside or removed from active management, including the Seney Wilderness Area (1970), the Strangmoor Bog National Natural Landmark (designation date 1973), and a number of Research Natural Areas and Public Use Natural Areas (Figure 12). The five Research Natural Areas are Strangmoor Bog (640 acres), SAF 15 Red Pine (100 acres), SAF 23 Hemlock (50 acres), and SAF 25 Sugar Maple-Beech-Yellow Birch (350 acres). The two Public Use Natural Areas are White Pine (30 acres) and Northern Hardwoods (68 acres).

*Black bear. USFWS photo.*

## Habitat Conservation, Restoration, and Preservation: Forests and Other Terrestrial Ecosystems

Seney NWR contains 20 Forest Management Units (FMUs, Figure 13 on page 36). These long-standing FMUs were devised based upon existing and potential vegetation features, location to access sites, size and shape, as well as management mandates that dictate management strategies to a considerable degree, including Wilderness Area and the designation of other natural areas. Other criteria, such as proximity to human development, were deemed not significant enough to further delineate FMUs.

Forests of Seney NWR have seen dramatic alterations due to exploitation (Verme 1996, Losey 2003), utilitarianism, and "edge management" (Leopold 1933). Now, the proposed philosophy for management of these ecosystems stems from a perspective of landscape (Forman 1995) and disturbance (Frehlich 2002) ecology within a conservation biology context (Hunter 1990, Askins 2000).

## Figure 12: Administrative and Visitor Facilities and Natural Areas of Seney NWR

## Figure 13: Seney NWR Forest Management Units

Prior to Refuge establishment, forests that contained valuable timber and were accessible either by road or stream were degraded and altered from their pre-European settlement conditions by logging and, in xeric, conifer-dominated areas, resulting wildfires fueled by logging debris (Karamanski 1989, Comer et al. 1995, Verme 1996, Drobyshev et al., In Press). The degree to which these forests were altered from their pre-European settlement condition is thought to be positively correlated to their proximity to roads and/or streams (Corace et al., Ongoing Refuge Research).

After Refuge establishment in 1935, forest management objectives were primarily concerned with managing for early successional habitats, such as aspen and jack pine. Consequently, in many (but not all) forest patches, compositional and structural patterns that now exist are considerably different relative to pre-European benchmark conditions. For instance, in many sites that once grew long-lived, later seral stage, red and white pine, past management activities have shifted stand dominance to shorter-lived, earlier seral stage, jack pine with a concomitant loss of structural diversity. Similarly, in northern hardwood stands, salvage logging for utilitarian objectives during the 1970s and the recent arrival of Beech Bark Disease have together decreased the ecological integrity of many of these forests as well, with adverse impacts to many wildlife species (especially neotropical migrant birds) of national, regional, or local concern.

The goal of forest management at the Refuge is to conserve the diversity of cover types and seral stages at the landscape scale, while providing ecosystems, habitats, or seral stages important for species of national, regional, state, or local conservation concern. At the patch scale, management focuses on conserving and restoring historic compositional and structural patterns to forests that were degraded by past human activities. In doing so, the Refuge provides a model for the Forest Bird Conservation Area (FBCA) concept posed by Matteson et al. (In Review).

Forest management at the Refuge should be ecologically-based (Seymour and Hunter 1999), should de-emphasize single-species management (Simberloff 1997), maintain Refuge biodiversity, and strive to conserve and restore nationally, regionally, or locally imperiled ecosystems and habitat types (Holling and Meffe 1996, Lambeck 1997). Management should also increase mean patch size (Crozier and Niemi 2003) across the Refuge, and increase connectivity between similar forests or habitat types. Forest management should also focus on the spatial arrangement of existing forests or habitat types and conserve and restore forest stand structure and composition where and when possible (Askins 2000). For instance, early successional forests (e.g., aspen, jack pine) that now exist on the Refuge boundary (e.g., Forest Management Units 1 to 6) should be conserved so as to produce larger overall patches by linking with similar cover types managed by the primary surrounding land owner, the State of Michigan.

Elsewhere, however, management should be directed at moving succession primarily "forward" and provide near benchmark conditions for later successional red and white pine and northern hardwood forests as near-benchmark examples of these forests are especially imperiled nationally, regionally, and locally (Noss and Scott 1997). Thus, forest management should provide a gradient from earlier successional forest cover types (e.g., aspen and jack pine) at the northern periphery of the Refuge to later successional ecosystems and seral stages within the interior and at the southern portion of the Refuge while maintaining existing stands of late successional forests wherever they are found.

The patch-scale focus of forest management should promote ecological integrity by restoring composition, structure, and processes in altered stands and maintaining these characteristics in relatively unaltered stands. In late successional forests

comprised of red and white pine, eastern hemlock, and northern hardwood-associated tree species, an increased focus should be placed on providing coarse woody debris and standing snags. According to a literature review by Sallabanks and Arnett (2005), of all the characteristics of forest ecosystems that can be altered by management, the size, diversity, and abundance of snags may be the most important factor affecting bird diversity and abundance at the stand scale. Research conducted at the Refuge also indicated that stands with more compositional and structural diversity (including increased coarse woody debris and snags) have more diverse small mammal communities, an important component of ecologically integrity in northern forest ecosystems (Harrington 2006).

Refuge forest patches with pre-European settlement forest conditions contain many large-diameter snags (Drobyshev et al. In Press). However, most forest patches on the Refuge are even-aged and less compositionally or structurally diverse. Except for a few, highly scattered individuals, there are very few snags and cavities present in some areas, except those in near benchmark conditions. Most of the snags that are present are of limited value to many cavity-nesting species (e.g., Wood Duck, Black-backed Woodpecker, Pileated Woodpecker) due to their relatively small diameter. The creation of snags will accomplish several objectives:

- Improve forest stand structural and compositional diversity.
- Increase the patchiness of canopy coverage and thereby enhance age structure of the stands.
- Provide nesting sites for cavity-nesting wildlife species.
- Increase woody debris on the forest floor for wildlife such as salamanders and invertebrates.
- Promote ecological processes.
- Provide organic material to soil layers altered by turn-of-the-century wildfires.

Forest management at the Refuge should use all the necessary tools to meet ecologically-based objectives. In most stands, prescribed fire will not move succession forward as it may compound the effects of past wildfires by consuming soil organic matter, and promoting the establishment of jack pine. However, where patches of early successional species such as aspen and jack pine are to be maintained, prescribed fire may be applied, and in some later successional stands in near benchmark condition, prescribed fire here too may be used to maintain existing conditions. Elsewhere, commercial and non-commercial mechanical treatments may be used to move succession forward or maintain existing conditions. In all instances, Michigan Best Management Practices (MDNR) are used to provide the minimum standards for management. In particular, wherever streams, pools, or wetlands exist management should be buffered from the effects of logging activities (the exception is on pool dikes where many of the existing trees should be removed). At a minimum, a 100-foot management buffer on either side of streams and surrounding pools will be used to minimize soil disturbances.

### Wetland Management

Seney NWR is blessed with an abundance of water for its pool system (Table 8). As a result, drought and growing season flooding are not extremely important factors influencing water management. This unique and biologically complex pool system was constructed during the late 1930s and early 1940s, making it at least 65-70 years old. The pool system at Seney NWR uses gravity flow to manipulate water levels in all pools. Water enters the north end of the Refuge via rivers, ditches or creeks and flows generally southeast to the Manistique River. General ground slope is southeast at approximately 10 feet per mile. Existing impoundments have been developed by constructing dikes across the general slope to intercept rivers, creek, ditches and overland water flow.

*White pine stump and jack pine, Seney NWR. USFWS photo.*

## Table 8: Pool Name With Water Control Structures, Initial Flooding Date and Size at Seney NWR

| Unit | Pool | Initial Flooding Date | Acreage (Open Water) |
|---|---|---|---|
| 1 | Show Pools (North and South) | Spring 1937 | 57 |
| | Upper Goose Pen | Spring 1937 | 27 |
| | Lower Goose Pen | Spring 1937 | 93 |
| | A-1 | Spring 1937 | 259 |
| | B-1 | Spring 1937 | 243 |
| | C-1 | Spring 1937 | 302 |
| | D-1 | Spring 1937 | 197 |
| | E-1 | Spring 1937 | 490 |
| | F-1 | Fall 1936 | 258 |
| | G-1 | Spring 1937 | 202 |
| | H-1 | Spring 1937 | 111 |
| | I-1 | Spring 1937 | 129 |
| | J-1 | Spring 1937 | 214 |
| | | | Unit 1 Total: 2,582 |
| 2 | A-2 | Fall 1939 | 282 |
| | C-2 | Fall 1939 | 501 |
| | M-2 | Spring 1941 | 863 |
| | T-2 East | Spring 1941 | 233 |
| | | | Unit 2 Total: 1,879 |
| 3 | C-3 | Fall 1942 | 702 |
| | Marsh Creek | Late 1950s | 950 |
| | Delta Creek | Late 1950s | 50 |
| | | | Unit 3 Total: 1,702 |
| Total Pool Acreage | | | 6,163 |

*Water Rights:* Because of the general land slope of 10 feet per mile and the location of water control structures, upstream landowners are not affected by water management on the Refuge. In the State of Michigan, a land owner of the water course is entitled to have the stream flow by or through his or her property substantially undiminished in quantity and quality. The natural flow of the stream, however, is subject to the privilege of the upstream riparian owner to make "reasonable" use of the water as it flows past or through his or her land. The owner of Seney NWR, the U.S. Fish and Wildlife Service, is a riparian landowner and can make reasonable use of the water passing through the Refuge as long as such use is not to the detriment of lower riparian

owners. Currently, water flows from the Refuge into the Manistique River without any major detriment in quantity to the downstream users.

The Refuge has received a few requests to hold as much water as possible during spring periods of high flow in the Manistique River. These requests were made during flood stage conditions when the Refuge was unable to retain any more water. Water management will, when possible, attempt to reduce discharge into the Manistique River during these times as long as water levels on the Refuge are not high enough to damage dikes or control structures.

*Water Supply:* Annual average precipitation is approximately 32 inches per year. Precipitation accounts for 60 percent of Refuge water intake. The bundant rainfall is essential to maintaining water evels in the managed pools because all 60 miles of Refuge dikes are constructed of sand and they have high profile seeps and subsequent high water loss. he remaining 40 percent of the Refuge water supply comes from the ditches, rivers, and creeks. Peak lows through the Refuge marsh and water system normally occur during spring. Snowmelt, frozen ground, and rain can combine to create destructive floods, although such events are rare. However during spring run-off daily attention to pool levels and structures is required.

*Pool History and Management:* Most water level management prior to 1963 consisted of holding the pools at a stable levels throughout the year (Fjetland 1973). Some experimentation with drawdowns occurred when pools levels were lowered to facilitate repair work. As a result, the pools have a variety of management histories. From 1963-1969 the approach was to manage the pools with fluctuating water levels. The general practice was to maintain low level through the winter, raise them in the spring, hold high through the nesting season and then drop the levels through the rest of the summer. In 1970, partly as a result of recommendations by Fjetland (1973), stable level water management resumed until 1983.

The current program is based on water level manipulations and maintenance of approximately 6,163 surface acres within 21 man-made impoundments with water control structures (1993 Long Range Marsh and Water Management Plan). An additional 65,000 wetland acres are maintained naturally by precipitation, surface runoff, or by diversions and ditches associated with the man-made structures. Rotational water level drawdown and flooding management within the 21 pool provides resident and migratory birds with approximately 1,500 acres of moist soil plant production annually. In addition, full and partial draw-downs produce an estimated 2,300 acres of emergent vegetation for nesting and brood habitat.

Each pool is managed for specific wildlife objectives as detailed in the current Annual Water Management Plan. This Plan is used to define detail pool objectives and associated water levels. It takes into account maintenance requirements and the objectives and water levels in adjacent pools' Annual Water Management Plans are guided by Long Range Marsh and Water Management Plan, written in 1993.

During spring and early summer, pools will be filled to the maximum permissible level unless the annual plan specifies otherwise. During late summer, water levels on most pools will be lowered approximately 1 foot to facilitate use of submergent vegetation by staging and migrating waterfowl and to provide some mudflats for use by Sandhill Crane, shorebirds, and Canada Goose. After October 15, impoundment levels will be maintained to accommodate over wintering of fish species and initial spring runoff. All Annual Water Level Management Plans are subject to change given the current environmental conditions.

Once the CCP is completed for Seney NWR, the Long Range Marsh and Water Management Plan will be revised and incorporated into the Seney NWR Habitat Management Plan.

*F-Pool, Seney NWR. USFWS photo.*

# Associated Plans and Initiatives

## Michigan's Wildlife Action Plan

In 2005, Michigan's Wildlife Action Plan (WAP) was completed to better manage wildlife species and their habitats of "greatest conservation need" in Michigan. The plan was developed with the support of funding from the State Wildlife Grant Program (SWG) created by Congress in 2001. The goal of the plan is to provide a common strategic framework that will enable Michigan's conservation partners to jointly implement a long-term holistic approach for the conservation of all wildlife species. Members of the partnership include the Michigan Department of Natural Resources, the U.S. Fish and Wildlife Service, the U.S. Forest Service, The Nature Conservancy, Michigan Natural Features Inventory, academics from several Michigan universities, as well as many other agencies and conservation organizations.

The Michigan Wildlife Action Plan:

- Provides an ecological, habitat-based framework to aid in the conservation and management of wildlife;
- Identifies and recommends actions to improve habitat conditions and population status of species with the greatest conservation need (SGCN), which are those species with small or declining populations or other characteristics that make them vulnerable;
- Recommends actions that will help to keep common species common;
- Identifies and prioritizes conservation actions, research and survey needs, and long-term monitoring needed to assess the success of conservation efforts;
- Complements other conservation strategies, funding sources, planning initiatives, and legally mandated activities;
- Incorporates public participation to provide an opportunity for all conservation partners and Michigan residents to influence the future of resource management;
- Provides guidance for use of SWG funds; and
- Provides a clear process for review and revision as necessary to address changing conditions and to integrate new information as it becomes available.

## Migratory Bird Conservation Initiatives

Several migratory bird conservation plans have been published over the last decade that can be used to help guide management decisions for refuges. Bird conservation planning efforts have evolved from a largely local, site-based orientation to a more regional, even inter-continental, landscape-oriented perspective (Figure 14). Several trans-national migratory bird conservation initiatives have emerged to help guide the planning and implementation process. The regional plans relevant to Seney NWR are:

- The Upper Mississippi River/Great Lakes Joint Venture Implementation Plan of the North American Waterfowl Management Plan;
- The Partners in Flight Boreal Hardwood Transition [land] Bird Conservation Plan;
- The Upper Mississippi Valley/Great Lakes Regional Shorebird Conservation Plan; and
- The Upper Mississippi Valley/Great Lakes Regional Waterbird Conservation Plan.

All four conservation plans will be integrated under the umbrella of the North American Bird Conservation Initiative. Each of the bird conservation initiatives has a process for designating priority species, modeled to a large extent on the Partners in Flight method of computing scores based on independent assessments of global relative abundance, breeding and wintering distribution, vulnerability to threats, area importance, and population trend. These scores are often used by agencies in developing lists of priority bird species. The Service based its 2001 list of Non-game Birds of Conservation Concern primarily on the Partners in Flight, shorebird, and waterbird status assessment scores.

# Wildlife Species of Management Concern

Table 9 on page 42 summarizes information on the status and current habitat use of important wildlife species found on lands within by Seney NWR. Individual species, or species groups, were chosen because they are listed as Regional Resource Con-

**Figure 14: Bird Conservation Region 12, Boreal Hardwood Transition**

servation Priorities or state-listed threatened or endangered species. Other species are listed due to their importance for economic or recreational reasons, because the Refuge or its partners monitor or survey them, or for their status as a nuisance or invasive species.

# Current Refuge Programs: Where We Are Today

Consistent with its authorizing legislation, Seney NWR conducts a broad array of wildlife management activities and provides a variety of visitor services. Refuge management has made significant progress in implementing these planned activities over the years since establishment. Refuge planning and management, however, are a continual work in process and evolve over time, depending on feedback and monitoring as well as changing values, needs, and priorities in wildlife management at the Refuge, regional, and national scale.

This section summarizes current management programs, operations, and facilities at Seney NWR. It also describes the participation and cooperation of Refuge staff and management activities with our partnering agencies and stakeholders in the wider community on efforts to balance competing demands for natural resources, wildlife, and protection from environmental hazards.

## Habitat Restoration

Many of the current management efforts on the Refuge focus on restoring ecosystems and wildlife habitats and populations that have declined since the intensive habitat modification and destruction wrought by Euro-American settlement, agricultural development and drainage projects.

### Prescribed Fire

Fires are a natural part of the Boreal Forest in the Great Lakes Ecosystem. Prior to European settlement, large fires (10,000 to 25,000 acres) swept across the landscape approximately every 25 to 35 years (Drobyshev et al. In Press). This ecological disturbance shaped the composition and structure

## Table 9: Wildlife Species of Conservation Concern at Seney NWR and Nearby Lands

| Common Name | Scientific Name | Special Designations | | | Occurence on the Refuge a= Abundant c= Common u=Uncommon r= Rare-occasional, vagrant, | | | | Preferred Habitat(s) |
|---|---|---|---|---|---|---|---|---|---|
| | | Region 3 Conservation Priority | Regional Forester Sensitive | Michigan Special Animal | a | c | u | r | |
| **Birds** | | | | | | | | | |
| Common Loon | *Gavia immer* | ✓ | ✓ | ✓ | | ✓ | | | OWA |
| Double-creasted Cormorant | *Phalacrocorax auritus* | ✓ | | | | | | ✓ | OWA |
| American Bittern | *Botaurus lentiginosus* | ✓ | | ✓ | | ✓ | | | OWE |
| Least Bittern | *Ixobrychus exilis* | ✓ | ✓ | ✓ | | | | ✓ | OWE |
| Black-crowned Night Heron | *Nycticorax nycticorax* | ✓ | ✓ | ✓ | | | | ✓ | OWE |
| Trumpeter Swan | *Cygnus buccinator* | ✓ | ✓ | ✓ | ✓ | | | | OWA |
| Snow Goose | *Chen caerulescens* | ✓ | | | | | | ✓ | OWA |
| Canada Goose | *Branta canadensis* | ✓ | | | ✓ | | | | OWA |
| American Black Duck | *Anas rubripes* | ✓ | | | | ✓ | | | OWA |
| Canvasback | *Aythya valisineria* | ✓ | | | | | | ✓ | OWA |
| Lesser Scaup | *Aythya affinis* | ✓ | | | | | | ✓ | OWA |
| Wood Duck | *Aix sponsa* | ✓ | | | | ✓ | | | OWA, OWE |
| Mallard | *Anas platyrhynchos* | ✓ | | | | ✓ | | | OWA, OWE |
| Blue-winged Teal | *Anas discors* | ✓ | | | | ✓ | | | OWA, OWE |
| Northern Pintail | *Anas acuta* | ✓ | | | | | | ✓ | OWA, OWE |
| Osprey | *Pandion haliaetus* | | | ✓ | | ✓ | | | OWA |
| Bald Eagle | *Haliaeetus leucocephalus* | ✓ | | ✓ | | ✓ | | | OWA |
| Peregrine Falcon | *Falco peregrinus* | ✓ | ✓ | ✓ | | | | ✓ | OWE, GRA, HAY |
| Merlin | *Falco columbarius* | | | ✓ | | | ✓ | | DCF, DMF, MCF, MMF, WCF, WMF |
| Red-shouldered Hawk | *Buteo lineatus* | ✓ | ✓ | ✓ | | | | ✓ | WMF, WCF |
| Cooper's Hawk | *Accipiter cooperii* | | | ✓ | | | ✓ | | DCF, DMF, MCF, MMF, WCF, WMF |

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|---|---|---|---|---|---|---|---|---|---|
| | | Region 3 Conservation Priority | Regional Forester Sensitive | Michigan Special Animal | a | c | u | r | |
| Northern Goshawk | *Accipiter gentiles* | ✓ | ✓ | ✓ | | | ✓ | | DCF, DMF, MCF, MMF, WCF, WMF |
| Northern Harrier | *Circus cyaneus* | ✓ | ✓ | ✓ | | ✓ | | | OWE, GRA, HAY, OLD |
| Spruce Grouse | *Falcipennis canadensis* | | ✓ | ✓ | | | ✓ | | DCF, WCF |
| Sharp-tailed Grouse | *Tympanuchus phasianellus* | | ✓ | ✓ | | | ✓ | | GRA, HAY, OLD |
| Yellow Rail | *Coturnicops noveboracensis* | ✓ | ✓ | ✓ | | | ✓ | | OWE |
| Upland Sandpiper | *Bartramia longicauda* | ✓ | ✓ | | | | ✓ | | GRA, HAY, OLD |
| American Woodcock | *Scolopax minor* | ✓ | | | | ✓ | | | SUP |
| Greater Yellowlegs | *Tringa melanoleuca* | ✓ | | | | ✓ | | | SHO |
| Caspian Tern | *Sterna caspia* | | ✓ | ✓ | | ✓ | | | OWA |
| Common Tern | *Sterna hirundo* | ✓ | ✓ | ✓ | | | ✓ | | OWA |
| Black Tern | *Chlidonias niger* | ✓ | ✓ | ✓ | | | ✓ | | OWA, OWE |
| Black-billed Cuckoo | *Coccyzus erythropthalmus* | ✓ | | | | | ✓ | | SWE, SUP |
| Long-eared Owl | *Asio otus* | ✓ | | ✓ | | | ✓ | | DCF, DMF, WCF, WMF |
| Great Gray Owl | *Strix nebulosa* | | ✓ | | | | | ✓ | OWE, GRA, HAY, OLD |
| Short-eared Owl | *Asio flammeus* | | ✓ | ✓ | | | | ✓ | OWE, GRA, HAY, OLD |
| Boreal Owl | *Aegolius funereus* | | ✓ | | | | | ✓ | WDF |
| Whip-poor-will | *Troglodytes aedon* | ✓ | | | | | ✓ | | DCF, GRA, HAY, OLD |
| Black-backed Woodpecker | *Picoides arcticus* | | ✓ | ✓ | | | ✓ | | DCF, DMF, MCF, MMF, WCF, WMF |

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|---|---|---|---|---|---|---|---|---|---|
| | | Region 3 Conservation Priority | Regional Forester Sensitive | Michigan Special Animal | a | c | u | r | |
| Northern Flicker | *Colaptes auratus* | ✓ | | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Red-headed Woodpecker | *Melanerpes erythrocephalus* | ✓ | | | | | | ✓ | GRA, HAY, OLD |
| Olive-sided Flycatcher | *Contopus cooperi* | ✓ | ✓ | | | | ✓ | | DCF, DMF, MCF, MMF, WCF, WMF |
| Yellow-bellied Flycatcher2 | *Empidonax flaviventris* | | ✓ | | | ✓ | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Marsh Wren | *Cistothorus palustris* | | | ✓ | | | ✓ | | OWE, SWE |
| Sedge Wren | *Cistothorus platensis* | ✓ | | | | ✓ | | | SWE |
| Wood Thrush | *Hylocichla mustelina* | ✓ | | | | | ✓ | | MMF, DCF |
| Swainson's Thrush2 | *Catharus ustulatus* | | ✓ | | | | ✓ | | WCF, WMF |
| Black-throated Blue Warbler | *Dendroica caerulescens* | ✓ | ✓ | | | | ✓ | | MDF |
| Canada Warbler | *Wilsonia canadensis* | ✓ | | | | | ✓ | | MDF, WMF, MMF |
| Kirtland's Warbler | *Dendroica kirtlandii* | ✓ | | ✓ | | | | ✓ | DCF |
| Connecticut Warbler | *Oporornis agilis* | ✓ | ✓ | | | ✓ | | | SUP |
| Cape May Warbler | *Dendroica tigrina* | ✓ | | | | | ✓ | | WCF, WMF |
| Bay-breasted Warbler | *Dendroica castanea* | | ✓ | | | | ✓ | | WCF, WMF |
| Cerulean Warbler | *Dendroica cerulean* | ✓ | ✓ | ✓ | | | | ✓ | WMF, WCF |
| Golden-winged Warbler | *Vermivora chrysoptera* | ✓ | | | | | | ✓ | SUP |
| Field Sparrow | *Spizella pusilla* | | | | | | ✓ | | GRA, HAY, OLD, SUP |
| Le Conte's Sparrow | *Ammodramus leconteii* | ✓ | ✓ | | | ✓ | | | OWE |
| Bobolink | *Dolichonyx oryzivorus* | ✓ | ✓ | | | ✓ | | | GRA, HAY, OLD, PAS |

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|---|---|---|---|---|---|---|---|---|---|
| | | Region 3 Conservation Priority | Regional Forester Sensitive | Michigan Special Animal | a | c | u | r | |
| Eastern Meadowlark | *Sturnella magna* | ✓ | | | | | ✓ | | GRA, HAY, OLD, PAS |
| Western Meadowlark | *Sturnella neglecta* | ✓ | | ✓ | | | | ✓ | GRA, HAY, OLD, PAS |
| | | | | | | | | | |
| **Mammals:** | | | | | | | | | |
| Water Shrew | *Sorex palustris* | | ✓ | | | | ✓ | | MDF, MMF, MCF, SHO |
| Northern Bat | *Myotis septentrionalis* | | ✓ | | | | | ✓ | DDF |
| Gray Wolf | *Canis lupus* | ✓ | | ✓ | | | ✓ | | DDF, MDF, DMF, MMF, DCF, MCF, SUP, OLD, GRA, PAS, HAY, SHO |
| Black Bear | *Ursus americanus* | | ✓ | | | ✓ | | | DDF, MDF, DMF, MMF, DCF, MCF |
| River Otter | *Lutra canadensis* | | ✓ | | | ✓ | | | OWA |
| Badger | *Taxidae taxus* | | ✓ | | | | | ✓ | GRA, PAS, HAY |
| Marten | *Martes americana* | | ✓ | | | | ✓ | | DCF, MCF |
| Canada Lynx | *Lynx canadensis* | | | ✓ | | | | ✓ | DCF, MCF, WCF |
| Bobcat | *Lynx rufus* | | ✓ | | | ✓ | | | DMF, MMF, DCF, MCF |
| Moose | *Alces alces* | | | ✓ | | | ✓ | | WCF, SWE |
| | | | | | | | | | |
| **Fish:** | | | | | | | | | |
| Brook Trout | *Salvelinus fontinalis* | ✓ | | | | | | ✓ | OWA |
| Pugnose Shiner | *Notropis anogenus* | | | ✓ | | | | ✓ | OWA |

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|---|---|---|---|---|---|---|---|---|---|
| | | Region 3 Conservation Priority | Regional Forester Sensitive | Michigan Special Animal | a | c | u | r | |
| Sea Lamprey | *Petromyzon marinus* | ✓ | | | | | | ✓ | OWA |
| Lake Sturgeon | *Acipenser fulvescens* | ✓ | | ✓ | | | | ✓ | OWA |
| | | | | | | | | | |
| **Herpofauna** | | | | | | | | | |
| Wood Turtle | *Clemmys insculpta* | | ✓ | ✓ | | | ✓ | | WCF, SHO, SWE |
| Blanding's Turtle | *Emydoidea blandingii* | | ✓ | ✓ | | | | ✓ | WCF, SWE, SHO, GRA, OLD, OWE |
| Chorus Frog | *Pseudacris triseriata* | | | ✓ | | | ✓ | | WDF, MDF, GRA, OWE |
| Four-toed Salamander | *Hemidactylium scutatum* | | ✓ | | | | | ✓ | WCF, OWE |

Habitat Definitions (Brewer et al. 1991): **DDF**= Dry Deciduous Forest or Savanna; **MDF**= Mesic Deciduous Forest; **WDF**= Wet Deciduous Forest; **DMF**= Dry Mixed Forest or Savanna; **MMF**= Mesic Mixed Forest; **WMF**=Wet Mixed Forest; **DCF**=Dry Coniferous Forest; **MCF**=Mesic Coniferous Forest; **WCF**= Wet Coniferous Forest; **SUP**= Shrub Uplands; **SWE**= Shrub Wetland; **OLD**= Old Field; **GRA**= Grassland ; **PAS**= Pasture; **HAY**= Hayfield; **OWE**=Open Wetland; **SHO**= Shoreland; **OWA**= Open Water

of vegetative communities and over the millennia many native plants and animals have not only adapted to but have become dependent on fire. For example, Yellow Rails depend on open expanses of sedge marsh for breeding and Red Crossbills feed almost exclusively on seeds produced in mature red and white pine forests; both of these habitat types are maintained by fire.

With human settlement came extensive logging followed by catastrophic fire and then years of fire suppression. These anthropomorphic activities have had a profound impact on the fire frequency and resulting vegetation at Seney NWR. The frequency of small fires (fewer than 250 acres) has increased, but large fires are no longer allowed to sweep across the landscape (Drobyshev et al. In Press). As a result, shrubs encroach upon the sedge wetlands and jack pine dominates sites that were once inhabited by red and white pines.

At Seney NWR, prescribed fire is primarily used to set back succession in the wetlands, to conserve early successional forests (e.g., jack pine, aspen), or to conserve upland old fields and other openlands. In some upland areas, after mechanical tree removal to restore the dominance of red and white pine, periodic fire will help maintain this dominance. In wetlands, periodic burning is used to kill the shrubs and regenerate the sedges.

Prescribed fires at Seney NWR are being carried out under the guidance of the Refuge's Fire Management Plan, which calls for burning an average of 6,000 acres annually. Post-burn monitoring is used to ensure prescribed burning is meeting objectives. The Fire Management Plan also contains a "Fire Use" provision which allows for the management of a wildland fire as a prescribed fire on nearly 62,000 acres or 65 percent of Seney NWR.

## Invasive Plants and Other Pests

Many non-native plants and pathogens have been identified at the Refuge. Exotic plant species presently found at the Refuge include glossy buckthorn, multiflora rose, reed canary grass, purple loosestrife, spotted knapweed, tartarian honeysuckle, leafy spurge, silvery cinquefoil, timothy, live-forever, Japanese barberry, St. John's wort, Canada thistle, musk mallow, yellow sweet clover, smooth brome, butter-and-eggs, orchard grass, Kentucky bluegrass, catnip, shepherd's purse, ryegrass, Queen Anne's lace, ox-eye daisy, tall buttercup, bladder campion, bird's foot trefoil, orange hawkweed, heal-all, plantain, yellow goat's-beard, and field sow-thistle. However, many more species occur in the Eastern Upper Peninsula and are likely to colonize the Refuge in the near future. The Refuge staff watches for new invaders and attempts to manage them appropriately.

### *Dutch Elm Disease*

Historically, one of the largest and most dominant members of Refuge hardwood forest communities, American elm has been virtually eliminated from the Eastern Upper Peninsula of Michigan by Dutch elm disease. Spread principally by the European elm beetle, the fungal pathogen arrived in Michigan in 1950 (Dickman and Leefers 2003). By the 1970s, Dutch Elm disease had so heavily infested the hardwood areas around the Chicago Farm, that all of the elm was logged. Today, American elm trees can still be found on the Refuge, but they are short-lived and never attain the size or stature they once had.

### *Glossy Buckthorn*

Glossy buckthorn is an exotic invasive shrub within many Midwestern wetlands, including much of Unit 1 of Seney NWR. It grows as a tall shrub, and can be identified by its glossy, dark green leaves and gray bark. The U.S. Forest Service considers glossy buckthorn a "Category One" invasive species because it is highly invasive, invades natural habitats, and replaces native species. Where glossy buckthorn becomes established, it out-competes natural vegetation (e.g., *Alnus*, *Betula*, *Prunus*, *Viburnum*, and *Salix* species), can become a monoculture, and can alter ecosystem patterns and processes. Previous studies have indicated that invasions of glossy buckthorn along wetland areas have resulted in decreased plant species diversity and altered hydrology (Devine 1999), with negative implications for wildlife habitat.

*Mixed pine forest, Seney NWR. USFWS photo.*

Active management of glossy buckthorn is critical to minimize the spread of this species to other wetland areas, and to rehabilitate those areas presently impacted. At Seney NWR, glossy buckthorn is the main invasive plant species which the Refuge manages. Nagel et al. (2008) studied the efficacy of different management actions on reducing the amount and distribution of glossy buckthorn at the Refuge. Treatments were implemented in concert with control efforts currently practiced. Stump application of 20 percent glyphosate alone proved ineffective 1 year after treatment, with no difference in sprout density between this concentration of herbicide applied by sponge application, scorching with the flame of a propane torch, or untreated controls. Additional low-volume broadcast application of 5 percent glyphosate to resprouts the following year significantly reduced sprout density as compared to scorching and controls, with no difference between scorch treatments and the controls. Low-volume spraying of the herbicide to extirpate seedlings reduced the number of stems by 96 and 91 percent 1 and 2 years following treatment. There was no difference in seedling density between scorching treatments and the controls. It appears the most effective management option for reducing glossy buckthorn is repetitive herbicide application, possibly for more than 2 years (Corace et al. 2008). In

addition to implementation of treatments, monitoring is critical for ensuring an effective glossy buckthorn management program.

***Beech Bark Disease***

Beech bark disease (BBD) is a serious threat to the American beech tree and northern hardwood forests. This disease is caused by an interaction of the exotic sap-feeding beech scale insect (*Cryptococcus fagi*) and at least three species of Nectria fungi. Beech scale was first introduced to North America from Europe sometime around 1890. By the 1930s, the scale was found in Maine and the Maritime Provinces of eastern Canada. Other areas of New England and New York were found to have the scale in their forests by the 1960s. By 1975, the scale was in northeastern Pennsylvania. Presently, it is also found in West Virginia, Virginia, North Carolina, Tennessee, Ohio, Ontario, and Michigan. Although the disease has likely been in Michigan for quite some time, it was not until 2000-2001 that beech bark disease was reported in nine counties in Michigan's northern Lower Peninsula and the Upper Peninsula counties of Luce, Chippewa, Alger, and Delta.

Beech bark disease has several effects on trees, stands, and ecosystems. These include reduced leaf size, discolored foliage, dieback, reduced tree growth, reduced mast, and tree mortality. In 2003, three long-term beech bark disease monitoring plots were established on the Refuge. The objectives are to: 1) identify the extent of Michigan's beech resource that is affected by BBD, 2) collect baseline data on current conditions of the beech resource and northern hardwood stands containing beech before this resource is affected by BBD, and 3) monitor changes in the beech resource and northern hardwood forests due to BBD and other disturbances. The non-native scale insect associated with BBD was first documented on the Refuge in 2003.

In 2006 a northern hardwood stand assessment and evaluation was conducted at the Refuge (Whitman and Corace unpub. manuscript). Specific research questions posed were: 1) what is the present composition and structure of the Refuge's northern hardwood-dominated stands?; 2) how might the loss of American Beech affect forest composition and structure?; 3) what will regenerate in the canopy gaps created by American Beech mortality?; 4) and what might be the wildlife implications? In general, all stands had a considerable American beech component and the American beech trees found are highly susceptible to beech bark disease based on their size and suspected age. Eventually, tree mortality caused by BBD will create canopy gaps in these stands followed by natural stand development and the concomitant mortality of shade intolerant trees. In the absence of active management, results suggest that in most of the resulting canopy gaps sugar maple will be dominant in the new cohort of seedlings and saplings. If conserving, enhancing, or restoring stand composition and structure is desired, management actions should focus on enhancing stand-level compositional diversity by promoting less common tree species, such as eastern hemlock and yellow birch. This can most effectively be done by increasing the canopy gaps created by beech mortality near existing yellow birch and eastern hemlock trees. No harvesting of American beech trees is warranted, unless for safety reasons.

*Bog, Seney NWR. USFWS photo.*

***Emerald Ash Borer***

According to the Michigan Department of Natural Resources, the natural range of *Agrilus planipennis*, the emerald ash borer (EAB), is eastern Russia, northern China, Japan, and Korea. It is unknown exactly when this exotic arrived on this continent, although it is suspected that the carrier was ash wood used for stabilizing cargo in ships or for packing or crating heavy consumer products. In Michigan all species of North American ash appear to be susceptible. In the absence any natural enemies and with an ample supply of ash trees that lack any form of resistance to them, ash borers have exploded in population size during the last 2 years. Trees in woodlots as well as landscaped areas tend to be most vulnerable to infection. For the most part, affected trees or branches appear to be 2 inches in diameter or larger. The canopy of infested

trees begins to thin above infested portions of the trunk and major branches because the borer destroys the water and nutrient conducting tissues under the bark. Heavily infested trees exhibit canopy die-back usually starting at the top of the tree. One-third to one-half of the branches may die in 1 year. Most of the canopy will be dead within 2 years of when symptoms are first observed, though occasionally ash trees will push out sprouts from the trunk after the upper portions of the tree dies. At the Refuge, black or white ash are not a dominant member of any forest community, so the adverse impact of EAB may be minimal. However, the Refuge is part of an EAB monitoring program run by Schoolcraft County.

### Nuisance Species Control

Seney NWR has little need to control nuisance species. Presently only beaver needs to be managed. Beaver are managed because they plug water-control structures, which obstructs water flow to the pool system and can negatively impact the dikes and dams. Trapping is the primary means of controlling nuisance beaver. The Refuge maintains a list of trappers who are asked to trap specific areas where beaver are causing problems. The number of beaver taken annually varies annually depending upon the number of problems areas and the number of beaver contributing to the problem. In 2006, 31 beaver were trapped and the year before four were trapped.

Brown-headed Cowbirds are of concern to those wishing to conserve migratory songbirds due to their parasitism of other bird species nests. Management of cowbirds by lethal means has aided in the recovery of endangered species, such as Kirtland's Warbler, and other passerines of conservation concern (Chace et al. 2005). At Seney NWR, cowbirds are frequently observed foraging on the headquarters lawn, but relatively infrequently observed elsewhere. Using a combination of commercial bird seed and "decoy" birds, a total of 41 cowbirds (19 males, 22 females) were caught and killed during April and May 2006 in accordance with a state permit. Future low-cost management efforts such as this should continue.

### Wildlife Monitoring and Research

Seney NWR staff use literature reviews, monitoring and research to guide its management, and all play a vital role in wildlife habitat management at the Refuge. Wildlife monitoring consists of surveys and censuses of selected species or species groups and are typically made on an annual basis. Wildlife monitoring is generally done by Seney NWR staff and volunteers, and consists of organized surveys and or censuses or a compilation of observations and recorded sightings made over the course of the year. Research studies are usually undertaken in cooperation with universities or other government agencies or NGOs, often with the direct participation and cooperation of Refuge staff and assisted by volunteers.

### Surveys and Censuses

Most surveys and censuses at Seney NWR are guided by the 1990 Wildlife Inventory Plan. This plan is currently under revision and should be completed within the next few years.

*Endangered and Threatened Species* – On March 12, 2007 the gray wolf was officially delisted as an endangered species. However, a federal court decision on September 29, 2008 overturned the delisting action and gray wolves in the Great Lakes area are once again listed as endangered under the Endangered Species Act. The Refuge has two or three collared wolves and four to six non-collared wolves using the Refuge during any time of the year. The Michigan DNR conducts aerial surveys for the wolves all year long and reports the information to the Refuge. The Bald Eagle was delisted on August 9, 2007. There are nine Bald Eagle nests on the Refuge, four to five of which are in good to fair condition. The Refuge produces two to four eaglets annually. Eaglets are banded every other year by researchers from Clemson University, and the data are added to the national database.

*Bald Eagle banding, Seney NWR. USFWS photo.*

*Waterfowl* – Waterfowl surveys are conducted each spring and fall to document use of the Refuge pools during migration. Weekly roadside surveys are conducted by driving the pool dike system and counting all waterfowl seen. Spring surveys are conducted from ice out until the first week of May. Fall surveys are conducted from early September to the middle of November or first ice up. The Refuge has waterfowl count data going back to 1937. Current species distribution has Trumpeter Swan, Canada Goose, Ring-necked Duck, Hooded Merganser, and Mallard as the most common species that are observed and nest on the Refuge. Other common migrants include American Wigeon, Bufflehead, and Wood Duck. There are greater numbers of duck species using the Refuge during the fall migration than the spring migration. The Common Loon first appeared at Seney NWR in 1939 and has been a fixture on the waterscape ever since. To date, Seney NWR has one of the most intensively monitored Common Loon populations in North America. The population is annually monitored, nests are checked for reproductive output, and young are banded. In recent years, Seney NWR has averaged 15 territories with pairs and produced about 12 chicks each year.

*Trumpeter Swans* – Trumpeter Swans were first reintroduced to the Refuge in 1991 and the first recorded nesting of these swans was in 1992, when a pair bred as 3-year olds (Corace et al. 2006). A total of 44 birds were introduced from 1991 to 1993. Currently the Refuge supports 240 adult birds, 30 swan nests, and hatches out over 100 cygnets. Trumpeter Swan surveys are conducted in the same way the waterfowl surveys are done, except the focus is on the swans. Data that are collected include the total number of adult swans, total number of swan nests, and the number of cygnets hatched per nest. Once cygnets have hatched, the numbers of cygnets per nest are tracked over time until fledging occurs in October. Data are currently being collected on the nesting ecology of the birds, on the number of eggs per nest, eggs hatched per nest and egg viability.

*Marshbirds and other Migratory Birds* – Seney NWR conducts surveys for secretive marshbirds each spring and early summer. Species that are surveyed for include (but are not limited to) American Bittern, Pied-billed Grebe, Sora and Virginia Rail. Passive calls and call playback techniques are used. The most common marshbirds encountered during the surveys in order of most common to least common are the American Bittern, Sora Rail and Virginia Rail. Seney NWR is currently expanding its Marshbird Survey Program by adding more routes to the survey to get a more complete coverage of the Refuge and develop a population index to these secretive birds. Also, the Refuge participates in the American Woodcock Peenting Survey that is run by the USFWS Migratory Bird Management Office out of Fort Snelling, Minnesota. The Refuge has one survey route for woodcock on the northern boundary. The Refuge participates in a spring and fall Sandhill Crane count. The spring count is conducted by the International Crane Foundation out of Baraboo, Wisconsin, and Seney NWR serves as the Schoolcraft County coordinator for the survey. The fall count is conducted by the USFWS Migratory Bird Management Office out of Fort Snelling, Minnesota. The Refuge has one USGS Breeding Bird Survey Route within the boundary of the Refuge and conducts migratory songbird point counts each June. The more common species that are using the Refuge at this time include Hermit Thrush, Oven Bird, Nashville Warbler, and Blue Jay.

*Upland Game Birds* – As part of an MDNR, Wildlife Division-led effort to survey Ruffed Grouse, Seney NWR conducts a roadside route to count the number of males heard drumming. The route has 10 listening stops that are consistent from year to year. The number of Ruffed Grouse heard during a fixed time interval (4 minutes) is recorded at each stop. Data are summarized by the Michigan Department of Natural Resources, Wildlife Division as the number of grouse heard per survey route. This survey provides the Wildlife Division an additional method to monitor the population.

Sharp-tailed Grouse in Michigan's Upper Peninsula – including those at Seney NWR – represent the most easterly distribution of the species in the United States. A state-listed species of special concern, the Sharp-tailed Grouse is an area-sensitive flagship species of large openland ecosystem complexes in the eastern Upper Peninsula of Michigan. The annual lek survey is an attempt to estimate the population size of sharptails in Michigan.

*Amphibians* – Seney NWR is home to nine native species of anurans (frogs and toads). In recent years, many observers have been concerned with the apparent rarity, decline, and/or population die-offs of several of these species in Michigan and elsewhere. These concerns were not only for the species themselves, but also for the ecosystems on which they depend. As a result, the Michigan Frog and Toad Survey was initiated in 1988. Seney NWR has one survey route that consists of 10 wetland sites

*Snapping turtle, Seney NWR. USFWS photo.*

that are visited by an observer three times annually: in early spring, late spring, and summer. At each site, the observer identifies the species present on the basis of their breeding season calls or songs, and makes a simple estimate of abundance for each species, using a Call Index Value of 1, 2, or 3.

*Other Raptors* – Refuge volunteers, interns, visiting researchers and staff compile observations of raptors at the Refuge, especially owls and woodland hawks. The Refuge also has nesting Osprey on the Refuge. There are five nests on the Refuge with two or three active at any one time. The Refuge produces on average about three to four chicks per year. Chicks are banded each year by researchers.

*Furbearers* – The Refuge works in conjunction with the MDNR in identifying trends in furbearer populations. Species seen during this survey include gray wolf, the reintroduced fisher and American marten, the Federally regulated bobcat and river otter, and a number of other furbearers of varying status. Seney NWR has two survey routes used to conduct a structured winter track count to assist the MDNR in determining the distribution and relative abundance of several furbearers and selected prey species, simultaneously.

## Studies and Investigations

The Refuge has a long tradition of hosting a variety of research projects that have assisted in the management of the Refuge. The Refuge's first peer-reviewed publication was in The Journal of Wildlife Management in 1947. Written by the first Refuge Manager, C. S. Johnson, the article was entitled "Canada Goose Management, Seney National Wildlife Refuge." Research that has occurred on the lands of Seney NWR has covered every decade since 1940 and has yielded more than 81 research projects, 31 peer-reviewed publications, 14 Master's Theses, and three Doctoral Dissertations.

Seney NWR recognizes the important and much needed role research has in the management of federal lands. The Refuge's vision statement includes a section about research:

> "Students and researchers will be encouraged to use the Refuge as an outdoor laboratory for biological and ecological research that focuses on understanding natural patterns and processes and developing habitat management techniques."

Seney NWR encourages researchers to actively pursue projects with the staff. Seney NWR has the infrastructure (12-person bunkhouse, equipment, volunteers, and other facilities) to support a wide array of research projects. Recent and ongoing studies include (but are not limited to) the following:

*Joint Fire Science Project: Restoration-based fuel reduction recommendations for mixed-pine forests of Upper Michigan* – This project was initiated in 2005 by Seney NWR Refuge Forester and co-principal investigators from The Ohio State University and the U.S. Forest Service. The project 1) developed a better understanding of the fire history regimes, fuel loadings, and forest composition and structural characteristics of pre-European settlement and post-settlement mixed-pine forest; 2) analyzed current fire hazard and forest stewardship of mixed-pine forest ecosystems; and 3) developed restoration-based fuel reduction recommendations for mixed-pine forest ecosystems of eastern Upper Michigan.

*The Effects of Summer Grazing from Trumpeter Swans on the Aquatic Macrophyte Communities in Seney NWR* – This project was initiated in 2006 as a result of the successful reintroduction of the swans over 15 years ago. The project is headed by the University of Wisconsin-Oshkosh in conjunction with the Refuge Biologist. About 240 Trumpeter Swans use Seney NWR, and concern has been raised as to whether the swans are impacting the pools. This ongoing project has set up feeding exclosures in the pools to keep swans out of areas where they are known to feed. The project will assess the impacts the swans are having on the types and distribution of the macrophytes in the pools.

*Fire ecology in Northern Sedge Meadows: Factors Influencing Yellow Rails and Other Birds at Seney NWR* – This project was initiated in 2006 by the Refuge Biologist and USGS-Northern Prairie Wildlife Research Center, Jamestown, North Dakota, and was originally entitled "Evaluating Techniques for Determining Habitat Use of Yellow Rails." Seney NWR often hosts a substantial number of breeding Yellow Rails in large expanses of sedge meadows. Previous studies at Seney NWR and elsewhere have described shallow flooding and vegetative conditions preferred by rails and have documented a positive response by rails to habitat changes due to prescribed fire (Burkman 1993). However, in-depth examinations of how rails use sedge meadows and the interacting factors influencing rail use of burned areas are lacking. This project has completed one field season and upon examination of the first year data and lack of Yellow Rails found for the telemetry portion, a new study has evolved to look at all birds that use the wet sedge meadows and their response and the vegetation response to prescribed fire.

*Clutch Size and Nest Site Characteristics of Trumpeter Swans* – This project was initiated in 2006 by the Refuge Biologist. The project is evaluating the success of the Trumpeter Swan reintroduction program by looking at demographic characteristics of the birds. Clutch size, egg viability, and fecundity are all important variables to measure when determining how well an animal adapts to a new area. After 1 year of data collection, the swans at Seney NWR on average have larger clutches than Trumpeter Swans in other flyways. Data collection continued into 2007 and 2008 as time and funding permited.

*Rapid Change in Species Composition of Mammal Communities in the Northern Great Lakes* – This project was initiated by the Museum of Zoology and Department of Ecology and Evolutionary Biology, University of Michigan. The Upper Peninsula fauna is of particular interest to biologists because it represents a transition zone where many boreal species reach the southern limits of their distributions while several austral species are at or near their northern limits. Research has documented the range extensions of two small mammals, the white-footed mouse and southern flying squirrel, both of which are moving eastward and northward. Preliminary data also suggest that the eastern chipmunk is increasing in abundance relative to the more boreal least chipmunk. It is argued, based on analyses of population fluctuations of the white-footed mouse, that these changes are likely due to climatic warming. The project is ongoing.

*Impacts of a Constructed Pool on a Fen in Seney NWR: Restoration Implications* – This project was initiated with USGS-BRD-Great Lakes Science Center and Seney NWR staff. The study examined the nature and extent of degradation to the Marsh Creek wetland caused by alteration of natural hydrology and provided base line data for the restoration project. Wetlands bordering Marsh Creek were quantitatively sampled to characterize the wetland plant communities, groundwater hydrology and water quality. Ecological and hydrologic differences were observed in the wetlands upstream and downstream from the C-3 Pool. Redirecting some of the water in the C-3 Pool down the historic Marsh Creek channel could restore surface flow in the creek, increase the amount of disturbance associated with fluctuating water levels, and affect wetland plant communities.

*An Experimental Approach to Determinging the Efficacy of Glossy Buckthorn Management at Seney NWR* – This project was initiated by the Refuge Forester and the School of Forest Resources and Environmental Science, Michigan Technological University. Glossy buckthorn is an exotic species that has become a major invasive plant within wetlands of Seney NWR and elsewhere in the Midwest. Invasion of glossy buckthorn along wetland areas has resulted in decreased plant species diversity and altered hydrology, with implications for wildlife habitat management and restoration. The objectives of this research were to test the efficacy of different management actions on seedlings and mature glossy buckthorn shrubs. Treatments were implemented in concert with control efforts currently practiced on the Refuge. Stump application of 20 percent glyphosate alone proved ineffective 1 year after treatment with no difference in sprout density between herbicide, scorching, or controls. Additional broadcast application of 5 percent glyphosate to resprouts the following year significantly reduced sprout density as compared to scorching and controls. It appears the most effective management option for reducing glossy buckthorn is repetitive herbicide application possibly for greater than 2 years (Nagel et al. 2008, Corace et al. 2008).

*Relationship of Small Mammals and Habitat Variables in the Context of Forest Restoration at Seney NWR* – This project was initiated by the Refuge Forester and the University of Michigan. Infor-

*Seney NWR. USFWS photo.*

mation regarding what habitat variables affects small mammal diversity and abundance may help guide management decisions and restoration efforts at Seney NWR. Fieldwork included small mammal trapping and the collection of habitat variables among three macro-habitat categories of conifer-dominated and hardwood forest stands. At the macro-habitat scale, no significant differences were found between small mammal captures and site categories on either deciduous or coniferous plots. However, the results did show that microhabitat features are important in predicting the distribution of small mammals. Binomial regression analysis identified three important habitat elements on which managers should concentrate restoration efforts: coarse woody debris, snags, and tree species diversity (Harrington 2006).

*Mercury Exposure in Common Loons of the Upper Peninsula* – This long-term project was initiated by Common Coast Research and Conservation and former Refuge staff. In concert with banding activities that have enabled long-term research into the population dynamics and life history of the Common Loon, blood and feather samples have been collected from Upper Peninsula adults and juveniles since 1991 for the purpose of assessing their exposure to the persistent neurotoxin mercury (Hg). Extensive sampling on the federally protected lands of Isle Royale National Park, Ottawa National Forest, and Seney NWR have focused upon juvenile loons and their utility as a bio-indicator of mercury loading and uptake within specific lake environments. Results from this ongoing research have suggested that 1) juvenile loons, as top-level piscivorous integrators, represent an accurate, efficient and underutilized barometer of single-source Hg bioavailability, 2) some Upper Peninsula lakes are among the most merucyr-contaminated ecosystems in the northern Great Lakes region, and 3) Seney NWR could, for reasons of geography, hydrology, and infrastructure, serve as an exceptional site for a broad-base mercury monitoring program

## Predator and Exotic Wildlife Management

### Sea Lamprey

The sea lamprey (*Petromyzon marinus*) is an invader from the Atlantic Ocean that entered the Great Lakes following the dredging of the Welland Canal. This parasitic fish spends part of its life cycle feeding on the blood and body fluids of native fishes by attaching, via a suction mouth, and rasping a hole in the side of their host using a toothed-tongue. Each sea lamprey destroys up to 40 pounds of fish during its adult lifetime. Great Lakes sea lamprey populations exploded during the 1940s and 1950s and contributed significantly to the collapse of fish species, such as lake trout, that were the economic mainstay of commercial fisheries.

Since 1954, the Great Lakes Fishery Commission has administered the Great Lakes Sea Lamprey Management Program. The Service, as the U.S. agent for sea lamprey control, has managed sea lamprey populations in U.S. waters of the Great Lakes. The primary method for controlling sea lamprey uses the lampricide TFM (3-trifluoromethyl-4-nitrophenol) to kill larval sea lampreys burrowed in stream sediment. Barriers that block upstream migration of spawning sea lampreys provide a second important method of control.

During 1971, sea lampreys were detected in the Manistique River near Germfask. Prior to that, the Manistique Paper Co. Inc (MPI) dam, located near the mouth of the Manistique River, effectively served as a barrier to upstream infestation. During 1974, the river was treated with TFM and the MPI dam was patched to prevent further infestation of the watershed. Over the years, patchwork of the dam had been successful. However, during the late 1990s, the dam deteriorated further and sea lampreys again colonized the watershed. The river was treated with lampricides during 2003, 2004, and 2007. Since the Manistique River has become one of the largest contributors of parasitic sea lamprey in the Great Lakes, it is anticipated that additional

lampricide treatments will be required to control the infestation to protect the highly valued fisheries of northern Lake Michigan.

Repeated TFM treatments can be problematic because TFM kills native lamprey larvae along with sea lampreys. Seney NWR provides habitat to three species of native lamprey (Appendix C). Although native lampreys tend to be more resistant to lampricide than sea lampreys, the difference in toxic response is not sufficient to selectively remove only sea lampreys during a lampricide treatment. A decrease in native lamprey populations has been documented in many treated Great Lake streams (Schuldt and Gould 1980; NRCC, 1985). The Service assesses the status of lamprey populations before and after lampricide treatments, and maintains a long-term database on these assessment activities. These surveys show that native lamprey continue to populate most streams in the Manistique River basin, although numbers may be reduced in reaches where TFM treatments occur.

The Refuge staff is currently involved in the planning of a new sea lamprey barrier at the site of the MPI dam, which could be operational by 2012. Reinstatement of an effective barrier to sea lamprey migration in the lower river is currently the only way to eliminate the need for repeated lampricide treatments.

# Interagency Coordination Activities

It takes partnerships to run a national wildlife refuge, and Seney NWR has a long history of working with others to "get the job done" for wildlife. Examples range from the first manager's partnership with the Civilian Conservation Corps, which built many of Seney's impoundments, to the last manager's work with the Coast Guard and private industry to protect Common Tern nesting colonies on Lake Michigan. Currently the Refuge has strong partnerships with the Michigan DNR, universities (Michigan State, Michigan Tech, the University of Michigan and The Ohio State University), other Government Agencies (U.S. Forest Service, National Park Service, U.S. Coast Guard, U.S. Geological Survey) and non-government agencies (The Nature Conservancy, Seney Natural History Association, Michigan Audubon Society, and Great Lakes Shipwreck Society). Of particular note are the Refuge's research and fire and public use programs, which would not exist without partnerships.

## Public Recreation and Environmental Education

The 1997 National Wildlife Refuge System Improvement Act emphasizes wildlife management and that all prospective public uses on any given refuge must be found compatible with the wildlife-related refuge purposes before they can be allowed. The Refuge System Improvement Act also identifies six priority uses of national wildlife refuges that in most cases will be considered compatible uses. They are:

- Hunting
- Fishing
- Wildlife Observation
- Wildlife Photography
- Environmental Education
- Environmental Interpretation

Seney NWR supports all six of these activities. In so doing it attracts 43,000 to 88,000 visitors per year. The number of people that visit per year is dependent upon many factors, some which the Refuge controls, such as the number of programs offered and outreach efforts. Over the past 4 years we have continued to scale back on public use activities due to lack of staff. Factors beyond our control, such as the weather, economy and game populations, also affect our visitation.

## Tribal Consent Decree

On November 2, 2007 the United States, State of Michigan and five Tribes signed an Inland Consent Decree. This Decree affirms the rights of the Bay Mills Indian Community, Sault Ste. Marie Tribe of the Chippewa Indians, Grand Traverse Band of Ottawa and Chippewa Indians, Little River Band Ottawa Indians and Little Traverse Bay Band of Odawa Indians to exercise hunting and fishing rights on specified lands which were ceded by the Tribes under the Treaty of 1836. Seney NWR is within the treaty area. Therefore, to the extent a particular activity on Seney NWR is subject to State regulations those rights shall be governed by the Decree and applicable federal regulations. To the extent that an activity is not subject to State regulations, the exercise of Tribal rights shall be governed

by a memorandum of understanding between the Tribes and USFWS and by applicable Federal laws and regulations.

# Visitor Services

Seney NWR provides the following facilities and opportunities for visitors:

- The Visitor Center is open May 15 to Oct 15, 9 a.m. to 5 p.m., 7 days per week.
- Informational and interpretive displays including: children's touch table, who's calling sound ID, wolf-coyote comparisons, loon diorama, bathroom blurbs, monarch life cycle live exhibit.
- Visitors can view a 14-minute slide show that provides orientation to the Refuge.
- The Pine Ridge Nature Trail is a 1.4-mile, self guided, sign in place, interpretive hiking trail (signs identify plants and interpret how they support wildlife).
- Marshland Wildlife Drive provides 7 miles of gravel road with an additional 3.5-mile fishing loop.
- There is an accessible fishing pier with observation scopes.
- Fishing-line collection containers.
- Three observation decks are located on the Refuge, each with a spotting scope and interpretive panel (loons, swans, eagles).
- There are designated areas for hunting deer, grouse, hare, woodcock and bear.
- The Refuge has a photo/observation blind that receives limited use.
- More than 90 miles of backcountry roads are open to hiking and biking.
- Native gardens are planted around the Visitor Center.
- Five cross-country ski trails are groomed weekly.
- Binoculars are available for loan at the Visitor Center.
- Information kiosks are found at several locations on the Refuge including the Visitor Center and Wigwams Pavilion.

*Environmental education program, Seney NWR. USFWS photo.*

## Hunting

Hunting on the Refuge is very popular with local residents and many visitors. There are two hunting units on the Refuge. Hunting Area A encompass 49,522 acres in the center of the Refuge. Area B covers much of the Wilderness, a strip of land along the north boundary and in the southeast corner; it contains 36,200 acres. The Refuge unit containing the Headquarters and Visitor Center is closed to hunting.

When small game populations are high, hunters journey from throughout the Midwest to the Refuge. Hunting for Ruffed Grouse and American Woodcock is allowed in Area B. Snowshoe hare hunting is allowed in Area A after December 1 and throughout the season in Area B. All hunting is done in accordance with Michigan DNR regulations.

Hunting for big game (white-tailed deer and black bear) on the Refuge is permitted during the state seasons, however there are added restrictions. The use of bait, dogs, snowmobiles or ATVs are prohibited. Area A is open for hunting deer during the "regular gun," "muzzleloading," and "late archery" seasons. Area B is open for all big game hunting seasons. These restrictions all but eliminate black bear hunting on the Refuge, because the state issues a limited number of bear tags and few hunters are willing to hunt without bait or dogs.

The Refuge's restrictions may have the opposite effect on deer hunting. While some may disagree with the restrictions, an overwhelming number of deer hunters surveyed in 2003 said they hunt at Seney NWR because it is a large area where they

can hunt traditionally, without the influence of baiting or the annoyance of ATVs. Despite the low hunter success, 9 percent compared to a state-wide average of 40 percent, many hunters have come back for decades. To facilitate deer hunting, Refuge roads are opened and camping is allowed west of the Driggs River.

### Fishing

Seney NWR provides a 3.5-mile Fishing Loop and a universally accessible pier to facilitate fishing. Many people enjoy fishing for yellow perch and northern pike from the banks of Refuge impoundments. Others fish the Driggs River for brook trout or the Manistique River for walleye, smallmouth bass, and brown trout. Impoundment fishing is open from May 15 to September 30 in specified locations, and river fishing is allowed in accordance with state regulations. No boats or flotation devises are allowed on the impoundments and lead-free tackle must be used. Ice fishing is permitted on all Refuge impoundments, but this activity is not very popular.

Each year, during the state's "free fishing weekend," Refuge staff, volunteers and the Seney Natural History Association (SNHA) host a children's fishing day. This event began in 1990 and has become a tradition with many local families. Volunteers are stationed along the fishing loop with poles and bait to help children fish, there are fishing related activities in the Visitor Center and certificates are awarded for the largest yellow perch and northern pike in five age categories. The SNHA provides a free fish dinner to participants and their families and local vendors donate fishing-related items as door prizes.

### Wildlife Observation

Seney NWR is known as a great place to watch wildlife and the Whitefish Point Unit is recognized internationally for its importance as a migratory bird stopover. Each year, visitors from around the world come to the Refuge to observe wildlife. The road network and impoundments provide excellent opportunities for people of all ages and abilities to observe wildlife. Others prefer to walk the Pine Ridge Nature Trail or hike and bike the backcountry roads in search of wildlife. If they are lucky they may glimpse a black bear, moose, or gray wolf. During the winter, visitors can don cross-country skis or snowshoes to track wildlife.

Staff and volunteers working at the Visitor Center maintain a wildlife observation log and share that information with visitors. They also loan binoculars to visitors and help them locate observation decks with viewing scopes. Tours are given on Wednesday evenings that provide viewing opportunities along the back country roads and Yellow Rail tours offer a unique nighttime opportunity to see or hear a much sought-after species.

*Red squirrel, Seney NWR. Photo by Igor Drobyshev.*

### Wildlife Photography

The network of roads and other facilities along the pools affords photographers of all skill levels excellent opportunities to photograph wildlife. Many beginners focus their lens on the charismatic Trumpeter Swan or Common Loon, as is evident by entries to the Annual Seney NWR Photo Contest. More seasoned photographers often venture beyond the auto tour route to capture images of plants, insects, and landscapes bathed in a wide spectrum of light conditions.

### Interpretation

The Refuge Visitor Center, which is open 9 a.m. to 5 p.m. every day from May 15 to October 15, contains a variety of displays to interpret the natural resources of Seney NWR. It contains permanent exhibits such as a loon diorama, a gray wolf/coyote comparison, a "Who's Calling" soundboard, a "lift the flap" mural, a track box, and a touch table. Creative temporary displays are used to inform the visi-

tors of what's blooming, who is migrating, the use of fire management, the threats of invasive species and other Refuge management activities.

Refuge kiosks, which are presently being upgraded, provide minimal interpretive information on the Fish and Wildlife Service and specifically Seney NWR. The Marshland Wildlife Drive and Pine Ridge Nature Trail both have interpretive panels along their routes and the observation platforms were built with a focus on loons, eagles and swans. Brochures and posters also provide additional interpretive information.

In addition to the wildlife tours that are provided every Wednesday evening, presentations, guided events, and other special events are held, including Children's Fishing Day and Scout Day. Smaller interpretive events held throughout the season provide interpretive information on a variety of topics such as hunting and fishing, endangered species, backyard wildlife, migratory birds, fire management, invasive species management, wildflowers and wildlife films.

The Refuge's interpretive program is heavily subsidized by funds from SNHA. Most of the Refuge's events and interpretive activities are carried out by interns who receive monetary stipends from SNHA. The SNHA has also paid for the publication of brochures and signs as well as the construction of observation decks. A majority of their funds are derived from the sale of books and educational material sold in a small book store located in the Visitor Center.

The Refuge welcomes school groups and others interested in environmental education. School field trips are accommodated through tours, hikes, pond studies using a video microscope, games and career talks. On Scout Day the Refuge provides educational sessions for boy and girl scouts, grades K-6. Sessions include topics such as: bird banding, weather, water cycles, knots, orienteering, fire safety, tree identification, first aid, wildlife observation and dressing for outdoor activities. Seney NWR also provides outreach to university students by presenting tours and lectures. There is a growing demand for environmental education both on and off Refuge.

### Volunteer and Friends Contributions

Seney NWR is fortunate to have an extraordinary volunteer program and a tremendous friends group. Without them there would be little substance to the Refuge's visitor use program. Volunteers staff the Visitor Center 8 hours a day from May 15 through October 15. They also help with public events, biological monitoring, maintenance projects and administrative duties. In all, volunteers contribute 8,000 to 10,000 hours annually to sustain and enhance Refuge programs. The SNHA is the Refuge's friends group. Established in 1987, the SNHA has contributed more than $400,000 and funded approximately 80 internships to support Refuge programs. All of this has been done through membership dues and revenue generated from bookstore sales.

*Children's Fishing Day, Seney NWR. USFWS photo.*

## Archaeological and Cultural Resources

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 cultural resources laws. The Refuge Manager assists the RHPO by informing the RHPO about Service undertakings, by protecting archeological sites and historic properties on Service man-

aged and administered lands, by monitoring archeological investigations by contractors and permittees, and by reporting violations.

## 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 one dual-function officer who is commissioned to conduct law enforcement on federal property. In addition, the Zone Officer for Michigan and Ohio, currently stationed at Shiawassee NWR, and Special Agents conduct and assist with law enforcement efforts on the Refuge and surrounding lands. Federal law enforcement is a cooperative effort by many agencies in the region. Cooperative relationships and strategies have been developed with state conservation officers and the Schoolcraft County Sheriff's Department.

## Wilderness Area and Wilderness Review

The Seney Wilderness Area was designated by Congress in 1970 and covers 25,150 acres (26 percent of the Refuge). The Strangmoor Bog National Natural Landmark is also located within the Seney Wilderness (Figure 12 on page 35). The majority of the wilderness is characterized by "string bog" topography, with moist organic soils and sand ridge islands (Heinselman 1965).

The variable nature of fire historically shaped the diverse Wilderness landscape (Drobyshev et al. In Press). Fluctuations in weather patterns, hydrology, topography, soils, fuels, and stand structure affected fire severity patterns. The 1976 Walsh Ditch Fire that burned most of the Wilderness demonstrated the variable nature of fire in that within its perimeter fire effects were patchy in nature. It left unburned 63 percent of the area, light surface burned 18 percent, moderately surface burned 7 percent, hard surface burned 9 percent and organic soil burned 3 percent (Anderson 1982).

The Wilderness Area is managed under the provisions of the 1964 Wilderness Act as a unit of the National Wilderness Preservation System. That is, it is: "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (The Wilderness Act, September 3, 1964; (16 U.S.C. 1121))

As part of the CCP process, we reviewed other lands within the legislative boundaries of Seney NWR for wilderness suitability. No additional lands were found suitable for designation as defined by the Wilderness Act of 1964. Many of the lands acquired for the Refuge have been substantially altered by humans, both before and after the Refuge's establishment, particularly from agriculture, roads, and flood control and hydrological infrastructure. Manmade facilities like dikes, ditches, water control structures, roads, and other facilities are spread throughout the Refuge, while artificial impoundments and manipulated wetlands are a large part of the landscape.

# Chapter 4: Future Management Direction: Tomorrow's Vision

## Introduction

The planning team developed goals and objectives for three management alternatives at Seney NWR. Cooperating agencies, conservation organizations, and Refuge staff all participated in this endeavor. The alternatives are:

- Alternative 1: Current Management Direction of Opportunistic Conservation, Restoration, and Preservation (No Action);
- Alternative 2: Management Gradient of Conservation Emphasis (Unit 1), to Conservation/Restoration Emphasis (Unit 2), to Restoration/Preservation Emphasis (Unit 3); to Wilderness Preservation (Unit 4)
- Alternative 3: Management to Emphasize Historic Patterns and Processes through Restoration and Wilderness Preservation (Unit 4).

The Environmental Assessment (Appendix A of the Draft CCP) describes and evaluates each alternative. The preferred alternative is Alternative 2 (Habitat Management Gradient), and this forms the basis for the Seney NWR CCP. The goals, objectives, and strategies are presented on the following pages. The planning team established goals for major management areas, objectives for achieving those goals, and the specific strategies that will be employed by Refuge staff. The goals are organized into the broad categories of wildlife, habitat, and people.

1. Goal 1: Wildlife – Preserve, conserve, and (where and when appropriate) restore the diversity of wildlife native to the Eastern Upper Peninsula of Michigan; with an emphasis on Region 3 Conservation Priority Species (see Refuge species lists in Appendices) Goals, Objectives and Strategies.
2. Goal 2: Habitat – Conserve the range of habitat conditions now found within the Refuge and (where and when possible) restore pre-European conditions once characteristic of the Eastern Upper Peninsula of Michigan.
3. Goal 3: People – Provide visitors and the community with opportunities to experience quality, wildlife-dependent activities and to understand and appreciate the rich mosaic of wildlife and habitats found within the Eastern Upper Peninsula of Michigan.

*Seney NWR. USFWS photo.*

## Goal 1: Wildlife

Preserve, conserve, and (where and when appropriate) restore the diversity of wildlife native to the Eastern Upper Peninsula of Michigan; with an emphasis on Region 3 Conservation Priority Species (see Refuge species lists in Appendices).

### Objective 1.1. Trust Resources

Implement a monitoring program to track the presence, abundance, population trends, and/or habitat associations of select Trust Resources, including but not limited to Region 3 Conservation Priority Species, habitats, communities and ecosystems (e.g., patterned fen in Strangmoor Bog National Natural Landmark). As the need arises, implement research to answer questions that have been raised regarding the management of Trust Resources.

*Rationale:* The heterogeneity of Seney NWR, its position in the landscape, and its remoteness all contribute to its role as a place for many U.S. Fish and Wildlife Service Trust Resources, including Region 3 Conservation Priority Species. Priority Species that currently inhabit Seney NWR include (but are not limited to) the gray wolf, Common Loon, Trumpeter Swan, American Bittern, Yellow Rail, Bald Eagle, Osprey, Northern Goshawk, Upland Sandpiper, Olive-sided Flycatcher, Black-throated Blue Warbler, Canada Warbler, Connecticut Warbler, Le Conte's Sparrow, and Bobolink. Service Trust Resources also include unique habitat types, communities and ecosystems. An example of the latter is the Strangemoor Bog National Natural Landmark, which constitutes the largest patterned fen in the Lower 48 States.

*Strategies*

1. Follow the monitoring plan.
2. Conduct annual review of monitoring plan to assess trends of Trust Resources and determine if there are any priorities for research or monitoring.
3. If a Trust Resource research issue has been identified, initiate research at the station level. If the issue goes beyond the boundary of the Refuge, take lead role in contacting other federal, state, university, and NGO partners and develop a broader scale research project to address those issues.

*Pine marten. USFWS photo.*

### Objective 1.2. Wildlife, Habitat, Community and Ecosystem Research

Promote applied research aimed at answering wildlife, habitat, community, and ecosystem-based questions without compromising wildlife, visitor, and Wilderness values.

*Rationale:* Applied research is an important component of management at Seney NWR. It is used when questions arise that cannot be answered via past experience, discussions with other management professionals, or a review of the literature. Often research is used to develop or evaluate a management technique to insure it is having the desired effect. Currently a number of research projects are being conducted at the Refuge that will assist in directing future planning and management for wildlife species, their habitats, and associated communities and ecosystems.

*Strategies*

1. Monitor and assess research annually, including access for researchers and the location, duration, and impacts of research.
2. Promote applied research and initiate dialogue with federal and state agencies, universities, and NGOs to answer management questions.

3. Propose the development of Seney NWR as a Land Management Research and Demonstration Area. This would help the Refuge to become a leader in northern forest research, wetland ecology, and conservation and would enable the sharing of that knowledge with others to benefit both private and publicly-owned lands.
4. Seek external research funding through partnerships with others outside of the Service, where and when possible.
5. Communicate research findings with the broader conservation community through peer-reviewed and other publications, lectures, and other outreach activities.
6. Inform visitors of research findings and explain their importance for planning and management at Seney NWR.
7. Prioritize research on trust species, habitats, communities, and ecosystems of conservation priority.
8. Develop a better understanding as to how Refuge ecosystems function on a landscape and regional scale, including the effects of future climate change.

## Goal 2: Habitat

Conserve the range of habitat conditions now found within the Refuge and (where and when possible) restore to pre-European conditions once characteristic of the Eastern Upper Peninsula of Michigan.

### Objective 2.1. Scrub-Shrub

Reduce this habitat type by 3,419 acres (-12 percent) from 2007 levels (28,954 acres). Manage remaining 25,535 acres for the diversity of species present, including Region 3 Conservation Priority Species American Woodcock and Black-billed Cuckoo.

*Rationale:* This dominant habitat type of the Refuge has been increasing due to the lack of ecological disturbance and the natural succession of the Open Wetland habitat type (see below). Plant species currently dominant in this habitat type include willow, bog birch, and tag alder. These species can form dense stands that alter hydrology and limit fire as the primary natural ecological disturbance. The rate and extent of the secondary succession, in this habitat type, has likely increased relative to pre-European times due to altered hydrology and lack of fire.

Historically, Seney NWR had large expanses of open fens that were dominated by *Carex* and other graminoid species. This is clearly evident from aerial photographs taken in the 1930s. However, many years of fire suppression and altered hydrology have resulted in the encroachment of trees and shrubs into these open fens and bogs, altering vegetation structure and community (White 1965, Middleton 2002, Brisson et al. 2006). Open fens are important habitat for Yellow Rail, LeConte's Sparrow and Sedge Wren, which are considered priority species for Bird Conservation Area 20 (Partners In Flight) and are listed as species of special concern by the U.S. Fish and Wildlife Service – Region 3. There have been documented positive responses by rails to prescribed burning to reduce woody vegetation in the open fens from previous studies at Seney NWR (Burkman 1993) and from current research (Jane Austin pers. comm.). Figure 15 depicts future landcover conditions and Table 10 on page 63 describes the changes in vegetative cover with implementation of the CCP.

*Strategies*

1. Modify annual burn plans to delineate target areas and target acres.
2. Add 122 acres by eliminating Spur Pools and Delta Creek Pool.

*Cattails, Seney NWR. USFWS photo.*

**Figure 15: Future Landcover, Seney NWR**

## Table 10: Changes in Vegetative Cover Types, Seney NWR

| Habitat Type | Current Management Direction (Acres) | Future Goal | | Change | |
|---|---|---|---|---|---|
| | | Acres | Percent | Acres | Percent |
| Scrub-Shrub | 28,954 | 25,534 | 27 | -3,551 | -12 |
| Open Wetlands | 16,616 | 20,464 | 22 | 3,848 | 23 |
| Mixed Forest – Uplands | 11,396 | 11,396 | 12 | 0 | 0 |
| Coniferous Forest – Uplands | 8,857 | 8,952 | 9 | 95 | 1 |
| Mixed Forest – Lowlands | 8,221 | 8,221 | 9 | 0 | 0 |
| Coniferous Forest – Lowlands | 7,825 | 7,825 | 8 | 0 | 0 |
| Open Water (Pools, Rivers, etc.) | 5,104 | 4,676 | 5 | -428 | -8 |
| Deciduous Forest – Uplands | 4,372 | 4,600 | 5 | 232 | 5 |
| Deciduous Forest – Lowlands | 2,515 | 2,515 | 3 | 0 | 0 |
| Upland Old Fields and Openland | 1,302 | 979 | 1 | -327 | -25 |
| Total | 95,162 | 95,162 | | | |

3. In Unit 1, reduce acreage by 1,002 (north end of Unit).
4. In Unit 2, reduce acreage by 886 (A-2 Pool area).
5. In Unit 3, reduce acreage by 1,653 (Marsh Creek Pool and C-3 Pool areas).

### Objective 2.2. Open Wetlands

Increase this habitat type by 23 percent or 3,847 acres from 2007 levels (16,617 acres). Manage the resulting 20,464 acres through prescribed fire for the diversity of species present, including Region 3 Conservation Priority Species American Bittern, Le Conte's Sparrow, Northern Harrier, Sedge Wren, and Yellow Rail.

*Rationale:* Sedge-bluejoint grasses and sphagnum-leatherleaf make up the greatest amount of acreage of this habitat type. These areas are dominated by 13 known species of the genus *Carex*. Included within these vast stands of sedges are smaller stands and or pockets of bluejoint grass, cattail, and leather leaf. Also occurring within these vast stands are sphagnum hummocks that protrude on the landscape. Continued active management is necessary to maintain this important habitat type and prevent it from succeeding into scrub shrub.

*Strategies*

1. Continue research that promotes the understanding of how this habitat type functions. Parameters to be measured should include hydrology (surface and subsurface water flow), soils, and vegetation response to management actions.
2. Use prescribed and natural fire, where and when appropriate (3,541 acres).
3. In Unit 2, add 306 acres in T-2 East Pool.
4. Continue monitoring Region 3 Conservation Priority Species response before, during and after management actions.

### Objective 2.3. Mixed Forest – Uplands

Maintain 2007 acreage (11,396 acres), diversity of seral stages, and (where and when possible) restore historic composition and structure for the diversity of species present, including Region 3 Conservation Priority Species American Woodcock, Black-throated Blue Warbler, Canada Warbler, Connecticut Warbler, gray wolf, and Northern Goshawk.

*Rationale:* This broad habitat type contains a wide range of forest conditions, from those composed primarily of early successional species such as aspen and jack pine to forest dominated by sugar maple, yellow birch, white pine, and eastern hemlock. Much of this habitat type, both on the Refuge and throughout the Eastern Upper Peninsula, has undergone considerable alteration relative to pre-European times. Its composition has been shifted to more early successional species, with a relatively uniform age structure. This is markedly different than benchmark conditions, which contain greater tree species and structural diversity. Future management should focus on promoting ecological integrity of these stands by promoting compositional and structural diversity, and (in most instances) move succession forward to emulate later seral stage characteristics.

*Strategies*

1. Understand the natural disturbance regime inherent to the forest types within this broad habitat and work within the confines of seral pathways dictated by soil, climate, and hydrology.
2. Promote stands dominated by early seral stages of mixed forest at the Refuge periphery.
3. Promote stands dominated of later seral stages of mixed forest in the Refuge interior.
4. In managed stands, promote increased compositional and structural heterogeneity, including large-diameter coarse woody debris and snags.
5. Use management techniques that emulate natural ecological disturbances (e.g., single tree mortality for multi-aged stands, stand (cohort) replacement for even-aged stands).
6. Use commercial and non-commercial mechanical treatments, where and when appropriate.
7. Use prescribed and natural fire, where and when appropriate.
8. Ensure white-tailed deer populations do not negatively affect the habitat.
9. Manage invasive species aggressively (see below).

### Objective 2.4. Coniferous Forest – Uplands

Increase acreage from 2007 levels (8,857 acres) by 95 acres to 8,952 acres (+1 percent), maintain diversity of seral stages, and restore historic composition and structure when and where possible. Region 3 Conservation Priority Species using this habitat type on the Refuge include Cape May Warbler, gray wolf, Northern Flicker, Olive-sided Flycatcher, and Whip-poor-will.

*Rationale:* Of the upland habitat types on the Refuge, upland coniferous forest has undergone the greatest alteration and has the greatest potential for restoration. Pre-European settlement, most forest stands in this habitat type consisted primarily of long lived red and white pine, with a minor component of jack pine, aspen, and other overstory species. Exploitive and utilitarian forest management practices and subsequent wildfires fed by logging slash converted thousands of acres to second growth aspen and jack pine in the region, including the Refuge. By some estimates, less than 1 percent of the area formerly covered by the late successional stage of this habitat type still exsists in the Eastern Upper Peninsula. Fortunately, the Refuge has remote pine islands that were never harvested and these serve as benchmarks for restoration of this habitat type. Per the station's Biological Review, future management should focus on promoting ecological integrity of these stands and (where and when possible) restore composition and structure to benchmark conditions.

*American beech with black bear claw marks, Seney NWR. USFWS photo.*

*Strategies*

1. Understand and emulate the natural disturbance regime inherent to the forest types within this broad habitat type and work within the confines of seral pathways dictated by soil, climate, and hydrology.
2. Increase 95 acres from West Walsh Farm and East Walsh Farm.
3. Promote stands dominated by early seral stages at the Refuge periphery.
4. Promote stands dominated by later seral stages in the Refuge interior.
5. In managed stands, promote increased compositional and structural heterogeneity, including large-diameter coarse woody debris and snags.
6. Use management techniques that emulate natural ecological disturbances (e.g., single tree mortality for multi-aged stands, stand (cohort) replacement for even-aged stands in other instances).
7. Use commercial and non-commercial mechanical treatments, where and when appropriate.
8. Use prescribed and natural fire, where and when appropriate.
9. Ensure white-tailed deer populations do not negatively affect the habitat.
10. Manage invasive species aggressively (see below).

### Objective 2.5. Mixed Forest – Lowlands

Maintain 2007 acreage (8,221), diversity of seral stages, and (where and when possible) restore historic composition and structure for the diversity of species present, including Region 3 Conservation Priority Species American Woodcock, Cape May Warbler, Canada Warbler, gray wolf, and Olive-sided Flycatcher.

*Rationale:* It is unknown how altered this habitat type is at the Refuge relative to its historic condition. Since Refuge establishment, relatively little active management has occurred in this habitat type. Future management should focus on assessing the condition of this habitat type and promote ecological integrity of these stands.

*Strategies*

1. Understand and emulate the natural disturbance regime inherent to the forest types within this broad habitat type and work within the confines of seral pathways dictated by soil, climate, and hydrology.
2. In managed stands, promote increased compositional and structural heterogeneity, including large-diameter coarse woody debris and snags.
3. Use management techniques that emulate natural ecological disturbances (e.g., single tree mortality in some instances and stand replacement in other instances).
4. Use commercial and non-commercial mechanical treatments, where and when appropriate.
5. Use prescribed and natural fire, where and when appropriate.
6. Ensure white-tailed deer populations do not negatively affect the habitat.
7. Manage invasive species aggressively (see below).

### Objective 2.6. Coniferous Forest-Lowlands

Maintain 2007 acreage (7,825 acres), diversity of seral stages, and (where and when possible) restore historic composition and structure for the diversity of species present, including Region 3 priorities Cape May Warbler, gray wolf, Northern Flicker, and Olive-sided Flycatcher.

*Rationale:* Relative to pre-European benchmark conditions, this habitat type is thought to be relatively unaltered at the Refuge. Other than the cutting of white cedar trees for boundary posts, relatively little active forest management has occurred in this habitat type. Changes, however, to the hydrology at the Refuge have likely adversely impacted this habitat type in some areas. Tamarack, for instance, is likely less of a component of some forest stands due to hydrologic alterations. Restoring the hydrology of some areas may help restore this species. Future management should focus on promoting ecological integrity of these stands.

*Strategies*

1. Understand and emulate the natural disturbance regime inherent to the forest types within this broad habitat type and work within the confines of seral pathways dictated by soil, climate, and hydrology.
2. In managed stands, promote increased compositional and structural heterogeneity, including large-diameter coarse woody debris and snags.
3. Use management techniques that emulate natural ecological disturbances (e.g., single tree mortality in some instances and stand replacement in other instances).
4. Use commercial and non-commercial mechanical treatments, where and when appropriate.
5. Use prescribed and natural fire, where and when appropriate.
6. Restore hydrology, where adversely impacted.
7. Ensure white-tailed deer populations do not negatively affect the habitat.
8. Manage invasive species aggressively (see below).

### Objective 2.7. Open Water

Reduce acreage from 2007 level (5,104 acres) by 428 acres (-8 percent), and manage remaining 4,676 acres for the diversity of species present, including Region 3 Conservation Priority Species Bald Eagle, Common Loon, Trumpeter Swan, and Wood Duck.

*Rationale:* Except for beaver ponds, open water was not very prominent on the landscape prior to Refuge establishment. According to Refuge notes, there was only one named body of water on the Refuge, which was located near M-2 Pool. The majority of area in this habitat type is mainly confined to the Refuge's 27 pools, of which 21 have water control capability. Other sources of open water consist of beaver ponds and the creeks, ditches and rivers that fill the pools. Submerged aquatic vegetation and associated invertebrates provide essential food for waterbirds. Submergents are present throughout the marsh but reach their greatest densities in open bays free of emergents. The Refuge has documented over 35 species of submergents, including 16 species of pondweed. The pools should continue to be managed for the Region 3 Conservation Priority Species listed above. Any pool that is not contributing to the life history strategies of the Region 3 Conservation Priority Species list or inhibits the natural function and processes of wetlands on a landscape scale will be considered for removal.

*Strategies*

1. Continue managing the pools in accordance with the 1993 Long Range Marsh and Water Management Plan until CCP has been implemented.
2. Upon CCP implementation, develop new Marsh and Water Management Plan with new goals and objectives that support the CCP and mission of the Refuge.
3. Continue yearly monitoring of waterbird use of the pools.
4. Continue monitoring fisheries of the pools every 3 to 5 years.
5. Develop fish population data (species, age class, etc) for each pool.
6. Continue monitoring aquatic vegetation every 5 years.
7. Remove the dikes at Spur Pools, Delta Creek and T-2 (East). Conduct appropriate biotic and abiotic monitoiring, before, during and after these projects.
8. Maintain all remaining water control infrastructure.

### Objective 2.8. Deciduous Forest – Uplands

Increase deciduous forest acreage from 2007 levels (4,372 acres) by 232 acres (+5 percent) and manage the resulting 4,600 acres to maintain the diversity of seral stages and (where and when possible) restore historic composition and structure for the diversity of species present, including Region 3 Conservation Priority Species American Woodcock, Black-throated Blue Warbler, gray wolf, and Northern Goshawk.

*Rationale:* Throughout the Eastern Upper Peninsula and at the Refuge, this habitat type (with a small conifer component) is considerably altered relative to pre-European benchmark conditions. Now, more so in times past, this broad habitat type

*Lady's slipper, Seney NWR. USFWS photo.*

is characterized by forests in earlier seral stages and with a considerable aspen component. Late successional stages of this habitat type have in particular undergone considerable alteration relative to pre-European benchmark conditions, both within the Eastern Upper Peninsula of Michigan and at the Refuge. In most late successional stands, composition has been shifted from a mixed forest community to one primarily dominated by shade-tolerant maple species. Fewer individuals of species such as yellow birch (not to mention the minor conifer component of white pine, eastern hemlock and white spruce) are now found. At the Refuge, this habitat type is found in scattered stands, usually on the most nutrient-rich soils. In many of these forest stands, prior logging for exploitive and utilitarian reasons has degraded stand composition and structure relative to pre-European benchmark conditions, and Beech Bark Disease has further exacerbated these problems by causing mortality in one of the few native hard mast-producing species at the Refuge (American beech). Future management should focus on promoting ecological integrity of these stands by emulating gap dynamics, promoting composition and structural diversity, and (in most instances) move succession forward to emulate later seral stage characteristics.

<u>*Strategies*</u>

1. Understand the natural disturbance regime inherent to the forest types within this broad habitat type and work within the confines of seral pathways dictated by soil, climate, and hydrology.
2. Eliminate the following old fields, either passively by allowing forest succession to occur or promote forest succession by plantings: Smith Field (22 acres), Sub-Headquarters Field (64 acres), Conlon Farm (39 acres), Chicago Farm (97 acres), and miscellaneous forest openings (10 acres).
3. In managed stands, promote increased compositional and structural heterogeneity, including large-diameter coarse woody debris and snags.
4. Promote early seral stages dominated by aspen at the Refuge perimeter.
5. Stands with late seral characteristics should be conserved wherever they exist, and restored in the interior of the Refuge.
6. Enhance representation of more uncommon species such as yellow birch and eastern hemlock, and conserve as much American beech as possible.
7. Use management techniques that emulate natural ecological disturbances (e.g., single tree mortality in late seral stands).
8. Use commercial and non-commercial mechanical treatments, where and when appropriate.
9. Ensure white-tailed deer populations do not negatively affect the habitat.
10. Manage invasive species aggressively (see below).
11. Continue to monitor spread of beech bark disease and treatment effectiveness.

### Objective 2.9. Deciduous Forest-Lowlands

Maintain acreage at 2007 levels (2,515 acres), diversity of seral stages, and (where and when possible) restore historic composition and structure for the diversity of species present for the diversity of species present, including Region 3 Conservation Priority Species American Woodcock, Black-throated Blue Warbler, gray wolf, and Northern Goshawk.

*Rationale:* This habitat type has seen relatively little management in the past at the Refuge and is not considered drastically altered relative to pre-European benchmark conditions. Future management should focus on gap dynamics and promoting composition and structural diversity while moving succession forward in most areas.

No active management is called for in this habitat type.

*Strategies*

1. Understand and emulate the natural disturbance regime and work within the confines of seral pathways dictated by soil, climate, and hydrology.
2. Ensure white-tailed deer populations do not negatively affect the habitat.
3. Manage invasive species aggressively (see below).

### Objective 2.10. Upland Old Fields and Openland

Reduce openland habitat from 2007 levels (1,302 acres) by 327 acres (-25 percent) and manage the remaining 979 acres for the diversity of species present, including Region 3 Conservation Priority Species American Woodcock, Bobolink, Upland Sandpiper, and Northern Harrier.

*Rationale:* This habitat type consists of primarily anthropogenic habitats created prior to the Refuge establishment in 1935. Many non-native grass species, such as Kentucky bluegrass and several brome species, characterize these areas. Other than Diversion Farm (which because of its size and location offers habitat for a number of species of Regional Conservation Priority), most fields should be either allowed to naturally succeed to forests or be actively managed to do so.

*Strategies*

1. Conserve Diversion Farm using a combination of tools, including prescribed fire and mowing.
2. Elsewhere, restore fields to upland deciduous forest stands either passively through natural secondary succession or through active management that could include planting of seedlings (see above).
3. Ensure white-tailed deer populations do not negatively affect the habitat
4. Manage invasive species aggressively (see below).

### Objective 2.11. Invasive Species Management

By 2020, reduce the area infested with target invasive plant species (e.g., glossy buckthorn, tartarian honeysuckle, multi-flora rose) by 50 percent from the documented 2007 level and eliminate new infestations of these and other highly invasive species as they occur.

*Rationale:* Many exotic plants and pathogens have been identified at the Refuge, with many being invasive. Moreover, more invasive species are expected to arrive in the area in the future. Management should strive to assess the threat these species have on native ecosystem/habitat structure and function and (for those species that constitute the greatest threats) an active management and monitoring program should ensue.

*Strategies*

1. Document the locations and sizes of targeted populations.
2. Use chemical, mechanical, prescribed and natural fire (where appropriate) as means to manage infestations in cases where biological control techniques have not been developed.
3. Monitor the infestations and effectiveness of management measures.
4. When available, use biological control as a preferred strategy.

*Severe forest burn site, Seney NWR. USFWS photo.*

## Goal 3: People

Provide visitors and the community with opportunities to experience quality, wildlife-dependent activities and to understand and appreciate the rich mosaic of wildlife and habitats found within the Eastern Upper Peninsula of Michigan.

### Objective 3.1: Hunting

Provide 200 days of quality upland hunting experiences per year with fewer than 10 complaints annually.

*Rationale:* To evaluate improvements across the entire visitor services program and summarize progress, the Refuge will use the evaluation standards of RAPP (Refuge Annual Performance Plan). RAPP measures act as a general indicator of how successful management is in satisfying the criteria for quality of recreation use as described in the Service Manual Chapter 605 FW1.6. RAPP identifies 11 criteria for evaluating the quality of the priority wildlife-dependent recreational activities. By applying the 11 criteria to each use, a quality ranking factor can be assigned. The Refuge program for the specific use is considered "good" if you meet eight to 11 of the criteria; "fair" if you meet five to seven; and "poor" if you meet zero to four. One example of a criterion is "promotes safety of participants, other visitors and facilities." Some improvements are clearly needed and inferred from the criteria in the Service manual.

These improvements are identified in the following paragraphs in the strategies and under the strategies of the wildlife dependent activities listed in the next objectives. As the visitor services program of the Refuge matures and more details are specified in a visitor services plan, the Refuge will be able to move to more direct and specific measures of recreation quality. These direct measures will include a survey of visitors.

*Strategies*

1. Continue annual small game hunting opportunities (grouse, woodcock, hare) within framework of MDNR and Refuge restrictions.
2. Continue annual firearms and archery white-tailed deer and black bear hunting opportunities (within framework of Michigan DNR and Refuge restrictions).

*Refuge exhibit at a local art festival, Seney NWR. USFWS photo.*

3. Continue to provide camping opportunities and open roads during white-tailed deer firearms season.
4. Eliminate toxic shot for all species except white-tailed deer and black bear.
5. Conduct counts to determine numbers of Ruffed Grouse, American Woodcock and snowshoe hare hunters.
6. Develop operational definition of success and measures for hunting through a survey of hunter satisfaction.

### Objective 3.2: Fishing

Provide 125 days of quality fishing experiences per year with fewer than 10 complaints annually.

*Strategies*

1. Maintain an accessible fishing platform.
2. Maintain roads for fishing route.
3. Maintain fish line disposal containers.
4. Continue the Children's Fishing Day event.
5. Provide a fishing platform at the Wigwam access area.
6. Conduct a count to determine the number of anglers.
7. Develop an operational definition of success and measures for fishing through a survey of angler satisfaction.

### Objective 3.3: Wildlife Observation and Photography

Provide year-round opportunities for at least 25,000 visitors annually to observe and photograph wildlife and habitat.

*Strategies*

1. Continue annual amateur photo contest.
2. Maintain 7-mile Marshland Wildlife Drive.
3. Maintain 1.4-mile hiking trail.
4. Maintain 10 miles of groomed ski trails.
5. Maintain six viewing platforms with scopes and interpretive panels.
6. Provide viewing platform at Wigwams access area.
7. Provide guided photo opportunities and/or workshops.
8. Increase facilities (i.e. trails, observation platforms) at Whitefish Point.
9. Develop operational definition of success and measures for wildlife observation and photography through a survey of visitor satisfaction.

### Objective 3.4: Environmental Education and Interpretation

Annually provide no fewer than 400 quality environmental education experiences and 700 quality interpretive experiences per year to promote an understanding of the rich mosaic of wildlife and habitats found within the Eastern Upper Peninsula.

*Strategies*

1. Provide facilities and programs for area schools, universities, community groups, and other Refuge visitors, with a message that emphasizes the importance of habitat diversity, natural patterns and processes, and wildlife management.
2. Increase use of education trunks.
3. Continue to provide interpretive programs, events, festivals, tours for Refuge visitors, with a message that emphasizes habitat diversity, natural patterns and processes, and wildlife management.
4. Conduct at least two special events, 12-24 auto tours, and 12-24 programs on-site to interpret the Refuge, its habitat diversity, natural patterns and processes, and wildlife management.
5. Maintain interpretive signs/panels on nature trail and viewing platforms.
6. Provide and maintain 14 kiosks that orient visitors and help interpret habitats, wildlife, management, and regulations (Figure 16).
7. Increase programming and use of facilities for environmental education activities for area schools, universities, community groups, and other Refuge visitors, with a curriculum-based message that emphasizes habitat diversity, natural patterns and processes, and wildlife management.
8. Develop an operational definition of success and measures for environmental education.
9. Encourage partnerships with local schools, community groups and surrounding agencies.
10. Provide teacher workshops with partner schools.
11. Increase environmental education and interpretation presence at Whitefish Point.
12. Develop operational definition of success and measures for interpretation through a survey of visitor satisfaction.
13. Update the Refuge orientation slide show using new DVD technology.
14. Hire a full-time visitor services manager.
15. Replace the Refuge Visitor Center and office (see Chapter 5).
16. Improve parking site to accommodate trailers used by Refuge volunteers.

### Objective 3.5: Protection of Cultural Resources

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

*Educational display, Seney NWR. USFWS photo.*

*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*

1. 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.)
2. 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.)
3. Develop an oral cultural history to preserve the "community memory" about the area.
4. Explore the idea of converting the CCC cabin into an historic/cultural museum.

### Objective 3.6: Cultural Resources Appreciation

Seventy percent of visitors will understand and appreciate the cultural history of the Refuge.

*Strategy*

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

### Objective 3.7: Whitefish Point Unit

Within 5 years of CCP completion, implement the Service's provisions of the 2002 Human Use/ Natural Resource Management Plan for Whitefish Point.

*Rationale:* As mentioned in Chapter 1, Seney NWR manages 33 acres of the former Coast Guard Station at Whitefish Point. Currently there are no permanent buildings or designated trails on the property and the USFWS does not administer any programs on site. However, Human Use Plan obligates the USFWS to provide some minor facilities at the site. As of 2008, no funds have been designated to implement these provisions.

The Refuge will work with a Joint Committee, which consists of Michigan Audubon Society, Great Lakes Shipwreck Historical Society and the Service, to implement provisions of the Human Use Natural Resource Management Plan for Whitefish Point. Specifically the Refuge will seek to implement the following actions on its lands to protect the fragile habitat at the Point for the wildlife that depend upon it.

*Strategies*

1. Designate trails to allow public access while protecting environmentally sensitive areas. One trail will lead from the parking lot to the tip of the Point. The second will run along an old cobble road in a southeasterly direction.
2. Close the southeast beach from April to August to promote nesting of Piping Plovers.
3. Work with the GLSHS to route visitors to the beach via their boardwalk and revegetate the cut-through from the parking lot to the beach.
4. Hire a Refuge Manager trainee with a major responsibility for on-site work, mitigation approvals and coordination with partners.

**Figure 16: Future Visitor Facilities on Seney NWR**

5. Occupy a portion of a Second Keeper's Quarters if the building is re-constructed. The building will also be used by other partners to the Whitefish Point plan.

### 3.8 Other Recreational Access

Provide additional access opportunities upon request on a case-by-case basis if compatible with Refuge purposes.

*Rationale:* Occasionally, the Refuge receives requests for access to portions of the refuge for events or activities. The access requests may not be solely for a wildlife-dependent activity. Two activities, horseback riding and snowmobile riding (on the Refuge perimeter) were mentioned during public scoping for the CCP.

*Horseback Riding:* Several members of the community have requested assess to Refuge roads for horseback riding. They desire an area to ride where disturbance by motor vehicles in minimal. This is particularly important for young riders or young horses. Currently the nearest dedicated horseback trail is 50 miles away. While horseback riding is not a wildlife dependent activity, it could be permitted on a limited basis provided riders are willing to clean up manure after each ride. The concern is that horses may deposit seeds of invasive species on the Refuge. Permission would be granted under a Special Use Permit and riders would be restricted to designated roads.

*Snowmobiling:* The Seney Snowmobile Club and Michigan Snowmobile Association are planning to construct a snowmobile trail along State Highway 77, which is the Refuge's eastern boundary. Their intent is to connect the towns of Seney and Germfask to existing trails south of the Refuge. The existing trail bypasses the town of Germfask and its safety is often compromised by winter logging activities. Most of the trail would be in the highway right-of-way, however there are several areas where the trail may infringe on Refuge property. Given that snowmobiling occurs in the winter when most wildlife have migrated from the Refuge and proposed trail will be along a state highway on the edge of the Refuge, consideration of the plan should be given when a proposal is completed. A concern is the potential use of the proposed trail by ATV traffic during the non-winter months when wildlife is abundant.

<u>*Strategy*</u>

1. Consider recreational access requests on a case-by-case basis.

# Chapter 5: Plan Implementation

## New and Existing Projects

This CCP outlines an ambitious course of action for the future management of Seney NWR. The ability to enhance wildlife habitats on the Refuge and to maintain existing and develop additional quality public use facilities will require a significant commitment of staff and funding from the Service. The Refuge will continually need appropriate operational and maintenance funding to implement the objectives in this plan.

The following provides a brief description of the highest priority Refuge projects as chosen by the Refuge staff.

### Seney NWR Operating Needs Projects

*Replenish Visitor Services/Environmental Education Capacity and Capability* – Hire a full-time Visitor Services Manager (Park Ranger). Due to Regional Workforce Planning considerations, the position at Seney NWR has been vacant since early in 2004. With this position filled, the Refuge would:

- Be able to conduct teacher workshops again
- Increase environmental education activities/presentations in area schools and at the Refuge, especially during the winter months when currently there is not any visitor services staff on duty.
- Increase outreach activities.
- Present more focused activities related to Service events such as Wildlife Refuge Week, Migratory Bird Day, etc.

A full-time Visitor Services Specialist would allow us to better meet one of the highest priorities for the U.S. Fish and Wildlife Service which is "Connecting People with Nature: Ensuring the Future of Conservation." Estimated Cost – $80,000. Strategy 14 under Objective 3.4.

*Seney NWR. USFWS photo.*

*Replace Refuge Visitor Center and Office* – The current Refuge Visitor Center was built in 1963. Current exhibits and displays are becoming outdated and the auditorium is a simple room with basic features. Technology for interactive displays, multi-media presentation, and exhibits has significantly evolved over the past 40 years. It would not be feasible to update the existing facility to modern standards. The current office, exhibit space, and book store space are all used to the maximum and there is no space to expand. A new building could be constructed completely to Federal accessibility standards and include the latest in energy conservation capabilities. In addition, the current parking space for the Visitor Center is limited and is not conducive for parking and maneuverability of modern RVs.

The current Refuge Office was originally built in 1935 as a garage and then was converted into an office building. The building has been renovated several times over the years. Office space is used to maximum capacity, especially during the summer months with the arrival of seasonal staff/interns. The Refuge does not have the space to store official records and display library materials. A new building would be constructed to meet Federal accessibility standards and include the latest in energy conservation capabilities.

A joint Visitor Center/Office building would be estimated at $4 million to $7 million, dependng on the chosen design. Strategy 15 under Objective 3.4.

*Increase Law Enforcement Capability* – Hire a full-time law enforcement officer. Currently the station only has one dual function officer. A full-time officer would be able to do more regular and intensive law enforcement on the Refuge throughout the year. The Refuge is responsible for managing and monitoring 30 different easements throughout the Upper Peninsula and northern Lower Peninsula; three remote island refuge units – one each in Lake Superior, Lake Michigan and Lake Huron; Whitefish Point, a remote unit of the Refuge approximately 70 miles from Seney NWR's Headquarters; and finally the Kirtland's Warbler Wildlife Management Area, which is composed of 125 different parcels in eight different counties in the northern Lower Peninsula. A full-time officer would be able to build cooperative relationships with neighboring enforcement agencies and enhance enforcement of state regulations on the Refuge. Estimated Cost - $100,000.

*Whitefish Point, Implement Human Use/Natural Resource Management Plan for Whitefish Point and Increase Public Use Opportunities* – Hire a full-time Refuge Manager trainee with a major responsibility to work with partners in implementing the Human Use/Natural Resource Management Plan. A portion of the old U.S. Coast Guard Station was transferred to the Great Lakes Shipwreck Historical Society, Michigan Audubon Society/Whitefish Point Bird Observatory and U.S. Fish & Wildlife Service/Seney National Wildlife Refuge. Regular Refuge staff presence is needed at Whitefish Point to build relationships with the other partners and to cooperatively work to implement the plan. This person would be able to acquire grant money or other funding to implement the plan. This person would be tasked with developing kiosks, new trails or other items to better educate and inform the general public about the natural resources at Whitefish Point. Estimated cost $70,000. Strategy 8 under Objective 3.3, Strategy 11 under Objective 3.4, and Strategy 5 under Objective 3.7.

*Maintain Refuge Infrastructure* – Seney NWR was established in 1935. Most of the water control structures, bridges, dikes, and canals for Refuge impoundments were built in the first 10 years of the Refuge's existence. The Refuge actively manages 21 impoundments that are very important in management for Common Loons, Trumpeter Swans, other waterfowl and waterbirds, plus they are a major facet of the Refuge public use program. The Refuge should be on a schedule to replace or rehabilitate one to two water control structures/bridges every 5 to 10 years. In a top 10 priority list for deferred maintenance projects for the time-frame 2010 to 2014, replacing the water control structure at Upper Goose Pen is the number 1 priority; replacing the C-2 to M-2 water control structure is the number 2 priority; and replacing the J to H bridge is the fifth priority.

All Refuge dikes/dams have issues with trees and brush growing on the slopes and erosion problems from wave action and beaver activity. Some dikes are showing bare spots from vegetation dying out, plus they are all showing wear from 60 to 70 years of use. In addition to annual maintenance, the Refuge should be on a schedule to every 5 years complete major rehabilitation work on at least one dike/dam. In a top 10 priority list for deferred maintenance projects for the time-frame 2010-2014, rehabilitating the dike at B-1 Pool is listed as our fourth prior-

*Researcher with eaglet, Seney NWR. USFWS photo.*

ity and the dike at H-1 Pool is listed as the ninth priority. Estimated costs for water control structures/bridges would range from $10,000 to $740,000. Estimated costs for rehabilitating a dike/dam would range from $10,000 to $1,000,000. Strategy 8 under Objective 2.7.

*Continue and Increase Efforts Concerning Invasive Species Control* – For several years, Seney NWR has been conducting an active glossy buckthorn (invasive species) control program including mechanical cutting of the shrub, prescribed burning and application of herbicide. Annually, approximately 20 acres per year are treated. In addition to glossy buckthorn, invasive populations of multiflora rose and tartarian honeysuckle are also treated. This project would hire a career seasonal bio-tech to assist the Refuge forester in continuing the control program on glossy buckthorn. In addition this person would inventory and document extent of other invasive populations and begin to treat these other invasives. Estimated Cost $35,000. Strategies 1-4 under Objective 2.11.

*Maintain Refuge Roads* – The Refuge maintains over 90 miles of roads, a majority of the roads are gravel but a significant portion are earthen roads. The 7.1-mile Auto Tour Loop and 4.3-mile Fishing Loop are both gravel. The Refuge maintains less than 2 miles of paved roads encompassing our entrance road and short roads to administrative sites. The entrance road and the Auto Tour and Fishing Loop, by far receive the most extensive public use. Estimated cost to re-pave the entrance road and associated parking lots at visitor center, office and shop would be $436,000. Strategy 2 under Objective 3.3.

*Investigate Feasibility of Utilizing Solar and/or Wind Power to Power River Road Quarters* – The Refuge River Road quarters is housing for summer interns and researches. The building is shut down and remains vacant in the winter. The building is located in an open field area and should be ideal for receiving and generating solar power and possibly wind power. No research has been conducted to date to determine the feasibility or expense of this project. (No specific strategy.)

*Increase Capacity for Volunteers* – Improve capabilities for housing trailers at River Road (location of pads, sewer and electrical hookups, phone hookups, etc.) Estimated Cost $10,000. Strategy 16 under Objective 3.4.

*Establish a Refuge Museum in the Historic Log Cabin* – The Historic Log Cabin was built by the CCC in 1940 from timber harvested at the Refuge and is a superb example of local workmanship. It has served as a lodging facility for visiting dignitaries and was said to be a favorite of J. Clark Salyer's. The Refuge has numerous artifacts, photographs and documents form its early years that would be suitable for display in a museum. One bedroom would remain to provide accommodations for an "Artist in Residence" program or individuals conducting historical research. No research has been conducted to date to determine the feasibility or expenses of this project. Strategy 4 under Objective 3.5.

## Future Staffing Requirements

Implementing the visions set forth in this CCP will require additions to the organizational structure of Seney NWR. Existing staff will direct their time and energy in somewhat new directions and new staff members will be added to assist in these efforts. The organizational chart (Figure 17) shows the existing Refuge staff as of Fiscal Year 2008. One full-time equivalent (FTE) law enforcement officer is needed to fully implement this plan by Fiscal Year 2023.

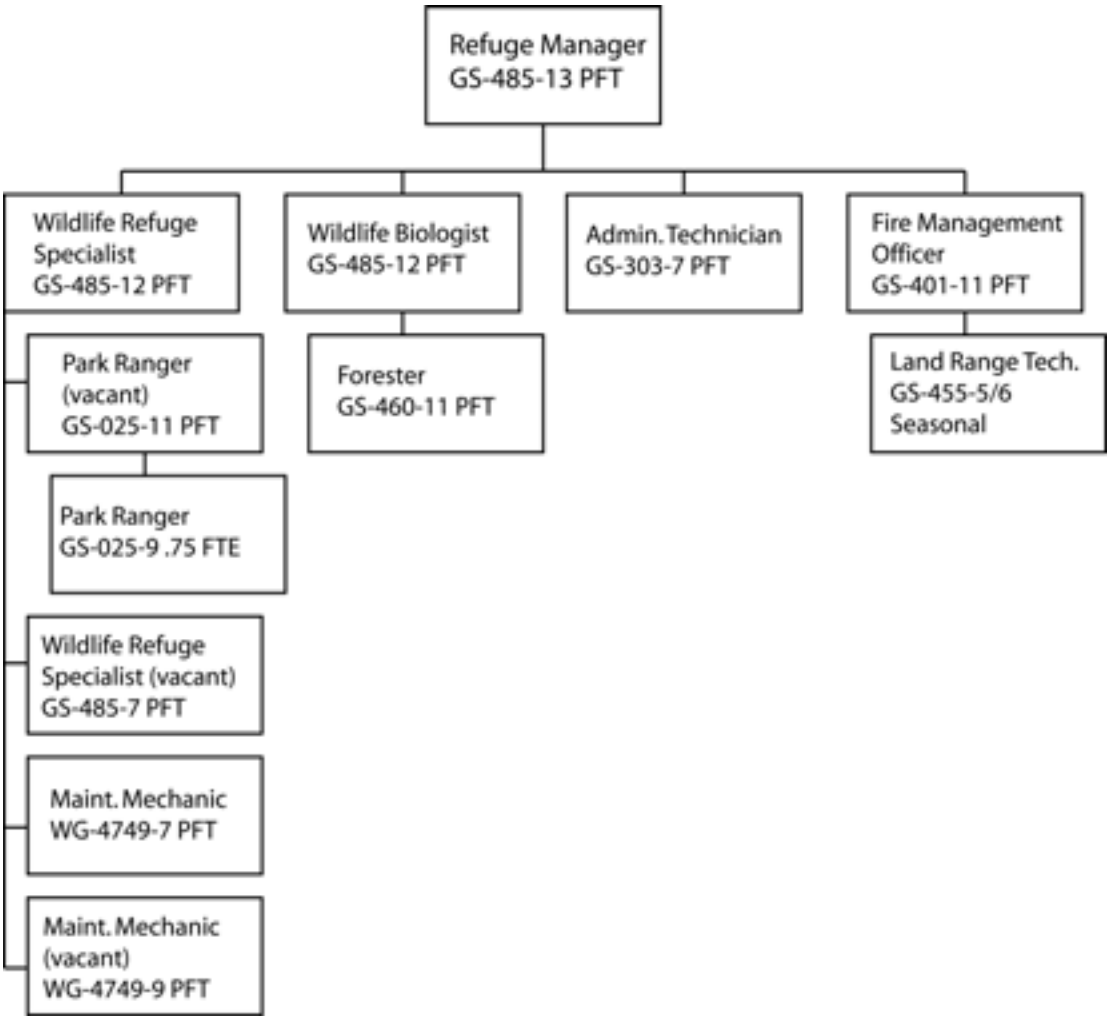
## Step-down Management Plans

Step-down management plans describe specific actions that support the accomplishment of Refuge objectives. The management plans identified in Table 11 on page 78 will be reviewed, revised, or developed as necessary to achieve the results anticipated in this CCP. Please note that several existing management plans will be incorporated into the new Habitat Management Plan.

## Wilderness Review

We reviewed Refuge lands outside of the designated wilderness area for suitability as additional wilderness. This evaluation is presented within Chapter 3. No additional lands were found suitable for designation as wilderness as defined in the Wilderness Act of 1964.

## Figure 17: Current Staffing, Seney NWR



## Table 11: Step-down Management Plan Schedule, Seney NWR

| Step-down Management Plan | Plan Completed/ Updated | Anticipated Revision |
|---|---|---|
| Visitor Services Plan | N/A | 2012 |
| Hunting Plan | 1989 | 2013 |
| Law Enforcement Plan | 2006 | 2009 |
| Furbearer Management &Trapping Plans | 1989 | 2013 Seney Habitat Management Plan |
| Marsh & Water Management Plan[1] | 1993 | |
| Forest Management Plan | 1991 | |
| Wildlife Inventory Plan | 1989 | |
| Fisheries Management Plan | 1989 | |
| Fire Management Plan | 2008 | 2013 |
| Wilderness Management Plan | N/A | 2012 |
| Cultural Resources Management Plan | 1976 | 2016 |
| Safety Plan | 2007 | 2012 |

1. *Annual Management Plans are written for the Water Management Plan.*

# Monitoring and Evaluation

The direction set forth in this CCP and specifically identified strategies and projects will be monitored throughout the life of this plan. On a periodic basis, the Regional Office will assemble a station review team whose purpose will be to visit Seney 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 Seney NWR is meant to provide guidance to Refuge managers and staff over the next 15 years. However, the CCP is also a dynamic and flexible document and several of the strategies contained in this plan are subject to 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.

# Finding of No Significant Impact

## Environmental Assessment and Comprehensive Conservation Plan for the Seney National Wildlife Refuge, Michigan

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

The alternative selected for implementation on the refuge is *Alternative 2*. The preferred alternative would encourage a future trend toward wildlife habitats that are native to the area and maintained, where feasible, by natural processes. The preferred alternative also includes increased opportunities for hunting, fishing, wildlife observation and photography, environmental education and interpretation. Alternative 2 would segment the Refuge into four general units and apply a management strategy to each unit. The units would follow a general gradient of management from low intensity (wilderness) to higher manipulation (managed impoundments and visitor use). Some high and low intensity management actions would occur in all units. Wildlife needs always receive priority when in conflict with visitor services.

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 2 as the management alternative for Seney NWR is not a major federal action which would significantly affect the quality of the human environment, within the meaning of Section 102 (2)(c) of the National Environmental Policy Act of 1969.

Additional Reasons:

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

Supporting References:

Environmental Assessment
Comprehensive Conservation Plan

ACTING Regional Director

2/12/09
Date

Page One

# 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.

**Conservation**
Active management to maintain existing conditions, more or less.

**Cultural Resources**
"Those parts of the physical environment -- natural and built -- that have cultural value to some kind of sociocultural group ... [and] those nonmaterial 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.

**High Quality Recreation**
Wildlife-dependent recreational programs that meet criteria defined in Section 1.6 of 605 FW 1.

**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.

**Landbirds**
All birds that inhabit non-wetland habitats.

**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**
A concise statement of what we want to achieve. The statement is specific, measurable, achievable, results oriented, and time-fixed.

**Preferred Alternative**
The Service's selected alternative identified in the environmental assessment and fully developed in the Comprehensive Conservation Plan.

**Preservation**
Passive management that allows patterns to develop without intervention.

**Restoration**
Active management to return patterns or processes to a measured, pre-European condition.

**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.

**Trust Resources**
Trust resources are those resources for which the Service has been given specific responsibilities under federal law. These include migratory birds, interjurisdictional fishes (fish species that may cross state lines), federally listed threatened or endangered species, some marine mammals, and lands owned by the Service.

**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.

**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 plant species of a particular area.

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

**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 a 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.

**Wildlife Diversity**
A measure of the number of wildlife species in an area.

# Appendix C: Species Lists

**Birds of Seney NWR and Nearby Lands** / page 89

**Bird Species of Whitefish Point** / page 104

**Seney NWR 2004 Butterfly List** / page 113

**Herptofauna List, Seney NWR** / page 118

**List of Fish Species Found on Seney NWR** / page 120

**Mammal Species Found on Seney NWR** / page 123

**Seney NWR Herbarium** / page 130

# Birds of Seney NWR and Nearby Lands

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Common Loon | *Gavia immer* | | ✓ | | | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWA |
| Horned Grebe | *Podiceps auritus* | | | | ✓ | | OWA |
| Red-necked Grebe | *Podiceps grisegena* | | | | ✓ | | OWA |
| Eared Grebe | *Podiceps nigricollis* | | | | ✓ | | OWA |
| Pied-billed Grebe | *Podilymbus podiceps* | | ✓ | | | | OWA |
| American White Pelican | *Pelecanus erythrorhynchos* | | | | ✓ | | OWA |
| Double-crested Cormorant | *Phalacrocorax auritus* | | | | ✓ | Region 3 Conservation Priorities | OWA |
| American Bittern | *Botaurus lentiginosus* | | ✓ | | | Region 3 Conservation Priorities, Michigan Special Animal | OWE |
| Least Bittern | *Ixobrychus exilis* | | | | ✓ | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWE |
| Black-crowned Night Heron | *Nycticorax nycticorax* | | | | ✓ | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWE |
| Great Blue Heron | *Ardea herodias* | | ✓ | | | | OWA, OWE |
| Green Heron | *Butorides virescens* | | | | ✓ | | OWA, OWE |
| Great Egret | *Ardea alba* | | | | ✓ | | OWA, OWE |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Mute Swan | *Cygnus olor* | | | | ✓ | | OWA |
| Trumpeter Swan | *Cygnus buccinator* | ✓ | ✓ | ✓ | | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWA |
| Tundra Swan | *Cygnus columbianus* | | | | ✓ | | OWA |
| Snow Goose | *Chen caerulescens* | | | | ✓ | Region 3 Conservation Priorities | OWA |
| Canada Goose | *Branta canadensis* | ✓ | | | | Region 3 Conservation Priorities | OWA |
| American Black Duck | *Anas rubripes* | | ✓ | | | Region 3 Conservation Priorities | OWA |
| Canvasback | *Aythya valisineria* | | | | ✓ | Region 3 Conservation Priorities | OWA |
| Redhead | *Aythya americana* | | | | ✓ | | OWA |
| Lesser Scaup | *Aythya affinis* | | | | ✓ | Region 3 Conservation Priorities | OWA |
| Black Scoter | *Melanitta nigra* | | | | ✓ | | OWA |
| White-winged Scoter | *Melanitta nigra* | | | | ✓ | | OWA |
| Long-tailed Duck | *Clangula hyemalis* | | | | ✓ | | OWA |
| Bufflehead | *Bucephala albeola* | | | | ✓ | | OWA |
| Common Goldeneye | *Bucephala clangula* | | | | ✓ | | OWA |
| Ruddy Duck | *Oxyura jamaicensis* | | | | ✓ | | OWA |
| Wood Duck | *Aix sponsa* | | ✓ | | | Region 3 Conservation Priorities | OWA, OWE |
| Gadwall | *Anas strepera* | | | | ✓ | | OWA, OWE |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| American Widgeon | *Anas americana* | | | | ✓ | | OWA, OWE |
| Mallard | *Anas platyrhynchos* | | ✓ | | | Region 3 Conservation Priorities | OWA, OWE |
| Blue-winged Teal | *Anas discors* | | ✓ | | | Region 3 Conservation Priorities | OWA, OWE |
| Green-winged Teal | *Anas crecca* | | | | ✓ | | OWA, OWE |
| Northern Shoveler | *Anas clypeata* | | | | ✓ | | OWA, OWE |
| Northern Pintail | *Anas acuta* | | | | ✓ | Region 3 Conservation Priorities | OWA, OWE |
| Ring-necked Duck | *Aythya collaris* | | ✓ | | | | OWA, OWE |
| Hooded Merganser | *Lophodytes cucullatus* | | ✓ | | | | OWA, OWE |
| Red-breasted Merganser | *Mergus serrator* | | | | ✓ | | OWA, OWE |
| Common Merganser | *Mergus merganser* | | | | ✓ | | OWA, OWE |
| Osprey | *Pandion haliaetus* | | ✓ | | | Michigan Special Animal | OWA |
| Bald Eagle | *Haliaeetus leucocephalus* | | ✓ | | | Region 3 Conservation Priorities, Michigan Special Animal | OWA |
| Golden Eagle | *Aquila chrysaetos* | | | | ✓ | | OWE, GRA, HAY, OLD |
| Turkey Vulture | *Cathartes aura* | | | ✓ | | | GRA, HAY, OLD |
| Peregrine Falcon | *Falco peregrinus* | | | | ✓ | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWE, GRA, HAY |
| Merlin | *Falco columbarius* | | | ✓ | | Michigan Special Animal | DCF, DMF, MCF, MMF, WCF, WMF |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| American Kestrel | *Falco sparverius* | | ✓ | | | | GRA, HAY, OLD |
| Red-tailed Hawk | *Buteo jamaicensis* | | ✓ | | | | GRA, HAY, OLD |
| Rough-legged Hawk | *Buteo lagopus* | | | | ✓ | | OWE, GRA, HAY, OLD |
| Broad-winged Hawk | *Buteo platypterus* | | ✓ | | | | DCF, DMF, WCF, WMF |
| Red-shouldered Hawk | *Buteo lineatus* | | | | ✓ | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | WMF, WCF |
| Sharp-shinned Hawk | *Accipiter striatus* | | | ✓ | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Cooper's Hawk | *Accipiter cooperii* | | | ✓ | | Michigan Special Animal | DCF, DMF, MCF, MMF, WCF, WMF |
| Northern Goshawk | *Accipiter gentilis* | | | ✓ | | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | DCF, DMF, MCF, MMF, WCF, WMF |
| Northern Harrier | *Circus cyaneus* | | ✓ | | | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWE, GRA, HAY, OLD |
| Spruce Grouse | *Falcipennis canadensis* | | | ✓ | | Regional Forester Sensitive, Michigan Special Animal | DCF, WCF |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Ruffed Grouse | *Bonasa umbellus* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Sharp-tailed Grouse | *Tympanuchus phasianellus* | | | ✓ | | Regional Forester Sensitive, Michigan Special Animal | GRA, HAY, OLD |
| Ring-necked Pheasant | *Phasianus colchicus* | | | | ✓ | | GRA, HAY, OLD |
| American Coot | *Fulica americana* | | | | ✓ | | OWA, OWE |
| Sandhill Crane | *Grus canadensis* | | ✓ | | | | OWE, GRA, HAY, OLD |
| Yellow Rail | *Coturnicops noveboracensis* | | | ✓ | | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWE |
| Virginia Rail | *Rallus limicola* | | ✓ | | | | OWE |
| Sora | *Porzana carolina* | | ✓ | | | | OWE |
| Upland Sandpiper | *Bartramia longicauda* | | | ✓ | | Region 3 Conservation Priorities, Regional Forester Sensitive | GRA, HAY, OLD |
| Killdeer | *Charadrius vociferus* | | ✓ | | | | GRA, HAY, OLD |
| American Woodcock | *Scolopax minor* | | ✓ | | | Region 3 Conservation Priorities | SUP |
| Greater Yellowlegs | *Tringa melanoleuca* | | ✓ | | | Region 3 Conservation Priorities | SHO |
| Lesser Yellowlegs | *Tringa flavipes* | | | | ✓ | | SHO |
| Solitary Sandpiper | *Tringa solitaria* | | | | ✓ | | SHO |
| Spotted Sandpiper | *Actitis macularia* | | ✓ | | | | SHO |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Semipalmated Sandpiper | *Calidris pusilla* | | | | ✓ | | SHO |
| Least Sandpiper | *Calidris minutilla* | | | | ✓ | | SHO |
| White-rumped Sandpiper | *Calidris fuscicollis* | | | | ✓ | | SHO |
| Baird's Sandpiper | *Calidris bairdii* | | | | ✓ | | SHO |
| Pectoral Sandpiper | *Calidris melanotos* | | | | ✓ | | SHO |
| Common Snipe | *Gallinago gallinago* | | ✓ | | | | OWE, SHO |
| Dunlin | *Calidris alpina* | | | | ✓ | | SHO |
| Black-bellied Plover | *Pluvialis squatarola* | | | | ✓ | | OWE |
| Semipalmated Plover | *Charadrius semipalmatus* | | | | ✓ | | OWE |
| Bonaparte's Gull | *Larus philadelphia* | | | | ✓ | | OWA |
| Ring-billed Gull | *Larus delawarensis* | | ✓ | | | | OWA |
| Herring Gull | *Larus argentatus* | | ✓ | | | | OWA |
| Caspian Tern | *Sterna caspia* | | ✓ | | | Regional Forester Sensitive, Michigan Special Animal | OWA |
| Common Tern | *Sterna hirundo* | | | ✓ | | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWA |
| Black Tern | *Chlidonias niger* | | | ✓ | | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | OWA, OWE |
| Rock Dove | *Columba livia* | | | | ✓ | | RES |
| Mourning Dove | *Zenaida macroura* | | ✓ | | | | RES |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| White-throated Sparrow | *Zonotrichia albicollis* | | ✓ | | | | DCF, DMF |
| Black-billed Cuckoo | *Coccyzus erythropthalmus* | | | ✓ | | Region 3 Conservation Priorities | SWE, SUP |
| Great Horned Owl | *Bubo virginianus* | | | ✓ | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Barred Owl | *Strix varia* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Long-eared Owl | *Asio otus* | | | ✓ | | Region 3 Conservation Priorities, Michigan Special Animal | DCF, DMF, WCF, WMF |
| Snowy Owl | *Nyctea scandiaca* | | | | ✓ | | OWE, GRA, HAY, OLD |
| Northern Hawk Owl | *Surnia ulula* | | | | ✓ | | OWE, GRA, HAY, OLD |
| Great Gray Owl | *Strix nebulosa* | | | | ✓ | Regional Forester Sensitive | OWE, GRA, HAY, OLD |
| Short-eared Owl | *Asio flammeus* | | | | ✓ | Regional Forester Sensitive, Michigan Special Animal | OWE, GRA, HAY, OLD |
| Boreal Owl | *Aegolius funereus* | | | | ✓ | Regional Forester Sensitive | WDF |
| Northern Saw-whet Owl | *Aegolius acadicus* | | | ✓ | | | WDF, WMF |
| Chimney Swift | *Chaetura pelagica* | | | ✓ | | | RES |
| Common Nighthawk | *Caprimulgus vociferus* | | | ✓ | | | DCF, GRA, HAY, OLD |
| Whip-poor-will | *Troglodytes aedon* | | | ✓ | | Region 3 Conservation Priorities | DCF, GRA, HAY, OLD |
| Ruby-throated Hummingbird | *Archilochus colubris* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF, RES |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Belted Kingfisher | *Ceryle alcyon* | | ✓ | | | | OWA, OWE |
| Red-bellied Woodpecker | *Melanerpes carolinus* | | | ✓ | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Yellow-bellied Sapsucker | *Sphyrapicus varius* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Downy Woodpecker | *Picoides pubescens* | ✓ | | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Hairy Woodpecker | *Picoides villosus* | ✓ | | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Black-backed Woodpecker | *Picoides arcticus* | | | ✓ | | Regional Forester Sensitive, Michigan Special Animal | DCF, DMF, MCF, MMF, WCF, WMF |
| Northern Flicker | *Colaptes auratus* | ✓ | | | | Region 3 Conservation Priorities | DCF, DMF, MCF, MMF, WCF, WMF |
| Pileated Woodpecker | *Dryocopus pileatus* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Red-headed Woodpecker | *Melanerpes erythrocephalus* | | | | ✓ | Region 3 Conservation Priorities | GRA, HAY, OLD |
| Eastern Kingbird | *Tyrannus tyrannus* | | ✓ | | | | GRA, HAY, OLD |
| Olive-sided Flycatcher | *Contopus cooperi* | | | ✓ | | Region 3 Conservation Priorities, Regional Forester Sensitive | DCF, DMF, MCF, MMF, WCF, WMF |
| Eastern Wood-Pewee | *Contopus virens* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Yellow-bellied Flycatcher | *Empidonax flaviventris* | | ✓ | | | Regional Forester Sensitive | DCF, DMF, MCF, MMF, WCF, WMF |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Great Creasted Flycatcher | *Myiarchus crinitus* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Least Flycatcher | *Empidonax minimus* | | ✓ | | | | GRA, HAY, OLD |
| Willow Flycatcher | *Empidonax traillii* | | | ✓ | | | SWE, SUP |
| Eastern Phoebe | *Sayornis phoebe* | | ✓ | | | | GRAY, HAY, OLD, RES |
| Northern Shrike | *Lanius excubitor* | | | | ✓ | | GRA, HAY, OLD |
| Blue-headed Vireo | *Vireo solitarius* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Philadelphia Vireo | *Vireo philadelphicus* | | | | ✓ | | DCF, DMF, MCF, MMF, WCF, WMF |
| Red-eyed Vireo | *Vireo olivaceus* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Yellow-throated Vireo | *Vireo flavifrons* | | | | ✓ | | DCF, DMF |
| White-eyed Vireo | *Vireo griseus* | | | | ✓ | | SUP |
| Gray Jay | *Perisoreus canadensis* | | | ✓ | | | WCF, WMF |
| Blue Jay | *Cyanocitta cristata* | | | ✓ | | | WCF, WMF |
| American Crow | *Corvus brachyrhynchos* | | ✓ | | | | GRAY, HAY, OLD, RES |
| Common Raven | *Corvus corax* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Horned Lark | *Eremophila alpestris* | | | | ✓ | | GRA, HAY, OLD |
| Tree Swallow | *Tachycineta bicolor* | | ✓ | | | | GRA, HAY, OLD |
| Northern Rough-winged Swallow | *Stelgidopteryx serripennis* | | | ✓ | | | GRA, HAY, OLD |
| Bank Swallow | *Riparia riparia* | | ✓ | | | | GRA, HAY, RES, OLD |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Barn Swallow | *Hirundo rustica* | | ✓ | | | | GRA, HAY, RES, OLD |
| Cliff Swallow | *Petrochelidon pyrrhonota* | | ✓ | | | | GRA, HAY, RES, OLD |
| Purple Martin | *Progne subis* | | | ✓ | | | RES |
| Black-capped Chickadee | *Poecile atricapilla* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Boreal Chickadee | *Poecile hudsonica* | | | | ✓ | | WCF, WMF |
| Red-breasted Nuthatch | *Sitta canadensis* | | ✓ | | | | DCF, DMF, WCF, WMF |
| White-breasted Nuthatch | *Sitta carolinensis* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Brown Creeper | *Certhia americana* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| House Wren | *Euphagus cyanocephalus* | | | ✓ | | | DCF, GRA, HAY, OLD |
| Marsh Wren | *Cistothorus palustris* | | | ✓ | | Michigan Special Animal | OWE, SWE |
| Sedge Wren | *Cistothorus platensis* | | ✓ | | | Region 3 Conservation Priorities | SWE |
| Winter Wren | *Troglodytes troglodytes* | | ✓ | | | | WCF, WMF |
| Eastern Bluebird | *Sialia sialis* | | ✓ | | | | DCF, GRA, HAY, RES, OLD |
| Ruby-crowned Kinglet | *Regulus calendula* | | | ✓ | | | WCF |
| Golden-crowned Kinglet | *Regulus satrapa* | | ✓ | | | | WCF |
| American Robin | *Turdus migratorius* | | ✓ | | | | DCF, DMF, WCF, WMF, RES |
| Veery | *Catharus fuscescens* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Wood Thrush | *Hylocichla mustelina* | | | ✓ | | Region 3 Conservation Priorities | MMF, DCF |
| Hermit Thrush | *Catharus guttatus* | | ✓ | | | | DCF, DMF |
| Swainson's Thrush | *Catharus ustulatus* | | | ✓ | | Regional Forester Sensitive | WCF, WMF |
| Gray Catbird | *Dumetella carolinensis* | | ✓ | | | | SWE, SUP |
| Northern Mockingbird | *Mimus polyglottos* | | | | ✓ | | GRA, HAY, RES, OLD |
| Brown Thrasher | *Toxostoma rufum* | | ✓ | | | | DCF, SUP |
| European Starling | *Sturnus vulgaris* | | ✓ | | | | RES |
| American Pipit | *Anthus rubescens* | | | | ✓ | | |
| Bohemian Waxwing | *Bombycilla garrulus* | | | | ✓ | | DCF, DMF, MCF, MMF, WCF, WMF |
| Cedar Waxwing | *Bombycilla cedrorum* | | ✓ | | | | |
| Nashville Warbler | *Vermivora ruficapilla* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Magnolia Warbler | *Dendroica magnolia* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Yellow-rumped Warbler | *Dendroica coronata* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Black-throated Green Warbler | *Dendroica virens* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Pine Warbler | *Dendroica pinus* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Ovenbird | *Seiurus aurocapillus* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF |
| Blackburnian Warbler | *Dendroica fusca* | | | ✓ | | | MCF, MMF |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Black-and-White Warbler | *Mniotilta varia* | | ✓ | | | | MCF, MMF, WCF, WMF |
| Black-throated Blue Warbler | *Dendroica caerulescens* | | | ✓ | | Region 3 Conservation Priorities, Regional Forester Sensitive | MDF |
| Canada Warbler | *Wilsonia canadensis* | | | ✓ | | Region 3 Conservation Priorities | MDF, WMF, MMF |
| Kirtland's Warbler | *Dendroica kirtlandii* | | | | ✓ | Region 3 Conservation Priorities, Michigan Special Animal | DCF |
| Palm Warbler | *Dendroica palmarum* | | | ✓ | | | DCF |
| Yellow Warbler | *Dendroica petechia* | | ✓ | | | | OWE, SWE |
| Chestnut-sided Warbler | *Dendroica pensylvanica* | | ✓ | | | | SUP |
| Connecticut Warbler | *Oporornis agilis* | | ✓ | | | Region 3 Conservation Priorities, Regional Forester Sensitive | SUP |
| Mourning Warbler | *Oporornis philadelphia* | | ✓ | | | | SUP |
| Wilson's Warbler | *Wilsonia pusilla* | | | | ✓ | | SWE |
| Tennessee Warbler | *Vermivora peregrina* | | | ✓ | | | WCF, WMF |
| Northern Parula | *Parula americana* | | | ✓ | | | WCF, WMF |
| Cape May Warbler | *Dendroica tigrina* | | | ✓ | | Region 3 Conservation Priorities | WCF, WMF |
| Bay-breasted Warbler | *Dendroica castanea* | | | ✓ | | Regional Forester Sensitive | WCF, WMF |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Cerulean Warbler | *Dendroica cerulea* | | | | ✓ | Region 3 Conservation Priorities, Regional Forester Sensitive, Michigan Special Animal | WMF, WCF |
| Golden-winged Warbler | *Vermivora chrysoptera* | | | | ✓ | Region 3 Conservation Priorities | SUP |
| Orange-crowned Warbler | *Vermivora celata* | | | | ✓ | | |
| Blackpoll Warbler | *Dendroica striata* | | | ✓ | | | |
| American Redstart | *Setophaga ruticilla* | | ✓ | | | | SUP, SWE |
| Common Yellowthroat | *Geothlypis trichas* | | ✓ | | | | SWE |
| Northern Waterthrush | *Seiurus noveboracensis* | | | ✓ | | | WCF, WMF, SWE |
| Scarlet Tanager | *Piranga olivacea* | | | ✓ | | | MDF, MMF |
| Northern Cardinal | *Cardinalis cardinalis* | | | | ✓ | | RES |
| Snow Bunting | *Plectrophenax nivalis* | | | | ✓ | | RES |
| Indigo Bunting | *Passerina cyanea* | | ✓ | | | | SUP, MMF |
| Dark-eyed Junco | *Junco hyemalis* | | ✓ | | | | DCF, WCF |
| Eastern Towhee | *Pipilo erythrophthalmus* | | ✓ | | | | SUP |
| Savannah Sparrow | *Passerculus sandwichensis* | | ✓ | | | | GRA, HAY, OLD, PAS |
| Field Sparrow | *Spizella pusilla* | | | ✓ | | Region 3 Conservation Priorities | GRA, HAY, OLD, SUP |
| Le Conte's Sparrow | *Ammodramus leconteii* | | ✓ | | | Region 3 Conservation Priorities, Regional Forester Sensitive | OWE |
| Fox Sparrow | *Passerella iliaca* | | | | ✓ | | RES |
| Harris' Sparrow | *Zonotrichia querula* | | | | ✓ | | RES |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| White-crowned Sparrow | *Zonotrichia leucophrys* | | | | ✓ | | RES |
| Chipping Sparrow | *Spizella passerina* | ✓ | | | | | SUP, DCF, OLD |
| American Tree Sparrow | *Spizella arborea* | | | | ✓ | | RES |
| Clay-colored Sparrow | *Spizella pallida* | | | ✓ | | | SUP, DCF, OLD |
| Vesper Sparrow | *Pooecetes gramineus* | | ✓ | | | | SUP, DCF, OLD |
| Song Sparrow | *Melospiza melodia* | ✓ | | | | | SUP, SWE, OLD |
| Swamp Sparrow | *Melospiza georgiana* | | ✓ | | | | SWE, OWE |
| Lincoln's Sparrow | *Melospiza lincolnii* | | | ✓ | | | WCF |
| Brewer's Blackbird | *Euphagus cyanocephalus* | | | ✓ | | | DCF, GRA, HAY, OLD, PAS |
| Red-winged Blackbird | *Agelaius phoeniceus* | ✓ | | | | | OWE |
| Yellow-headed Blackbird | *Xanthocephalus xanthocephalus* | | | | ✓ | | OWE |
| Common Grackle | *Quiscalus quiscula* | | ✓ | | | | OWE |
| Brown-headed Cowbird | *Molothrus ater* | | ✓ | | | | RES |
| Bobolink | *Dolichonyx oryzivorus* | | ✓ | | | Region 3 Conservation Priorities, Regional Forester Sensitive | GRA, HAY, OLD, PAS |
| Eastern Meadowlark | *Sturnella magna* | | | ✓ | | Region 3 Conservation Priorities | GRA, HAY, OLD, PAS |
| Western Meadowlark | *Sturnella neglecta* | | | | ✓ | Region 3 Conservation Priorities, Michigan Special Animal | GRA, HAY, OLD, PAS |
| Baltimore Oriole | *Icterus galbula* | | | ✓ | | | RES |
| White-winged Crossbill | *Loxia leucoptera* | | | | ✓ | | DCF, DMF, WCF, WMF |

## Birds of Seney NWR and Nearby Lands (Continued)

| Common Name | Scientific Name | Abundance by Species that are Possible, Probable, or Confirmed Breeders in Schoolcraft County | | | | Special Designation | Preferred Habitat(s)[1] |
|---|---|---|---|---|---|---|---|
| | | Abundant | Common | Uncommon | Occassional-Rare-Vagrant Non-Breeders | | |
| Red Crossbill | *Loxia curvirostra* | | | | ✓ | | DCF, DMF, WCF, WMF |
| Purple Finch | *Carpodacus purpureus* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF, RES |
| American Goldfinch | *Carduelis tristis* | | ✓ | | | | SUP, RES |
| Pine Siskin | *Carduelis pinus* | | | ✓ | | | DCF, DMF, MCF, MMF, WCF, WMF, RES |
| Common Redpoll | *Carduelis flammea* | | | | ✓ | | |
| Evening Grosbeak | *Coccothraustes vespertinus* | | ✓ | | | | DCF, DMF, MCF, MMF, WCF, WMF, RES |
| Rose-breasted Grosbeak | *Pheucticus ludovicianus* | | | ✓ | | | MDF, MMF |
| Pine Grosbeak | *Pinicola enucleator* | | | | ✓ | | WCF, WMF, RES |

[1]Habitat Definitions (Brewer et al. 1991):

DDF= Dry Deciduous Forest or Savanna;
WDF= Wet Deciduous Forest;
MMF= Mesic Mixed Forest;
DCF=Dry Coniferous Forest;
WCF= Wet Coniferous Forest;
SWE= Shrub Wetland;
GRA= Grassland ;
HAY= Hayfield;
SHO= Shoreland;
MDF= Mesic Deciduous Forest;
DMF= Dry Mixed Forest or Savanna;
WMF=Wet Mixed Forest;
MCF=Mesic Coniferous Forest;
SUP= Shrub Uplands;
OLD= Old Field;
PAS= Pasture;
OWE=Open Wetland;
OWA= Open Water

# Birds of Whitefish Point

| Common Name | Genus: | Species |
|---|---|---|
| Tundra Swan | *Cygnus* | *columbianus* |
| Common Merganser | *Mergus* | *merganser* |
| Red-breasted Merganser | *Mergus* | *serrator* |
| Hooded Merganser | *Lophodytes* | *cucullatus* |
| Mallard | *Anas* | *platyrhynchos* |
| American Black Duck | *Anas* | *rubripes* |
| Gadwall | *Anas* | *strepera* |
| American Wigeon | *Anas* | *americana* |
| Blue-winged Teal | *Anas* | *discors* |
| Northern Shoveler | *Anas* | *clypeata* |
| Northern Pintail | *Anas* | *acuta* |
| Wood Duck | *Aix* | *sponsa* |
| Redhead | *Aythya* | *americana* |
| Canvasback | *Aythya* | *valisineria* |
| Greater Scaup | *Aythya* | *marila* |
| Lesser Scaup | *Aythya* | *affinis* |
| Ring-necked Duck | *Aythya* | *collaris* |
| Common Goldeneye | *Bucephala* | *clangula* |
| Bufflehead | *Bucephala* | *albeola* |
| Long-tailed Duck | *Clangula* | *hyemalis* |
| King Eider | *Somateria* | *spectabilis* |
| Black Scoter | *Melanitta* | *nigra* |
| White-winged Scoter | *Melanitta* | *fusca* |
| Surf Scoter | *Melanitta* | *perspicillata* |
| Greater White-fronted Goose | *Anser* | *albifrons* |
| Canada Goose | *Branta* | *canadensis* |
| Mute Swan | *Cygnus* | *olor* |
| Chimney Swift | *Chaetura* | *pelagica* |
| Ruby-throated Hummingbird | *Archilochus* | *colubris* |
| Whip-poor-will | *Caprimulgus* | *vociferus* |
| Common Nighthawk | *Chordeiles* | *minor* |

## Birds of Whitefish Point (Continued)

| Common Name | Genus: | Species |
|---|---|---|
| Wilson's Snipe | *Gallinago* | *delicata* |
| Ancient Murrelet | *Synthliboramphus* | *antiquus* |
| Pomarine Jaeger | *Stercorarius* | *pomarinus* |
| Parasitic Jaeger | *Stercorarius* | *parasiticus* |
| Long-tailed Jaeger | *Stercorarius* | *longicaudus* |
| Black-legged Kittiwake | *Rissa* | *tridactyla* |
| Glaucous Gull | *Larus* | *hyperboreus* |
| Iceland Gull | *Larus* | *glaucoides* |
| Thayer's Gull | *Larus* | *thayeri* |
| Great Black-backed Gull | *Larus* | *marinus* |
| Lesser Black-backed Gull | *Larus* | *fuscus* |
| Herring Gull | *Larus* | *argentatus* |
| Ring-billed Gull | *Larus* | *delawarensis* |
| Laughing Gull | *Larus* | *atricilla* |
| Franklin's Gull | *Larus* | *pipixcan* |
| Bonaparte's Gull | *Larus* | *philadelphia* |
| Little Gull | *Larus* | *minutus* |
| Sabine's Gull | *Xema* | *sabini* |
| Caspian Tern | *Sterna* | *caspia* |
| Forster's Tern | *Sterna* | *forsteri* |
| Common Tern | *Sterna* | *hirundo* |
| Arctic Tern | *Sterna* | *paradisaea* |
| Black Tern | *Chlidonias* | *niger* |
| Red Phalarope | *Phalaropus* | *fulicarius* |
| Wilson's Phalarope | *Phalaropus* | *tricolor* |
| American Woodcock | *Scolopax* | *minor* |
| Short-billed Dowitcher | *Limnodromus* | *griseus* |
| Long-billed Dowitcher | *Limnodromus* | *scolopaceus* |
| Stilt Sandpiper | *Calidris* | *himantopus* |
| Red Knot | *Calidris* | *canutus* |
| Purple Sandpiper | *Calidris* | *maritima* |

## Birds of Whitefish Point (Continued)

| Common Name | Genus: | Species |
|---|---|---|
| Pectoral Sandpiper | *Calidris* | *melanotos* |
| White-rumped Sandpiper | *Calidris* | *fuscicollis* |
| Baird's Sandpiper | *Calidris* | *bairdii* |
| Least Sandpiper | *Calidris* | *minutilla* |
| Dunlin | *Calidris* | *alpina* |
| Semipalmated Sandpiper | *Calidris* | *pusilla* |
| Western Sandpiper | *Calidris* | *mauri* |
| Sanderling | *Calidris* | *alba* |
| Marbled Godwit | *Limosa* | *fedoa* |
| Hudsonian Godwit | *Limosa* | *haemastica* |
| Greater Yellowlegs | *Tringa* | *melanoleuca* |
| Lesser Yellowlegs | *Tringa* | *flavipes* |
| Solitary Sandpiper | *Tringa* | *solitaria* |
| Willet | *Catoptrophorus* | *semipalmatus* |
| Upland Sandpiper | *Bartramia* | *longicauda* |
| Buff-breasted Sandpiper | *Tryngites* | *subruficollis* |
| Spotted Sandpiper | *Actitis* | *macularius* |
| Whimbrel | *Numenius* | *phaeopus* |
| Black-bellied Plover | *Pluvialis* | *squatarola* |
| Killdeer | *Charadrius* | *vociferus* |
| Semipalmated Plover | *Charadrius* | *semipalmatus* |
| Piping Plover | *Charadrius* | *melodus* |
| Ruddy Turnstone | *Arenaria* | *interpres* |
| American Bittern | *Botaurus* | *lentiginosus* |
| Great Blue Heron | *Ardea* | *herodias* |
| Great Egret | *Ardea* | *alba* |
| Snowy Egret | *Egretta* | *thula* |
| Cattle Egret | *Bubulcus* | *ibis* |
| Green Heron | *Butorides* | *virescens* |
| Turkey Vulture | *Cathartes* | *aura* |
| Rock Dove (Feral Pigeon) | *Columba (Patagioenas)* | *livia* |

## Birds of Whitefish Point (Continued)

| Common Name | Genus: | Species |
|---|---|---|
| Mourning Dove | *Zenaida* | *macroura* |
| White-winged Dove | *Zenaida* | *asiatica* |
| Belted Kingfisher | *Ceryle* | *alcyon* |
| Yellow-billed Cuckoo | *Coccyzus* | *americanus* |
| Black-billed Cuckoo | *Coccyzus* | *erythropthalmus* |
| Mississippi Kite | *Ictinia* | *mississippiensis* |
| Northern Harrier | *Circus* | *cyaneus* |
| Sharp-shinned Hawk | *Accipiter* | *striatus* |
| Cooper's Hawk | *Accipiter* | *cooperii* |
| Northern Goshawk | *Accipiter* | *gentilis* |
| Red-tailed Hawk | *Buteo* | *jamaicensis* |
| Red-shouldered Hawk | *Buteo* | *lineatus* |
| Swainson's Hawk | *Buteo* | *swainsoni* |
| Broad-winged Hawk | *Buteo* | *platypterus* |
| Rough-legged Hawk | *Buteo* | *lagopus* |
| Golden Eagle | *Aquila* | *chrysaetos* |
| Bald Eagle | *Haliaeetus* | *leucocephalus* |
| Gyrfalcon | *Falco* | *rusticolus* |
| Peregrine Falcon | *Falco* | *peregrinus* |
| Merlin | *Falco* | *columbarius* |
| Osprey | *Pandion* | *haliaetus* |
| Spruce Grouse | *Falcipennis* | *canadensis* |
| Sharp-tailed Grouse | *Tympanuchus* | *phasianellus* |
| Ruffed Grouse | *Bonasa* | *umbellus* |
| Common Loon | *Gavia* | *immer* |
| Pacific Loon | *Gavia* | *pacifica* |
| Red-throated Loon | *Gavia* | *stellata* |
| Sandhill Crane | *Grus* | *canadensis* |
| Virginia Rail | *Rallus* | *limicola* |
| Sora | *Porzana* | *carolina* |
| Pink-sided, Dark-eyed Junco | *Junco* | *hyemalis* |

## Birds of Whitefish Point (Continued)

| Common Name | Genus: | Species |
|---|---|---|
| Yellow-rumped Warbler | *Dendroica* | *coronata* |
| Scissor-tailed Flycatcher | *Tyrannus* | *forficatus* |
| Eastern Kingbird | *Tyrannus* | *tyrannus* |
| Western Kingbird | *Tyrannus* | *verticalis* |
| Great Crested Flycatcher | *Myiarchus* | *crinitus* |
| Eastern Phoebe | *Sayornis* | *phoebe* |
| Olive-sided Flycatcher | *Contopus* | *cooperi* |
| Yellow-bellied Flycatcher | *Empidonax* | *flaviventris* |
| Willow Flycatcher | *Empidonax* | *traillii* |
| Alder Flycatcher | *Empidonax* | *alnorum* |
| Least Flycatcher | *Empidonax* | *minimus* |
| Horned Lark | *Eremophila* | *alpestris* |
| Blue Jay | *Cyanocitta* | *cristata* |
| Common Raven | *Corvus* | *corax* |
| American Crow | *Corvus* | *brachyrhynchos* |
| European Starling | *Sturnus* | *vulgaris* |
| Bobolink | *Dolichonyx* | *oryzivorus* |
| Brown-headed Cowbird | *Molothrus* | *ater* |
| Yellow-headed Blackbird | *Xanthocephalus* | *xanthocephalus* |
| Red-winged Blackbird | *Agelaius* | *phoeniceus* |
| Eastern Meadowlark | *Sturnella* | *magna* |
| Western Meadowlark | *Sturnella* | *neglecta* |
| Orchard Oriole | *Icterus* | *spurius* |
| Baltimore Oriole | *Icterus* | *galbula* |
| Rusty Blackbird | *Euphagus* | *carolinus* |
| Brewer's Blackbird | *Euphagus* | *cyanocephalus* |
| Common Grackle | *Quiscalus* | *quiscula* |
| Evening Grosbeak | *Coccothraustes* | *vespertinus* |
| Pine Grosbeak | *Pinicola* | *enucleator* |
| Purple Finch | *Carpodacus* | *purpureus* |
| House Finch | *Carpodacus* | *mexicanus* |

## Birds of Whitefish Point (Continued)

| Common Name | Genus: | Species |
|---|---|---|
| Red Crossbill | *Loxia* | *curvirostra* |
| White-winged Crossbill | *Loxia* | *leucoptera* |
| Hoary Redpoll | *Carduelis* | *hornemanni* |
| Common Redpoll | *Carduelis* | *flammea* |
| American Goldfinch | *Carduelis* | *tristis* |
| Pine Siskin | *Carduelis* | *pinus* |
| Snow Bunting | *Plectrophenax* | *nivalis* |
| Lapland Longspur | *Calcarius* | *lapponicus* |
| Smith's Longspur | *Calcarius* | *pictus* |
| Vesper Sparrow | *Pooecetes* | *gramineus* |
| Grasshopper Sparrow | *Ammodramus* | *savannarum* |
| Nelson's Sharp-tailed Sparrow | *Ammodramus* | *nelsoni* |
| Lark Sparrow | *Chondestes* | *grammacus* |
| Harris's Sparrow | *Zonotrichia* | *querula* |
| White-crowned Sparrow | *Zonotrichia* | *leucophrys* |
| White-throated Sparrow | *Zonotrichia* | *albicollis* |
| American Tree Sparrow | *Spizella* | *arborea* |
| Chipping Sparrow | *Spizella* | *passerina* |
| Clay-colored Sparrow | *Spizella* | *pallida* |
| Field Sparrow | *Spizella* | *pusilla* |
| Song Sparrow | *Melospiza* | *melodia* |
| Lincoln's Sparrow | *Melospiza* | *lincolnii* |
| Swamp Sparrow | *Melospiza* | *georgiana* |
| Fox Sparrow | *Passerella* | *iliaca* |
| Eastern Towhee | *Pipilo* | *erythrophthalmus* |
| Northern Cardinal | *Cardinalis* | *cardinalis* |
| Rose-breasted Grosbeak | *Pheucticus* | *ludovicianus* |
| Indigo Bunting | *Passerina* | *cyanea* |
| Dickcissel | *Spiza* | *americana* |
| Lark Bunting | *Calamospiza* | *melanocorys* |
| Western Tanager | *Piranga* | *ludoviciana* |

## Birds of Whitefish Point (Continued)

| Common Name | Genus: | Species |
|---|---|---|
| Scarlet Tanager | *Piranga* | *olivacea* |
| Purple Martin | *Progne* | *subis* |
| Cliff Swallow | *Petrochelidon* | *pyrrhonota* |
| Barn Swallow | *Hirundo* | *rustica* |
| Tree Swallow | *Tachycineta* | *bicolor* |
| Bank Swallow | *Riparia* | *riparia* |
| Bohemian Waxwing | *Bombycilla* | *garrulus* |
| Loggerhead Shrike | *Lanius* | *ludovicianus* |
| Red-eyed Vireo | *Vireo* | *olivaceus* |
| Philadelphia Vireo | *Vireo* | *philadelphicus* |
| Warbling Vireo | *Vireo* | *gilvus* |
| Yellow-throated Vireo | *Vireo* | *flavifrons* |
| Blue-headed Vireo | *Vireo* | *solitarius* |
| White-eyed Vireo | *Vireo* | *griseus* |
| Black-and-White Warbler | *Mniotilta* | *varia* |
| Blue-winged Warbler | *Vermivora* | *pinus* |
| Golden-winged Warbler | *Vermivora* | *chrysoptera* |
| Orange-crowned Warbler | *Vermivora* | *celata* |
| Tennessee Warbler | *Vermivora* | *peregrina* |
| Northern Parula | *Parula* | *americana* |
| Cape May Warbler | *Dendroica* | *tigrina* |
| Yellow Warbler | *Dendroica* | *petechia* |
| Black-throated Blue Warbler | *Dendroica* | *caerulescens* |
| Magnolia Warbler | *Dendroica* | *magnolia* |
| Cerulean Warbler | *Dendroica* | *cerulea* |
| Chestnut-sided Warbler | *Dendroica* | *pensylvanica* |
| Bay-breasted Warbler | *Dendroica* | *castanea* |
| Blackburnian Warbler | *Dendroica* | *fusca* |
| Black-throated Green Warbler | *Dendroica* | *virens* |
| Pine Warbler | *Dendroica* | *pinus* |
| Prairie Warbler | *Dendroica* | *discolor* |

## Birds of Whitefish Point (Continued)

| Common Name | Genus: | Species |
|---|---|---|
| Ovenbird | *Seiurus* | *aurocapilla* |
| Northern Waterthrush | *Seiurus* | *noveboracensis* |
| Mourning Warbler | *Oporornis* | *philadelphia* |
| Common Yellowthroat | *Geothlypis* | *trichas* |
| Yellow-breasted Chat | *Icteria* | *virens* |
| Canada Warbler | *Wilsonia* | *canadensis* |
| American Redstart | *Setophaga* | *ruticilla* |
| House Sparrow | *Passer* | *domesticus* |
| American Pipit | *Anthus* | *rubescens* |
| Northern Mockingbird | *Mimus* | *polyglottos* |
| Gray Catbird | *Dumetella* | *carolinensis* |
| Brown Thrasher | *Toxostoma* | *rufum* |
| House Wren | *Troglodytes* | *aedon* |
| Winter Wren | *Troglodytes* | *troglodytes* |
| Sedge Wren | *Cistothorus* | *platensis* |
| Marsh Wren | *Cistothorus* | *palustris* |
| Brown Creeper | *Certhia* | *americana* |
| White-breasted Nuthatch | *Sitta* | *carolinensis* |
| Red-breasted Nuthatch | *Sitta* | *canadensis* |
| Black-capped Chickadee | *Poecile* | *atricapillus* |
| Boreal Chickadee | *Poecile* | *hudsonica* |
| Golden-crowned Kinglet | *Regulus* | *satrapa* |
| Ruby-crowned Kinglet | *Regulus* | *calendula* |
| Blue-gray Gnatcatcher | *Polioptila* | *caerulea* |
| Townsend's Solitaire | *Myadestes* | *townsendi* |
| Wood Thrush | *Hylocichla* | *mustelina* |
| Veery | *Catharus* | *fuscescens* |
| Gray-cheeked Thrush | *Catharus* | *minimus* |
| Swainson's Thrush | *Catharus* | *ustulatus* |
| Hermit Thrush | *Catharus* | *guttatus* |
| American Robin | *Turdus* | *migratorius* |

## Birds of Whitefish Point (Continued)

| Common Name | Genus: | Species |
|---|---|---|
| Eastern Bluebird | *Sialia* | *sialis* |
| Mountain Bluebird | *Sialia* | *currucoides* |
| Double-crested Cormorant | *Phalacrocorax* | *auritus* |
| American White Pelican | *Pelecanus* | *erythrorhynchos* |
| Northern Flicker | *Colaptes* | *auratus* |
| Hairy Woodpecker | *Picoides* | *villosus* |
| Downy Woodpecker | *Picoides* | *pubescens* |
| Black-backed Woodpecker | *Picoides* | *arcticus* |
| Yellow-bellied Sapsucker | *Sphyrapicus* | *varius* |
| Pileated Woodpecker | *Dryocopus* | *pileatus* |
| Red-headed Woodpecker | *Melanerpes* | *erythrocephalus* |
| Red-bellied Woodpecker | *Melanerpes* | *carolinus* |
| Western Grebe | *Aechmophorus* | *occidentalis* |
| Red-necked Grebe | *Podiceps* | *grisegena* |
| Horned Grebe | *Podiceps* | *auritus* |
| Eared Grebe | *Podiceps* | *nigricollis* |
| Pied-billed Grebe | *Podilymbus* | *podiceps* |
| Long-eared Owl | *Asio* | *otus* |
| Short-eared Owl | *Asio* | *flammeus* |
| Great Gray Owl | *Strix* | *nebulosa* |
| Boreal Owl | *Aegolius* | *funereus* |
| Northern Saw-whet Owl | *Aegolius* | *acadicus* |
| Great Horned Owl | *Bubo* | *virginianus* |
| Snowy Owl | *Bubo* | *scandiacus* |
| Northern Hawk Owl | *Surnia* | *ulula* |

# Seney NWR 2004 Butterfly List

| Common Name | Scientific Name | Habitat |
|---|---|---|
| Swallowtails | | |
| Black Swallowtail | *Papilio polyxenes asterius* | Old Fields, vacent rural and urban lots, framland. |
| Canadian Tiger Swallowtail | *Papilio canadensis* | Pine barrens, aspen forest openings and edges, roadsides and stream margins. |
| Whites & Suphurs | | |
| Mustard White | *Pieris napi* | Floodplain forests and other shrubby wetlands and roadsides |
| West Virginia White | *Pieris virginiensis* | Usually ristricted to Northern Hardowwed forests and edges. |
| Cabbage White | *Pieris rapae* | Gardens, roadsides, old fields and disturbed areas. |
| Olympia Marble | *Euchloe olympia* | Open woodlands, oak-pine barrens on sandy soils. |
| Clouded Sulpher | *Colias philodice Godart* | Open areas, clover and alfalfa fields, roadsides and disturbed areas. |
| Orange Sulphur | *Colias eurytheme* | Open areas, alfalfa and red clover fields, right-of-way and wet areas |
| Pink-edged Sulphur | *Colias interior* | Blueberry bogs and oak-pine barrens, recently burned pine barrens with abundence of blueberry, along trails and roadsides. |
| Little Sulphur | *Eurena lisa* | Fields, roadsides and gardens, also Great Lakes coastal areas |
| Harvester, Coppers, Hairstreaks, Blues | | |
| Harvester | *Feniseca tarquinius* | Deciduous forests, flodd plains and alder-borderd stream banks. |
| American Copper | *Lycaena phlaeas* | Old fields and disturbed areas, including weedy residental lots. |
| Bronze Copper | *Lycaena hyllus* | Wet Meadows, marshes and stream borders with sedges and wild iris |
| Bog Copper | *Lycaena epixanthe michiganensis* | Restricted to sphagnum-heath acid bogs |
| Dorcas Copper | *Lycaena dorcas* | Wet meadows, fens, seeps, inland lake margins and some Great Lakes coastal areas. |
| Pupleish Copper | *Lycaena helloides* | Roadsides, fields, disturbed areas, sedge marshes, and other wetlands. |
| Coral Hairstreak | *Satyrium titus* | Open areas, forest edges, roadsides and old fields beginnin to revert to shrub-forest |

# Seney NWR 2004 Butterfly List (Continued)

| Common Name | Scientific Name | Habitat |
|---|---|---|
| Banded Hairstreak | *Satyrium calanus falacer* | Forest openings and edges, old fields and roadsides |
| Stiped Hairstreak | *Satyrium liparops strigosum* | Oak-pine Barrens |
| Brown Elfin | *Incisalia augustinus* | Sphagnum-heath bogs and pine-barrens in Northern counties |
| Hoary Elfin | *Incisalia polia* | Oak-pine barrens, along great lakes dunes. |
| Henry's Elfin | *Incisalia henrici* | Open oak-pine barrens, forest openings/ edges and swamp borders |
| Eastern Pine Elfin | *Incisalia niphon clarki* | Open pine barrens, forest edges and roadsides. |
| Western Pine Elfin | *Incisalia eryphon* | Coniferous forest edges and openings, along roads and trails bordered by white pine. |
| Early Hairstreak | *Erora laetus* | Openings, edges and sun dappled trails in Northern hardwoods containing beech |
| Eastern Tailed Blue | *Everes comyntas* | Prairies, old fields, pastures and disturbed areas with a variety of legumes. |
| Northen Spring Azure | *Celastina lucia* | Forest openings and edges and along forest trails. |
| Northern Blue | *Lycaeides idas nabokovi* | Openings in pine barrens and on rock outcroppings. |
| Greenish Blue | *Plebejus saepiolus* | Old fields, forest openings, and roadsides |
| Brushfoots | | |
| Variegated Fritillary | *Euptoieta claudia* | Meadows, disturbed areas, pastures, streamsides and bogs. |
| Krautwurm's Fritillary | *Speyeria cybele cybele* | Forest openings and edges, forest roads and trails, and old fields. |
| Aphrodite Fritillary | *Speyeria aphrodite* | Oak-pine barrens, upland fields, prairies and roadsides. |
| Atlantis Fritillary | *Speyeria atlantis* | Canadian zone forest openings and edges, old fields and roadsides. |
| Bog Fritillary | *Boloria eunomia dawsoni* | Restricted to open sphagnum-heath bogs |
| Bog Silver-bordered Fritillary | *Boloria selene atrocostalis* | Bogs and adjacent trials and roadsides. |
| Meadow Fritillary | *Boloria bellona* | Moist meadows, pastures, old fields and clearing being invaded by violets |
| Frigga Gritillary | *Boloria frigga saga* | Sphagnum-heath bogs with dwarf birch |
| Silvery Checkerspot | *Chlosyne nycteis* | Floodplain forest openings, meadows, marshes and roadsides |

## Seney NWR 2004 Butterfly List (Continued)

| Common Name | Scientific Name | Habitat |
|---|---|---|
| Harris' Checkerspot | *Chlosyne harrisii* | Marsh edges, moist pastures, meadows, wet ditches and roadsides. |
| Northern Pearl Crescent | *Phyciodes selenis* | Forest openings and edges, old fields, streamsides and roadsides. |
| Tawny Crescent | *Phyciodes batesii* | Meadows, pastures, old fields, stream banks and roadsides. |
| Baltimore Checkerspot | *Euphydryas phaeton* | Brushy swamps, marshes, wet meadows and oak-pine barrens. |
| Question Mark | *Polygonia interrogationis* | Forest openings, edges and trails, roadsides and streamsides. |
| Common Merchant | *Polygonia comma* | Forest openings, edges and trails, swamps and streamsides. |
| Satyr Anglewing | *Polygonia satyrus* | Forest openings, edges, along streams, pine barrens and roadsides. |
| Green Comma | *Polygonia faunus* | Usually in coniferous forests and trails in Canadian Zones. |
| Hoary Comma | *Polygonia gracilis* | Boreal forest openings and edges, stream margins and trails. |
| Gray Comma | *Polygonia progne* | Forests, swamps, pine barrens and trails. |
| Compton Tortoise Shell | *Nymphalis vau-album j-album* | Forest opeings, edges and trails. |
| Mourning Cloak | *Nymphalis antiopa* | Forest openings, edges, swamp, meadows, stream margins and roadsides. |
| Milbert's Tortoise Shell | *Nymphalis milberti* | Swampa nd marsh edges, meadows, wet pastures, stream margins and roadside ditches. |
| American Painted Lady | *Vanessa virginienisis* | Old fields, praries, meadows, disturbed areas and roadsides. |
| Painted Lady | *Vanessa Cardui* | Old fields, disturbed areas, pastures and meadows. |
| Red Admiral | *Vanessa atalanta* | Swamp openings and edges, marshes, meadows, disturbed areas, and rural and urban gardens and parks. |
| Buckeye | *Junonia coenia* | Old fields, pastures, meadows, disturbed areas, coastal dunes and roadsides. |
| White Admiral | *Limentis arythemis* | Norhtern forest openings, edges, trails and roadsides. |
| Viceroy | *Limentitis archippus* | Marshes, meadows, stream and lake margins and roadside ditches. |
| Satyrs, Wood Nymphs and Arctics | | |
| Northern Pearly-eye | *Enodia anthedon* | Deciduous forests, swamps and edges and along streams. |

## Seney NWR 2004 Butterfly List (Continued)

| Common Name | Scientific Name | Habitat |
|---|---|---|
| Eyed Brown | *Satyodes eurydice* | Open sedge, meadows and edges. |
| Little Wood-Satyr | *Megisto cymela* | Deciduous forests, openings, edges, oak-pine barrends, fens, and brushy old fields. |
| Inornate Ringlet | *Coenonympha tullia inornata* | Open Northern forests, grassy old fields, meadows and roadsides |
| Wood Nymph | *Cercyonis pegala nephele* | Prairies, meadows, brushey fields, disturbed areas and roadsides |
| Chryxus Arctic | *Oeneis chryxus strigulosa* | Open jack pine barrens, dry grassy openings and open brushy ridges. |
| Jutta Arctic | *Oeneis jutta ascerta* | Black spruce-tamarask-sphagnum bog openings and edges |
| Milkweed Butterflies | | |
| Monarch | *Danaus plexippus* | Old fields, meadows, prairies, disturbed areas and roadsides. |
| Skippers | | |
| Northern Cloudy Wing | *Thorybes pylades* | Open forests and edges, brushy fields, oak-pine barrens and roadsides |
| Dreamy Dusky Wing | *Eryannis icelus* | Open forest, especially aspen in Northern areas, edges, cut-over forest brushy fields, bogs, disturbed areas and roadsides |
| Juvenal's Duskywing | *Erynnis juvenalis* | Scrub oak woods, edges, cut-over forests and roadsides. |
| Artic Skipper | *Carterocephalus palaemon mandan* | Forest openings and edges, stream amrgins, bogs and swamps. |
| Least Skipper | *Ancyloxypha numitor* | Streamsides, marsh borders, brushy swamps, ditches and along drains |
| European Skipper | *Thymelicus lineola* | Grassy fields, pastures, praries, urban areas, parks and roadsides. |
| Laurentian Skipper | *Hesperia comma laurentina* | Open areas, fields, meadows, roadsides and lakeshore |
| Leonard's Skipper | *Hesperia leonardus* | Meadows, tall-greass praires, oak-pine barrens and roadsides. |
| Indian Skipper | *Hesperia sassacus* | Old fields, praries, cut-over areas, oak-pine barrens and roadsides. |
| Peck's Skipper | *Polites peckius* | Meadows, old fields, urban yards and parks, right-of-way and roadsides. |
| Tawny-edge Skipper | *Polities themistocles* | Meadows, old fields, pastures, swales, disturbed areas, barrens and roadsides. |
| Crossline Skipper | *Polites origenes* | Old fields, praries and oak barrens. |

## Seney NWR 2004 Butterfly List (Continued)

| Common Name | Scientific Name | Habitat |
|---|---|---|
| Long Dash | *Polites mystic* | Marsh and forest edges, and wetlands along stream and roads. |
| Hobomok Skipper | *Poanes hobomok* | Forest openings and edges, meadows, disturbed areas and roadsides. |
| Two-spotted Skipper | *Euphyes bimacula* | Sedgy marshes, wet meadows and roadsides. |
| Dun Skipper | *Eyphyes vestris* | Meadows, swamp and marsh edges, disturbed areas and roadsides. |
| Pepper and Salt Skipper | *Amblyscirtes hegon* | Small, sunny forest openings, swamp edges and other partially shaded moist areas. |
| Roadside Skipper | *Amblyscirtes vialis* | Forest openings and edges, oak-pine barrens, prairies and roadsides. |

# Herptofauna List, Seney NWR

| Common Name | Scientific Name | Abundance | Special Status | | | Habitat(s) |
|---|---|---|---|---|---|---|
| | | | Region 3 Conservation Species | Regional Forester Sensitive | Michigan Special Animal | |
| Nothern Water Snake | *Nerodia sipedon sipedon* | Common | | | | Ephemeral wetlands, forests, agricultural areas |
| Northern Red-bellied Snake | *Storeria occipitomaculata occipitomaculata* | Unknown | | | | Permanent wetlands, rivers and streams, forests, grasslands and savannas, agricultural areas, urban areas |
| Eastern Garter Snake | *Thamnophis sirtalis sirtalis* | Abundant | | | | Ephemeral wetlands, permanent wetlands, rivers and streams, forests, grasslands and savannas, caves and springs, agricultural areas, urban areas |
| Northern Ringneck Snake | *Diadophis punctatus edwardsi* | Unknown | | | | Rivers and streams, forests, grasslands and savannas |
| Western Fox Snake | *Elaphe vulpina* | Unknown | | | | Permanent wetlands, rivers and streams, forests, grasslands and savannas, caves and springs |
| Eastern Smooth Green Snake | *Opheodrys vernalis* | Common | | | | Forests, grasslands and savannas |
| Snapping Turtle | *Chelydra serpentina* | Abundant | | | | Ephemeral wetlands, permanent wetlands, rivers and streams, grasslands and savannas, agricultural areas |
| Wood Turtle | *Clemmys insculpta* | Uncommon | | ✓ | ✓ | Rivers and streams, forests, agricultural areas |
| Blanding's Turtle | *Emydoidea blandingii* | Unknown | | ✓ | ✓ | Ephemeral wetlands, permanent wetlands, rivers and streams, grasslands and savannas, agricultural areas |
| Painted Turtle | *Chrysemys picta* | Abundant | | | | Ephemeral wetlands, permanent wetlands, rivers and streams, grasslands and savannas, agricultural areas |
| Chorus Frog | *Pseudacris triseriata* | Uncommon | | | ✓ | Permanent wetlands, grasslands and savannas |
| Northern Spring Peeper | *Pseudacris crucifer crucifer* | Abundant | | | | Permanent wetlands, forests, grasslands and savannas |
| Eastern Gray Treefrog | *Hyla versicolor* | Common | | | | Ephemeral wetlands, permanent wetlands, forests |
| Cope's Gray Treefrog | *Hyla chrysoscelis* | Uncommon | | | | Ephemeral wetlands, permanent wetlands, forests |

## Herptofauna List, Seney NWR (Continued)

| Common Name | Scientific Name | Abundance | Special Status | | | Habitat(s) |
|---|---|---|---|---|---|---|
| | | | Region 3 Conservation Species | Regional Forester Sensitive | Michigan Special Animal | |
| Green Frog | *Rana clamitans melanota* | Common | | | | Ephemeral wetlands, permanent wetlands, forests, grasslands and savannas |
| Nothern Leopard Frog | *Rana pipiens* | Common | | | | Ephemeral wetlands, permanent wetlands, forests, grasslands and savannas |
| Mink Frog | *Rana septentrionalis* | Common | | | | Ephemeral wetlands, permanent wetlands, forests, agricultural areas |
| Wood Frog | *Rana sylvatica* | Common | | | | Permanent wetlands, forests |
| Eastern American Toad | *Bufo americanus americanus* | Abundant | | | | Ephemeral wetlands, permanent wetlands, rivers and streams, forests, grasslands and savannas, caves and springs, agricultural areas, urban areas |
| Mudpuppy | *Necturus maculosus maculosus* | Unknown/ Absent? | | | | Ephemeral wetlands, agricultural areas |
| Blue Spotted Salamander | *Ambystoma laterale* | Unknown | | | | Ephemeral wetlands, permanent wetlands, forests, grasslands and savannas |
| Spotted Salamander | *Ambystoma maculatum* | Unknown | | | | Ephemeral wetlands, permanent wetlands, forests |
| Eastern Tiger Salamander | *Ambystoma tigrinum tigrinum* | Unknown/ Absent? | | | | Ephemeral wetlands, permanent wetlands, forests, grasslands and savannas, agricultural areas |
| Eastern Newt | *Notophthalmus viridescens* | Unknown/ Absent? | | | | Ephemeral wetlands, permanent wetlands, forests |
| Red-backed Salamander | *Plethodon cinereus* | Unknown | | | | Forests |
| Four-toed Salamander | *Hemidactylium scutatum* | Unknown/ Absent? | | ✓ | | Ephemeral wetlands, permanent wetlands, forests |

# List of Fish Species Found on Seney NWR

| Common Name | Alternate Common Name | Scientific Name | Alternate Scientific Name | 1994 Status[a] | 1992 Status[b] | 1994 Pool Survey[c] | Manistique River Assessment[d] | USFWS Green Bay Field Office Data[e] |
|---|---|---|---|---|---|---|---|---|
| Northern Pike | | *Esox lucius* | | A | A | ✓ | ✓ | ✓ |
| Walleye | | *Stizostedion vitreum* | *Sander vitreus* | N | U | | ✓ | |
| Brown Trout | | *Salmo trutta* | | U | N | | ✓ | |
| Brook Trout | | *Salvelinus fontinalis* | | U | U | ✓ | ✓ | ✓ |
| Yellow Perch | | *Perca flavescens* | | R | A | ✓ | ✓ | ✓ |
| Pumpkinseed | | *Lepomis gibbosus* | | C | C | ✓ | ✓ | ✓ |
| Bluegill | | *Lepomis marcrocris* | *Lepomis macochrius* | R | R | ✓ | ✓ | |
| Rock Bass | | *Ambloplites rupestris* | | N | U | | ✓ | ✓ |
| Brown Bullhead | | *Ictalurus nebulosa* | *Ameiurus nebulosa?* | A | A | ✓ | ✓ | ✓ |
| White Sucker | | *Catostomus commersoni* | | U | U | | ✓ | ✓ |
| Northern Redhorse | | *Moxostoma macrolepidotum* | | R | U | | | |
| Creek Chub | | *Semotilus atromaculatus* | | U | U | | ✓ | |
| Speckled Dace | | *Rhinicthys osculus* | | U | U | | | ✓ |
| Northern Redbelly Dace | | *Chrosumus eos* | *Phoxinus eos* | C | C | | ✓ | |
| Golden Shiner | | *Notemigonus chrysoleucas* | *Notemigonus crysoleucas* | C | C | ✓ | ✓ | ✓ |
| Bigmouth Shiner | | *Notropis dorsalis* | | R | N | | | |
| Mimic Shiner | | *Notropis volucellus* | | R | N | | | |

## List of Fish Species Found on Seney NWR (Continued)

| Common Name | Alternate Common Name | Scientific Name | Alternate Scientific Name | 1994 Status[a] | 1992 Status[b] | 1994 Pool Survey[c] | Manistique River Assessment[d] | USFWS Green Bay Field Office Data[e] |
|---|---|---|---|---|---|---|---|---|
| Blacknose Shiner | | *Notropis heterolepis* | | C | C | ✓ | | |
| Fathead Minnow | | *Pimephales promelas* | | A | A | | ✓ | |
| Bluntnose Minnow | | *Hyborynchus notatus* | Pimephales notatus | C | C | | ✓ | |
| Mud Minnow | | *Umbra limi* | | C | U | | ✓ | |
| Blackside Darter | | *Percina maculata* | | C | N | | ✓ | |
| Johnny Darter | | *Etheostoma nigrum* | | R | N | ✓ | ✓ | ✓ |
| Iowa Darter | | *Etheostoma exile* | | C | N | | | |
| Fantail Darter | Striped Fantail Darter | *Etheostoma flabellare* | | R | N | | ✓ | |
| Nothern Muddler | Mottled Sculpin | *Cottus bairdi* | | R | N | | ✓ | |
| Brook Stickleback | | *Cluaea inconstans* | | C | C | ✓ | ✓ | |
| Northern Brook Lamprey | | *Ichthyomyzon fossor* | | | | | ✓ | |
| Silver Lamprey | | *Icthyomyzon unicupsis* | | | | | ✓ | |
| American Brook Lamprey | | *Lampetra appendix* | | | | | ✓ | |
| Sea Lamprey[1] | | *Petromyzon marinus* | | | | | ✓ | |
| Lake Sturgeon[1,3] | | *Acipenser fulvescens* | | | | | ✓ | |

## List of Fish Species Found on Seney NWR (Continued)

| Common Name | Alternate Common Name | Scientific Name | Alternate Scientific Name | 1994 Status[a] | 1992 Status[b] | 1994 Pool Survey[c] | Manistique River Assessment[d] | USFWS Green Bay Field Office Data[e] |
|---|---|---|---|---|---|---|---|---|
| Common Shiner | | *Luxilus cornutus* | | | | | ✓ | |
| Sand Shiner | | *Notropis stramineus* | | | | | ✓ | |
| Finescale Dace | | *Phoxinus neogaeus* | | | | | ✓ | |
| Longnose Dace | | *Rhinicthys cataractae* | | | | | ✓ | |
| Burbot | | *Lota lota* | | | | | ✓ | |
| Smallmouth Bass | | *Micropterus dolomieu* | | | | | ✓ | |
| Northern Logperch | | *Percina caprodes* | | | | ✓ | ✓ | |
| Black Crappie | | *Pomoxis nigromaculatus* | | | | ✓ | | ✓ |
| Pugnose Shiner[3] | | *Notropis anogenus* | | | | ✓ | | |
| Central Mudminnow | | *Umbra limi* | | | | | | ✓ |
| Coho Salmon | | *Oncorhynchus kisutch* | | | | | | ✓ |

# Mammal Species Found on Seney NWR

| Common Name | Scientific Name | Ordinal Abundance | Habitat(s)[1] | Habitat(s) | Special Status | | |
|---|---|---|---|---|---|---|---|
| | | | | | Region 3 Conservation Priorities | Regional Forester Sensitive | Michigan Special Status |
| Opossum | *Didelphis virginiana* | Absent? | Deciduous woods near stream or lake, semi open country brushy fenelines, drainage ditches, and swamp borders | MDF, WDF, SUP | | | |
| Northern Short-tailed Shrew | *Blarina brevicauda* | Abundant | Moist environments with extensive herbaceous cover or a thick layer of litter | WDF, MDF, WMF, WCF, SWE | | | |
| Masked Shrew | *Sorex cinereus* | Abundant | Moist woodlots containing abundant plant cover, thick leaf litter, and decaying logs. Can include overgrown fields, alder thicket, cedar swamps, weedy fencerows, grassy marshes, and sphagnum bogs | MDF, WDF, PAS, GRA, HAY, SWE | | | |
| Water Shrew | *Sorex palustris* | Uncommon | Sluggish stream, bog or seasonal pond, but optimal habitat is small forest lined stream, with fast flowing water, and plenty of cover provided by undercut banks, jumbled rocks, downed trees, and other debris. | MDF, MMF, MCF, SHO | | ✓ | |
| Arctic Shrew | *Sorex arcticus* | Common | Fairly dry fields and forest openings, prefers moist areas adjacent to a lake, bog, swamp, or ditch | DDF, DMF, DCF, SHO | | | |
| Pygmy Shrew | *Sorex hoyi* | Unknown | Deciduous woods, coniferous forests, regenerating clear-cuts, grassy fields, swamps, bogs, and floodplains. Most live in boreal habitats with extensive ground cover. | DDF, MDF, DMF, DCF, GRA, SUP, SWE | | | |

# Mammal Species Found on Seney NWR (Continued)

| Common Name | Scientific Name | Ordinal Abundance | Habitat(s)[1] | Habitat(s) | Special Status | | |
|---|---|---|---|---|---|---|---|
| | | | | | Region 3 Conservation Priorities | Regional Forester Sensitive | Michigan Special Status |
| Star-nosed Mole | *Condylura cristata* | Common | Wet saturated soils and frequents the borders of swamps, lakes, streams, or isolated areas of poor drainage. | WDF, WMF, WCF, SWE, OWE | | | |
| Little Brown Bat | *Myotis lucifugus* | Common | Buildings | RES | | | |
| Northern Bat | *Myotis septentrionalis* | Unknown | Silver maples, hollow green ash, underneath loose bark of dead trees | DDF | | ✓ | |
| Hoary Bat | *Lasiurus cinereus* | Unknown | Any tree with dense shade, seclusion, and clear space below the roost | DDF, MDF, DMF, MMF, DCF, MCF | | | |
| Red Bat | *Lasiurus borealis* | Unknown | Leafy trees (elms, maples) or in conifers | DDF, MDF, DMF, DCF, MCF | | | |
| Big Brown Bat | *Eptesicus fuscus* | Unknown | Buildings | RES | | | |
| Silver-haired Bat | *Lasionycteris noctivagans* | Unknown | Fond of willows, maple or ash | DDF, MDF | | | |
| Snowshoe Hare | *Lepus americanus* | Abundant | Heavily forested areas with dense understory. Thrives in coniferous and mixed woods including cedar bogs and spruce swamps. | DMF, MMF, MCF, DCF | | | |
| Woodchuck | *Marmota monax* | Common | Rolling farmland interspersed with grassy pastures, small woodlots, and brushy fencelines | OLD, GRA, PAS, HAY | | | |
| Eastern Cottontail | *Sylvilagus floridanus* | Absent? | Herbaceous vegetation abounds and potential shelter exists from brush piles, shrubby thickets, or weedy fencerows. | SUP, OLD, GRA, PAS, HAY | | | |

# Mammal Species Found on Seney NWR (Continued)

| Common Name | Scientific Name | Ordinal Abundance | Habitat(s)[1] | Habitat(s) | Special Status | | |
|---|---|---|---|---|---|---|---|
| | | | | | Region 3 Conservation Priorities | Regional Forester Sensitive | Michigan Special Status |
| Eastern Grey Squirrel | *Sciurus carolinensis* | Common | Abundant deciduous trees, in extensive forested tracts, dense woodlots, riparian strips Can be stands of walnut, hickory, maple or beech are preferable it may frequent mixed deciduous/ coniferous stands. | DDF, MDF, DMF, MMF | | | |
| Fox Squirrel | *Sciurus niger* | Absent? | Deciduous trees in areas that lack a well-developed understory. Frequents woodlots, forest-field edges | DDF, MDF, OLD | | | |
| Red Squirrel | *Tamiasciurus hudsonicus* | Abundant | Extensive stands of evergreen trees or mixed Coniferous/ deciduous woodland | DCF, MCF, DMF, MMF | | | |
| Thirteen-lined Ground Squirrel | *Spermophilus tridecemlineatus* | Rare | Open areas with short grass | GRA | | | |
| Eastern Chipmunk | *Tamis striatus* | Abundant | Open deciduous forests where stumps, logs, rocky outcrops Ultimate habitat beech maple forest | DDF, MDF | | | |
| Least Chipmunk | *Tamias minimus* | Common | Boreal forest edge and internal forest clearings. | DDF, MDF, DMF, MMF | | | |
| Northern Flying Squirrel | *Glaucomys sabrinus* | Common | Mixed forests with mature deciduous and coniferous trees. Also frequents pure stands of either type. | DMF, MMF | | | |
| Southern Flying Squirrel | *Glaucomys volans* | Rare | Open deciduous woodlots with few shrubby thickets scattered among mature trees. | DDF, MDF | | | |
| Beaver | *Castor canadensis* | Common | Slow-moving streams or lakes bordered by young forests containing aspen, willow, or alder. | SHO | | | |

## Mammal Species Found on Seney NWR (Continued)

| Common Name | Scientific Name | Ordinal Abundance | Habitat(s)[1] | Habitat(s) | Special Status | | |
|---|---|---|---|---|---|---|---|
| | | | | | Region 3 Conservation Priorities | Regional Forester Sensitive | Michigan Special Status |
| House Mouse | *Mus musculus* | Rare | Buildings, cultivated fields, fencerows, wooded areas (around buildings) | RES, HAY | | | |
| Norway Rat | *Rattus norvegicus* | Rare | Buildings, cultivated fields. | RES, HAY | | | |
| Woodland Deer Mouse | *Peromyscus maniculatus gracilis* | Abundant | Forested habitats, shrubby areas, regenerating clear-cuts, and recent burns. | SUP, DCF, MCF, DDF, MDF, DMF, MMF | | | |
| Red-backed Vole | *Clethrionomys gapperi* | Common | Coniferous forests are preferred, deciduous or mixed coniferous/ deciduous woods acceptable with standing water nearby. | MDF, MMF, MCF, SWE, SHO | | | |
| White-footed Mouse | *Peromyscus leucopus* | Uncommon | Deciduous woodlands, where herbaceous cover is moderate and rocks and logs are abundant. | DDF, MDF | | | |
| Meadow Vole | *Microtus pennsylvanicus* | Common | Moist, grassy fields and also frequents marshes and bog thick with greases, sedges and rushes. | SWE, OLD, OWE | | | |
| Muskrat | *Ondatra zibethicus* | Common | Slow-moving streams, lakes, ponds, and especially marshes. | OWA, OWE | | | |
| Southern Bog Lemming | *Synaptomys cooperi* | Uncommon | Old fields, clear-cuts, shrubby locations, and upland woods. Frequents wet forested sites dominated by spruce, cedar, or tamarack, as well as more open sphagnum bogs. | MDF, WDF, MMF, WMF, MC, WCF, ORA, SUP, SWE | | | |
| Woodland Jumping Mouse | *Napaeozapus insignis* | Uncommon | Cool moist forests, with spruce-fir and hemlock hardwood associations but also in pure deciduous stands. Must be littered with rocks, logs, and stumps coated with a lush growth of ferns, grasses, and other. | MDF, MMF, MCF | | | |

## Mammal Species Found on Seney NWR (Continued)

| Common Name | Scientific Name | Ordinal Abundance | Habitat(s)[1] | Habitat(s) | Special Status | | |
|---|---|---|---|---|---|---|---|
| | | | | | Region 3 Conservation Priorities | Regional Forester Sensitive | Michigan Special Status |
| Meadow Jumping Mouse | *Zapus hudsonius* | Common | Variety of habitats. Fallow fields, woodland edges, shrubby thickets. Abundant in moist sites containing lush growth of grasses and forbs (damp meadows, streamside vegetation, and marsh borders) | SWE, GRA, PAS, SHO | | | |
| Porcupine | *Erethizon dorsatum* | Common | Deciduous and coniferous woodlands of stands containing pine and hemlock. | DDF, MDF, DMF, MMF, DCF, MCF | | | |
| Gray Wolf | *Canis lupus* | Uncommon | Diverse habitats. | DDF, MDF, DMF, MMF, DCF, MCF, SUP, OLD, GRA, PAS, HAY, SHO | ✓ | | ✓ |
| Coyote | *Canis latrans* | Common | Prairies, brushy area, wooded edges | DDF, MDF, DMF, MMF, DCF, MCF, PAS, GRA, HAY | | | |
| Gray Fox | *Urocyon cinereoargenteus* | Rare | In wooded swamps and in bottomland forests where woodlands and farmlands are mixed | DDF, MDF, DMF, MMF, DCF, WCF | | | |
| Red Fox | *Vulpes vulpes* | Common | Open country with reliable cover nearby, frequents forest-field edges, brushy fencelines and wooded borders of streams or lakes. | DDF, OLD, PAS, HAY | | | |
| Black Bear | *Ursus americanus* | Common | Dense coniferous or deciduous woods having a thick understory. | DDF, MDF, DMF, MMF, DCF, MCF | | ✓ | |

# Mammal Species Found on Seney NWR (Continued)

| Common Name | Scientific Name | Ordinal Abundance | Habitat(s)[1] | Habitat(s) | Special Status | | |
|---|---|---|---|---|---|---|---|
| | | | | | Region 3 Conservation Priorities | Regional Forester Sensitive | Michigan Special Status |
| Raccoon | *Procyon lotor* | Common | In or near wooded areas, often near a stream or pond. More abundant in hardwood stands than coniferous | DDF, MDF, DMF, MMF | | | |
| Mink | *Mustela vison* | Common | Streams, ponds, lakes with at least some brushy or rocky cover. | OWA, SWA | | | |
| Short-tailed Weasel | *Mustela erminea* | Common | Open forests, riparian woodlands, and shrubby fencerows. | | | | |
| Long-tailed Weasel | *Mustela frenata* | Uncommon | Forest-field edges, brushy fencelines, and wooded areas with shrubby cover | DDF, MDF, OLD, PAS, SHO | | | |
| Striped Skunk | *Mephitis mephitis* | Common | Mix of forests, fields, and wooded ravines. | HAY, PAS, DDF, MDF, DMF, MMF, DCF, DMF | | | |
| River Otter[2] | *Lutra canadensis* | Common | Clean, moderately deep streams, ponds, lakes. | OWA | | ✓ | |
| Badger[2] | *Taxidae taxus* | Unknown | Grasslands, open fields, and pastures. | GRA, PAS, HAY | | ✓ | |
| Marten[2] | *Martes americana* | Uncommon | Closed coniferous woodlands underlain by a lush growth of shrubs and forbs and appears less in mixed stands. | DCF, MCF | | ✓ | |
| Fisher | *Martes pennanti* | Common | Interior of dense coniferous forests. Capable of living in mature deciduous woods. | DCF, MCF, DDF, MDF | | | |
| Canada Lynx | *Lynx canadensis* | Unknown | Mature coniferous forests that are strewn with thick litter, ferns, and rotting logs. | DCF, MCF, WCF | | | ✓ |

# Mammal Species Found on Seney NWR (Continued)

| Common Name | Scientific Name | Ordinal Abundance | Habitat(s)[1] | Habitat(s) | Special Status | | |
|---|---|---|---|---|---|---|---|
| | | | | | Region 3 Conservation Priorities | Regional Forester Sensitive | Michigan Special Status |
| Bobcat | *Lynx rufus* | Common | Lies in coniferous and mixed deciduous/coniferous woods. Readily occupies wooded swamps close to riparian forest | DMF, MMF, DCF, MCF | | ✓ | |
| White-tailed Deer | *Odocoileus virginianus* | Abundant | Open forest environments interspersed with meadows, woodland clearings or farmland. | | | | |
| Moose | *Alces alces* | Rare | Boreal forest, particularly early successional stages, dominated by shrubby growth and immature trees. Frequents moist habitats as cedar swamps marshes and alder-willow thickets bordering waterways. | | | | ✓ |

1. *Habitat information obtained from: Kurta (2001). Habitat Definitions (Brewer et al. 1991): DDF= Dry Deciduous Forest or Savanna; MDF= Mesic Deciduous Forest; WDF= Wet Deciduous Forest; DMF= Dry Mixed Forest or Savanna; MMF= Mesic Mixed Forest; WMF=Wet Mixed Forest; DCF=Dry Coniferous Forest; MCF=Mesic Coniferous Forest; WCF= Wet Coniferous Forest; SUP= Shrub Uplands; SWE= Shrub Wetland; OLD= Old Field; GRA= Grassland ; PAS= Pasture; HAY= Hayfield; OWE=Open Wetland; SHO= Shoreland; OWA= Open Water*

# Seney NWR Herbarium[1]

| Taxonomy | Common Name |
|---|---|
| **MONOCOTYLEDONEAE (see Michigan Flora, Part 1)** | |
| **14. TYPHACEAE** | **CAT-TAIL FAMILY** |
| *1. Typha angustifolia* | Narrow-leaved Cat-tail |
| *2. Typha latifolia* | Common Cat-tail |
| *T. Typha x glauca* | Hybrid of above |
| **15. SPARGANIACEAE** | **BUR-REED FAMILY** |
| *1. Sparganium eurycarpum* | |
| *2. Sparganium minimum* | |
| *3. Sparganium fluctuans* | |
| *4. Sparganium americanum* | |
| *6. Sparganium chlorocarpum* | |
| *7. Sparganium angustifolium* | |
| **16. POTAMOGETONACEAE** | **PONDWEED FAMILY** |
| *1. Potamogeton robbinsii* | |
| *2. Potamogeton pectinatus* | Sago Pondweed |
| *3. Potamogeton filiformis* | |
| *6. Potamogeton praelongus* | |
| *7. Potamogeton richardsonii* | |
| *9. Potamogeton epihydrus* | |
| *10. Potamogeton alpinus* | |
| *11. Potamogeton amplifolius* | |
| *14. Potamogeton illinoensis* | |
| *15. Potamogeton gramineus* | |
| *16. Potamogeton natans* | |
| *18. Potamogeton zosteriformis* | |
| *24. Potamogeton friesii* | |
| *25. Potamogeton strictifolius* | |
| *P. Potamogeton x longiligulatus* | |
| *26. Potamogeton confervoides* | |
| *27. Potamogeton obtusifolius* | |
| *28. Potamogeton foliosus* | |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| *30. Potamogeton berchtoldii* | |
| **17. NAJADACEAE** | **NAIAD FAMILY** |
| *4. Najas flexilis* | |
| **19. ALISMATACEAE** | **WATER-PLANTAIN FAMILY** |
| *3. Sagittaria graminea* | |
| *4. Sagittaria latifolia* | Wapato; Duck-potato |
| **21. HYDROCHARITACEAE** | **FROG'S-BIT FAMILY** |
| *1. Vallisneria americana* | Tape-grass; wild-celery |
| **22. GRAMINAE (POACEAE)** | **GRASS FAMILY** |
| **1. POEAE (Tribe)** | |
| **1. Phragmites** | **Reed** |
| *1. Phragmites australis* | |
| *2. Dactylis* | |
| *1. Dactylis glomerata* | Orchard Grass |
| **9. Poa** | **Bluegrass** |
| *10. Poa compressa* | Canada Bluegrass |
| *11. Poa pratensis* | Kentucy Bluegrass |
| *12. Poa palustris* | Fowl Meadow Grass |
| **13. Bromus** | **Brome Grass** |
| *3. Bromus inermis* | Smooth Brome |
| *8. Bromus ciliatus* | Fringed Brome |
| **15. Glyceria** | **Manna Grass** |
| *2. Glyceria borealis* | |
| *4. Glyceria canadensis* | Rattlesnake Grass |
| *6. Glyceria striata* | Foul Manna Grass |
| **2. TRITICEAE (Tribe)** | |
| **5. Hystix** | |
| *1. Hystix patula* | Bottlebrush Grass |
| **7. Lolium** | |
| *2. Lolium perenne* | Ryegrass |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **8. Agropyron** | |
| *2. Agropyron trachycaulum* | Wheatgrass |
| *5. Agropyron repens* | Quack Grass |
| **4. AGROSTIDEAE (Tribe)** | |
| **4. Oryzopsis** | **Rice-grass** |
| *4. Oryzopsis asperifolia* | Rice-grass |
| *5. Muhlenbergia* | "Muhly" |
| *10. Muhlenbergia Mexicana* | |
| **7. Phleum** | |
| *2. Phleum pratense* | Timothy |
| **14. Calamagrostis** | **Reedgrass** |
| *2. Calamagrostis canadensis* | Blue-joint |
| **17. Agrostis** | **Bentgrass** |
| *2. Agrostis gigantea* | Redtop |
| *6. Agrostis hyemalis* | Ticklegrass |
| **5. CHLORIDEAE (Tribe)** | |
| **7. Spartina** | |
| *2. Spartina pectinata* | Cordgrass |
| **6. PHALARIDEAE (Tribe)** | |
| **3. Phalaris** | |
| *2. Phalaris arundinacea* | Reed Canary Grass |
| **8. ZIZANIEAE (Tribe)** | |
| **1. Zizania** | |
| *1. Zizania aquatica* | Wild-rice |
| **9. PANICEAE (Tribe)** | |
| **3. Echinochloa** | |
| *3. Echinochloa muricata* | |
| **7. Panicum** | **Panic Grass** |
| *1. Panicum virgatum* | Switch Grass |
| *27. Panicum columbianum* | |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **10. ANDROPOGONEAE (Tribe)** | |
| **1. Andropogoneae** | |
| *2. Andropogoneae scoparius* | Little Bluestem |
| *3. Andropogoneae gerardii* | Big Bluestem; Turkeyfoot |
| **23. CYPERACEAE** | **SEDGE FAMILY** |
| **1. Carex (Genus)** | **Sedge** |
| **13. Ovales (Group)** | |
| *60. Carex bebbii* | |
| *65. Carex crawfordii* | |
| **16. Montanae (Group)** | |
| *77. Carex pensylvanica* | |
| **33. Carex (Group)** | |
| *121. Carex flava* | |
| *129. Carex lasiocarpa* | |
| **38. Acutae (Group)** | |
| *144. Carex crinita* | |
| **42. Pseudo-Cypereae (Group)** | |
| *149. Carex pseudo-cyperus* | |
| **43. Paludosae (Group)** | |
| *157. Carex lacustris* | |
| **45. Vesicariae (Group)** | |
| *161. Carex oligosperma* | |
| *162. Carex tuckermanii* | |
| *165. Carex rostrata* | |
| **46. Lupulinae (Group)** | |
| *167. Carex intumescens* | |
| **3. Dulichium (Genus)** | |
| *1. Dulichium arundinaceum* | Three-way Sedge |
| **4. Cyperus** | **Nut-grass; Umbrella Sedge** |
| *12. Cyperus odoratus* | |
| *13. Cyperus esculentus* | |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **5. Eleocharis** | **Spike-rush** |
| *8. Eleocharis acicularis* | |
| *16. Eleocharis erythropopa* | |
| *17. Eleocharis smallii* | |
| **6. Rhynchospora** | |
| *3. Rhynchospora fusca* | |
| **7. Cladium** | |
| *1. Cladium mariscoides* | Twig-rush |
| **11. Scirpus** | **Bulrush** |
| *5. Scirpus validus* | Softstem Bulrush |
| *6. Scirpus acutus* | Hardstem Bulrush |
| *11. Scirpus americanus* | Threesquare |
| *19. Scirpus cyperinus* | Wool-grass |
| **14. Eriophorum** | **Cotton-grass; Bog-cotton** |
| *4. Eriophorum virginicum* | Tawny Cotton-grass |
| *5. Eriophorum angustifolium* | |
| **24. ARACEAE** | **ARUM FAMILY** |
| **1. Arisaema** | |
| *1. Arisaema triphyllum* | Jack-in-the-pulpit; Indian-turnip |
| *3. Peltandra* | |
| *1. Peltandra virginica* | Arrow-arum; Tuckahoe |
| **25. LEMNACEAE** | **DUCKWEED FAMILY** |
| **3. Lemna** | |
| *3. Lemna minor* | |
| **27. ERIOCAULACEAE** | **PIPEWORT FAMILY** |
| *1. Eriocaulon septangulare* | Pipewort |
| **30. PONTEDERIACEAE** | **PICKEREL-WEED FAMILY** |
| **2. Heteranthera** | |
| *1. Heteranthera dubia* | Water Star-grass |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **31. JUNCACEAE** | **RUSH FAMILY** |
| **2. Juncus** | |
| *1. Juncus effuses* | |
| *14. Juncus pelocarpus* | |
| *15. Juncus Canadensis* | |
| *17. Juncus brevicaudatus* | |
| *22. Juncus nodosus* | |
| **32. LILIACEAE** | **LILY FAMILY** |
| **3. Polygonatum** | **Solomon-seal** |
| *2. Polygonatum pubescens* | |
| **4. Streptopus** | **Twisted-stalk** |
| *1. Streptopus amplexifolius* | |
| **5. Trillium** | **Trillium; Wake-robin** |
| *6. Trillium grandiflorum* | Common Trillium |
| *9. Trillium cernuum* | Nodding Trillium |
| **6. Medeola** | |
| *1. Medeola virginiana* | Indian Cucumber-root |
| **7. Erythronium** | **Trout-lily; Dogtooth-violet; Adder's-tongue** |
| *1. Erythronium americanum* | |
| **8. Lilium** | |
| *1. Lilium philadelphicum* | Wood Lily |
| **12. Allium** | |
| *4. Allium schoenoprasum* | Chives |
| **15. Maianthemum** | |
| *1. Maianthemum canadense* | Wild or False Lily-of-the-valley; Canada Mayflower |
| *16.* ***Smilacina*** | False Solomon-seal |
| *1. Smilacina racemosa* | False Spikenard |
| *2. Smilacina trifolia* | |
| *3. Smilacina stellata* | |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **36. IRIDACEAE** | **IRIS FAMILY** |
| **1. Sisyrinchium** | **Blue-eyed-grass** |
| *8. Sisyrinchium montanum* | |
| **2. Iris** | **Iris; Flag** |
| *6. Iris versicolor* | Wild Blue Flag |
| **39. ORCHIDACEAE** | **ORCHID FAMILY** |
| **1. Cypripedium** | **Lady-slipper** |
| *1. Cypripedium acaule* | Moccasin Flower; Pink or Stemless Lady-slipper |
| **4. Arethusa** | |
| *1. Arethusa bulbosa* | Arethusa; Dragon's Mouth. |
| **5. Pogonia** | |
| *1. Pogonia ophioglossoides* | Rose Pogonia |
| **8. Habenaria** | **"Rein Orchid"** |
| *3. Habenaria psycodes* | Purple Fringed Orchid |
| *5. Habenaria lacera* | Ragged Fringed Orchid |
| *11. Habenaria clavellata* | Club-spur Orchid |
| **9. Corallorhiza** | **Coral-root** |
| *1. Corallorhiza maculata* | Spotted Coral-root |
| *2. Corallorhiza trifida* | Early Coral-root |
| *3. Corallorhiza striata* | Striped Coral-root |
| **10. Listera** | **Twayblade** |
| *2. Listera convallarioides* | Broad-leaved Twayblade |
| *18. Spiranthes* | Ladies'-tresses |
| *1. Spiranthes lacera* | Slender Ladies'-tresses |
| *5. Spiranthes cernua* | Nodding Ladies'-tresses |
| **DICOTYLEDONEAE (see Michigan Flora, Part 2** | |
| **41. SALICAEAE** | **WILLOW FAMILY** |
| **1. Salix** | **Willow** |
| *1. Salix exigua* | Sandbar Willow |
| *3. Salix ericophala* | |
| *7. Salix pellita* | Satiny Willow |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| *9. Salix candida* | Sage Willow |
| *13. Salix humilis* | Prairie Willow |
| *24. Salix petiolaris* | Slender Willow |
| **2. Populus** | **Poplar** |
| *6. Populus tremuloides* | Quaking Aspen |
| *7. Populus grandidentata Largetooth Aspen* | |
| **42. MYRICACAE** | **BAYBERRRY FAMILY** |
| **1. Comptonia** | |
| *1. Comptonia peregrina* | Sweetfern |
| **2. Myrica** | **Bayberry; Wax-myrtle** |
| *1. Myrica gale* | Sweet Gale |
| **45. BETULACEAE (formerly Corylaceae)** | **BIRCH FAMILY** |
| **1. Alnus** | **Alder** |
| *2. Alnus rugosa* | Speckled Alder; Tag Alder |
| **2. Betula** | **Birch** |
| *2. Betula pumila* | Bog or Dwarf Birch |
| *4. Betula papyrifera* | Paper, White, or Canoe Birch |
| **3. Corylus** | **Hazel** |
| *2. Corlyus cornuta* | Beaked Hazelnut |
| **46. FAGACEAE** | **BEECH FAMILY** |
| **1. Quercus** | **Oak** |
| *3. Quercus rubra* | Red Oak |
| *7. Quercus macrocarpa* | Bur Oak |
| **2. Fagus** | **Beech** |
| *1. Fagus grandifolia* | American Beech |
| **47. ULMACEAE** | **ELM FAMILY** |
| **1. Ulmus** | **Elm** |
| *3. Ulmus americana* | American or White Elm |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **49. CANNABACEAE** | **HEMP FAMILY** |
| **2. Humulus** | |
| *2. Humulus lupulus* | Common Hops |
| **54. POLYGONACEAE** | **SMARTWEED FAMILY** |
| **2. Rumex** | **Dock** |
| *1. Rumex acetosella* | Sheep or Red Sorrel |
| **5. Polygonum** | **Smartweed; Knotweed** |
| *12. Polygonum cilinode* | Fringed False Buckwheat |
| *16. Polygonum amphibium* | Water Smartweed |
| *16. (a) P.a. var. natans* (see var. *stipulaceum*) | |
| *16. (b) P.a. var. coccineum* (see var. *emersum*) | |
| *18. Polygonum lapathifolium* | Willow-weed |
| *20. Polygonum orientale* | Prince's Feather; Kiss-me-over-the-garden-gate |
| *23. Polygonum hydropiperoides* | Mild Water-pepper |
| **55. CHENOPODIACEAE** | **GOOSEFOOT FAMILY** |
| **9. Chenopodium** | **Goosefoot** |
| *9. Chenopodium capitatum* | Strawberry Blite |
| **60. PORTULACACEA** | **PURSLANE FAMILY** |
| **2. Claytoni** | **Spring-beauty** |
| *2. Claytonia caroliniana* | |
| **61. CARYOPHYLLACEAE** | **PINK FAMILY** |
| **6. Stellaria** | **Chickweed; Stitchwort** |
| *5. Stellaria longifolia* | |
| **7. Cerastium** | **Chickweed** |
| *6. Cerastium vulgatum (see C. fontanum)* | Mouse-ear Chickweed |
| **13. Dianthus** | **Pink** |
| *4. Dianthus deltoides* | Maiden Pink |
| **17. Silene** | |
| *4. Silene cucubalus (see S. vulgaris)* | Bladder Campion |
| *11. Silene pratensis* (see *Lychnus alba* below) | |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **18. Lychnis** | |
| * *Lychnis alba (see Silene pratensis)* | White Cockle; White Campion |
| **62. CERATOPHYLLACEAE** | **HORNWORT FAMILY** |
| **1. Ceratophyllum** | **Coontail** |
| *1. Ceratophyllum demersum* | |
| **63. NYMPHAEACEAE** | **WATER-LILY FAMILY** |
| **2. Brasenia** | |
| *1. Brasenia schreberi* | Water-shield |
| **4. Nymphaea** | **Water-lily** |
| *2. Nymphaea odorata* | |
| **5. Nuphar** | **Pond-lily; Cow-lily; Spatterdock** |
| *2. Nuphar variegate* | |
| **64. RANUNCULACEAE** | **BUTTERCUP FAMILY** |
| **1. Clematis** | **Virgin's Bower; Clematis; Woodbine** |
| *2. Clematis virginiana* | |
| **2. Aquilegia** | **Columbine** |
| *1. Aguilegia canadensis* | Wild Columbine |
| **5. Thalictrum** | **Meadow-rue** |
| *4. Thalictrum dasycarpum* | Purple Meadow-rue |
| **7. Actaea** | **Baneberry** |
| *1. Actaea rubra* | Red Baneberry |
| *2. Actaea pachyppoda* | White Baneberry |
| **8. Coptis** | |
| *1. Coptis groenlandica (see C. trifolia)* | Goldthread |
| **9. Hepatica** | **Hepatica** |
| *2. Hepatica americana* | |
| **11. Ranunculus** | **Buttercup; Crowfoot** |
| *11. Ranunculus abortibus* | Small-flowered Buttercup |
| *15. Ranunculus acris* | Tall or Common Buttercup |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **71. PAPAVERACEAE** | **POPPY FAMILY** |
| ***FUMARIACEAE (often included as a subfamily in the Papaveraceae)** | **FUMITORY FAMILY** |
| **1. Dicentra** | |
| *2. Dicentra cucullaria* | Dutchman's-breeches |
| *3. Dicentra canadensis* | Squirrel-corn |
| **73. CRUCIFERAE (BRASSICACEAE)** | **MUSTARD FAMILY** |
| **3. Barbarea** | **Winter Cress** |
| *1. Barbarea vulgaris* | Yellow Rocket |
| **8. Rorippa** | **Yellow Cress** |
| *3. Rorippa islandica (see R. palustris)* | |
| **14. Erysimum** | |
| *2. Erysimum cheiranthoides* | Wormseed Mustard |
| **20. Capsella** | |
| *1. Capsella bursa-pastoris* | Shepherd's-purse |
| **21. Arabis** | |
| *6. Arabis glabra* | Tower Mustard |
| **25. Berteroa** | |
| *1. Berteroa incana* | Hoary Alyssum |
| **75. SARRACENIACEAE** | **PITCHER-PLANT FAMILY** |
| **1. Sarracenia** | |
| *1. Sarracenia purpurea* | Pitcher-plant |
| **76. DROSERACEAE** | **SUNDEW FAMILY** |
| **1. Drosera** | **Sundew** |
| *1. Drosera rotundifolia* | Round-leaved Sundew |
| **78. CRASSULACEAE** | **ORPINE FAMILY** |
| **1. Sedum** | **Stonecrop; Sedum; Orpine** |
| *4. Sedum pururеum (see S. telephium)* | Live-forever |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **79. SAXIFRAGACEAE** | **SAXIFRAGE FAMILY** |
| ***GROSSULARIACEAE (Often included in the Saxifragaceae)** | **GOOSEBERRY FAMILY** |
| **1. Ribes** | **Currant; Gooseberry** |
| *1. Ribes cynosbati* | Wild or Prickly Gooseberry |
| *9. Ribes glandulosum* | Skunk Currant |
| **82. ROSACEAE** | **ROSE FAMILY** |
| **1. Rubus** | **Bramble; Rasberries; Dewberries; Blackberries** |
| *6. Rubus strigosus(-idaeus)* | Wild Red Raspberry |
| *8. Rubus hispidus* | Swamp Dewberry |
| *9. Rubus flagellaris* | Northern Dewberry |
| *11. Rubus allegheniensis* | Common Blackberry |
| **2. Rosa** | |
| *1. Rosa multiflora* | Multiflora or Japanese Rose |
| *9. Rosa palustris* | Swamp Rose |
| *13. Rosa acicularis* | Wild Rose |
| *14. Rosa blanda* | Wild Rose |
| **4. Sorbus** | **Mountain-ash** |
| *3. Sorbus americana* | |
| **5. Prunus** | **Cherry; Plum** |
| *2. Prunus virginiana* | Choke Cherry |
| *5. Prunus pumila* | Sand Cherry |
| *7. Prunus pensylvanica* | Pin or Fire Cherry |
| **6. Physocarpus** | |
| *1. Physocarpus opulifolius* | Ninebark |
| **7. Spiraea** | **Spiraea** |
| *3. Spiraea tomentosa* | Hardhack; Steeplebush |
| *4. Spiraea alba* | Meadowsweet |
| **8. Aronia** | |
| *1. Aronia prunifolia* | Chokeberry |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **9. Amelanchier** | **Serviceberry; Shadbush; Shadblow; Juneberry; Sugarplum** |
| *4. Amelanchier interior* | |
| **10. Crataegus** | **Hawthorn, Thornapple** |
| *4. Crataegus douglasii* | Black Hawthorn |
| **11. Malus** | **Apple** |
| *1. Malus pumila* | Apple |
| **17. Fragaria** | **Strawberry** |
| *1. Fragaria vesca* | Woodland Strawberry |
| **18. Potentilla** | **Cinquefoil; Five-finger** |
| *1. Potentilla fruticosa* | Shrubby Cinquefoil |
| *2. Potentilla palustris* | Marsh Cinquefoil |
| *3. Potentilla anserina* | Silverweed |
| *8. Potentilla tridentata* | Three-toothed Cinquefoil |
| *9. Potentilla norvegica* | Rough Cinquefoil |
| *10. Potentilla simplex* | Common or Old-field Cinquefoil |
| *12. Potentilla argentea* | Silver Cinquefoil |
| **21. Geum** | |
| *7. Geum macrophyllum* | Avens |
| **83. LEGUMINOSAE (FABACEAE)** | **PEA FAMILY** |
| **3. Melilotus** | **Sweet-clover** |
| *1. Melilotus alba* | White Sweet-clover |
| *2. Melilotus officinalis* | Yellow Sweet-clover |
| **4. Trifolium** | **Clover** |
| *3. Trifolium pratense* | Red Clover |
| *6. Trifolium repens* | White Clover |
| *8. Trifolium agrarium (see T. aureum)* | Hop Clover |
| **5. Medicago** | |
| *2. Medicago lupulina* | Black Medick |
| **26. Vicia** | **Vetch** |
| *8. Vicia villosa* | Hairy Vetch |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **29. Lotus** | |
| *1. Lotus corniculata* | Birdfoot Trefoil |
| **85. OXALIDACEAE** | **OXALIS or WOOD-SORREL FAMILY** |
| **1. Oxalis** | |
| *3. Oxalis Fontana* | |
| **86. GERANIACEAE** | **GERANIUM FAMILY** |
| **2. Geranium** | **Wild Geranium; Crane's-bill** |
| *3. Geranium robertianum* | Herb Robert |
| **91. POLYGALACEAE** | **MILKWORT FAMILY** |
| **1. Polygala** | **Milkwort; Polygala** |
| *1. Polyagala paucifolia* | Fringed Polygala; Gay-wings; Flowering-wintergreen |
| **92. EUPHORBIACEAE** | **SPURGE FAMILY** |
| **4. Euphorbia** | |
| *18. Euphorbia esula* | Leafy Spurge |
| **97. ANACARDIACEAE** | **CASHEW FAMILY** |
| **1. Toxicodendron** | |
| *2. Toxicodendron radicans* | Poison-ivy |
| **99. AQUIFOLIACEAE** | **HOLLY FAMILY** |
| **2. Ilex** | **Holly** |
| *1. Ilex verticillata* | Michigan Holly; Winterberry; Black Alder |
| **100. CELASTRACEAE** | **BITTERSWEET FAMILY** |
| **2. Euonymus** | |
| *2. Euonymus alata* | Winged Euonymus |
| **102. ACERACEAE** | **MAPLE FAMILY** |
| **1. Acer** | **Maple** |
| *3. Acer saccharum* | Sugar Maple or Hard Maple |
| *5. Acer rubrum* | Red Maple |
| **105. BALSAMINACEAE** | **TOUCH-ME-NOT FAMILY** |
| **1. Impatiens** | |
| *4. Impatiens capensis* | Spotted Touch-me-not |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **106. RHAMNACEAE** | **BUCKTHORN FAMILY** |
| **2. Rhamnus** | **Buckthorn** |
| *1. Rhamnus frangula* | Glossy Buckthorn |
| **107. VITACEAE** | **GRAPE FAMILY** |
| **3. Parthenocissus** | **Virginia Creeper; Woodbine** |
| *2. Parthenocissus inserta* | |
| **108. TILIACEAE** | **LINDEN FAMILY** |
| **1. Tilia** | |
| *1. Tilia americana* | Basswood; Linden |
| **109. MALVACEAE** | **MALLOW FAMILY** |
| **3. Malva** | **Mallow** |
| *2. Malva moschata* | Musk Mallow |
| **111. GUTTIFERAE (CLUSIACEAE)** | **ST. JOHN'S-WORT FAMILY** |
| **1. Triadenum** | |
| *1. Triadenum fraseri* | |
| **2. Hypericum** | **St. John's-wort** |
| *2. Hypericum kalmianum* | Kalm St. John's-wort |
| *6. Hypericum perforatum* | Common St. John's-wort; Klamath Weed; Goatweed |
| *7. Hypericum ellipticum* | |
| *12. Hypericum majus* | |
| **114. CISTACEAE** | **ROCKROSE FAMILY** |
| **2. Helianthemum** | **Rockrose; Frostweed** |
| *2. Helianthemum canadense* | |
| **115. VIOLACEAE** | **VIOLET FAMILY** |
| **2. Viola** | **Violet** |
| *3. Viola canadensis* | Canada Violet |
| *7. Viola conspersa* | Dog Violet |
| *11. Viola pallens (see V. macloskeyi)* | Smooth White Violet |
| *22. Viola nephrophylla* | |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **119. THYMELAEACEAE** | **MEZEREUM FAMILY** |
| **1. Dirca** | |
| *1. Dirca palustris* | Leatherwood |
| **120. ELAEAGNACEAE** | **OLEASTER FAMILY** |
| **1. Elaegnus** | |
| *1. Elaegnus angustifolia* | Russian Olive |
| *2. Elaegnus umbellata* | Autumn Olive |
| **121. LYTHRACEAE** | **LOOSESTRIFE FAMILY** |
| **4. Lythrum** | **Loosestrife** |
| *1. Lythrum salicaria* | Purple Loosestrife |
| **125. ONAGRACEAE** | **EVENING-PRIMROSE FAMILY** |
| **1. Circaea** | **Enchanter's-nightshade** |
| *1. Circaea alpine* | |
| **2. Ludwigia** | **False Loosestrife** |
| *1. Ludwigia palustris* | Water-purslane |
| **3. Epilobium** | **Willow-herb** |
| *1. Epilobium angustifolium* | Fireweed; Great Willow-herb |
| *7. Epilobium ciliatum* | |
| **6. Oenothera** | **Evening-primrose; Sundrops** |
| *3. Oenothera linearis (now O. fruticosa) (see Gray's Manual, p. 1066)* | Evening-primrose; Sundrops |
| *9. Oenothera parvifola* | |
| *12. Oenothera biennis* | |
| **126. HALORAGACEAE** | **WATER-MILFOIL FAMILY** |
| **2. Myriophyllum** | **Water-milfoil** |
| *5. Myriophyllum verticillatum* | |
| *6. Myriophyllum exalbescens* | |
| **129. UMBELLIFERAE (APIACEAE)** | **CARROT OR PARSLEY FAMILY** |
| **6. Daucus** | |
| *1. Daucus carota* | Wild Carrot; Queen-Anne's-lace |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **9. Osmorhiza** | **Sweet-cicely** |
| *3. Osmorhiza longistylis* | |
| *4. Osmorhiza claytonii* | Sweet-cicely |
| **33. Cicuta** | |
| *1. Cicuta bulbifera* | |
| **130. CORNACEAE** | **DOGWOOD FAMILY** |
| **1. Cornus** | **Dogwood** |
| *1. Cornus canadensis* | Bunchberry; Dwarf Cornel |
| *2. Cornus alternifolia* | Alternate-leaved Dogwood; Pagoda Dogwood |
| *5. Cornus rugosa* | Round-leaved Dogwood |
| *6. Cornus stolonifera* | Red-osier |
| **DICOTYLEDONEAE (see Michigan Flora, Part 3)** | |
| **132. PYROLACEAE** | **SHINLEAF OR WINTERGREEN FAMILY** |
| **1. Pyrola** | **Shinleaf; Pyrola** |
| *2. Pyrola elliptica* | |
| **MONOTROPACEAE (often included in the Pyrolaceae or as a subspecies in the Ericaceae)** | **INDIAN-PIPE FAMILY** |
| **2. Monotropa** | |
| *2. Monotropa uniflora* | Indian-pipe |
| **133. ERICACEAE** | **HEATH FAMILY** |
| **3. Andromeda** | |
| *1. Andromeda glaucophylla* | Bog-rosemary |
| **4. Ledum** | |
| *1. Ledum groenlandicum* | Labrador-tea |
| **5. Chamaedaphne** | |
| *1. Chamaedaphne calyculata* | Leatherleaf |
| **6. Gaylussacia** | |
| *1. Gaylussacia baccata* | Huckleberry; Crackleberry |
| **7. Vaccinium** | **Blueberries and Cranberries** |
| *2. Vaccinium oxycoccos* | Small cranberry |
| *3. Vaccinium macrocarpon* | Large cranberry |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| *9. Vaccinium myrtilloides* | Velvetleaf or Canada Blueberry |
| *11. Vaccinium angustifolium* | Low Sweet Blueberry |
| **8. Epigaea** | |
| *1. Epigaea repens* | Trailing-arbutus |
| **9. Gaultheria** | |
| *2. Gaultheria procumbens* | Teaberry; Wintergreen |
| **10. Arctostaphylos** | |
| *1. Arctostaphylos uva-ursi* | Bearberry; Kinnikinick |
| **135. PRIMULACEAE** | **PRIMROSE FAMILY** |
| **5. Lysimachia** | **Loosestrife** |
| *5. Lysimachia terrestris* | Swamp-candles |
| *6. Lysimachia thyrsiflora* | Tufted Loosestrife |
| **6. Trientalis** | |
| *1. Trientalis borealis* | Star-flower |
| **141. OLEACEAE** | **OLIVE FAMILY** |
| **1. Fraxinus** | **Ash** |
| *2. Fraxinus nigra* | Black Ash |
| *3. Fraxinus americana* | White Ash |
| **143. GENTIANACEAE** | **GENTIAN FAMILY** |
| **6. Gentianaceae** | |
| *1. Gentianaceae crinita* | |
| **8. Gentiana** | |
| *6. Gentiana rubricaulis* | Red Stemed Gentian |
| **144. APOCYNACEAE** | **DOGBANE FAMILY** |
| **2. Apocynum** | **Dogbane** |
| *1. Apocynum androsaemifolium* | Spreading Dogbane |
| *2. Apocynum cannabinum* | Indian-hemp |
| **145. ASCLEPIADACEAE** | **MILKWEED FAMILY** |
| **2. Asclepias** | **Milkweed** |
| *7. Asclepias incarnata* | Swamp Milkweed |
| *11. Asclepias syriaca* | Common Milkweed |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **146. CONVOLVULACEAE** | **MORNING-GLORY FAMILY** |
| **2. Convolvulus** | |
| *1. Convolvulus arvensis* | Field Bindweed |
| **150. VERBENACEAE** | **VERVAIN FAMILY** |
| **3. Verbena** | **Vervain** |
| *7. Verbena hastata* | Blue Vervain |
| **151. LABIATAE (LAMIACEAE)** | **MINT FAMILY** |
| **3. Lycopus** | **Bugleweed; Water-horehound** |
| *1. Lycopus uniflorus* | |
| *6. Lycopus americanus* | Water Horehound |
| **6. Mentha** | **Mint** |
| *1. Mentha arvensis* | Wild Mint |
| **9. Scutellaria** | **Skullcap** |
| *5. Scutellaria epilobiifolia (see S. galericulata)* | Marsh Skullcap |
| **10. Monarda** | |
| *3. Monarda fistulosa* | Wild Bergamot |
| **17. Prunella** | |
| *1. Prunella vulgaris* | Self-heal; Heal-all |
| **18. Clinopodium** | |
| *1. Clinopodium vulgare* | Wild-basil |
| **20. Stachys** | **Hedge-nettle** |
| *3. Stachys palustris* | |
| **22. Nepeta** | |
| *1. Nepeta cataria* | Catnip; Catmint |
| **26. Galeopsis** | |
| *1. Galeopsis tetrahit* | Hemp-nettle |
| **152. SOLANACEAE** | **NIGHTSHADE FAMILY** |
| **5. Solanum** | |
| *2. Solanum carolinense* | Horse-nettle |
| *3. Solanum dulcamara* | Nightshade; Bittersweet |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **153. SCROPHULARIACEAE** | **SNAPDRAGON FAMILY** |
| **1. Verbascum** | **Mullien** |
| *5. Verbascum thapsus* | Mullien; Flannel Plant |
| **5. Linaria** | **Toadflax** |
| *4. Linaria vulgaris* | Butter-and-eggs |
| **7. Castilleja** | **Indian Paintbrush** |
| *2. Castilleja coccinea* | |
| **17. Chelone** | **Turtlehead** |
| *2. Chelone glabra* | |
| **19. Veronica** | **Speedwell; Brooklime** |
| *5. Veronica scutellata* | Marsh Speedwell |
| **27. Gerardia (see Agalinis)** | **Gerardia** |
| *2. Agalinis tenuifolia* | |
| **28. Mimulus** | **Monkey-flower** |
| *2. Mimulus ringens* | |
| **157. LENTIBULARIACEAE** | **BLADDERWORT FAMILY** |
| **2. Utricularia** | **Bladderwort** |
| *6. Utricularia intermedia* | Flat-leaved Bladderwort |
| *8. Utricularia gibba* | |
| *9. Utricularia geminiscapa* | |
| *10. Utricularia vulgaris* | Common Bladderwort |
| **160. PLANTAGINACEAE** | **PLANTAIN FAMILY** |
| **2. Plantago** | **Plantain** |
| *5. Plantago lanceolata* | Ribgrass; Buckhorn; Narrow-leaved or English Plantain |
| *9. Plantago major* | Common Plantain |
| **161. RUBIACEAE** | **MADDER FAMILY** |
| **3. Galium** | **Bedstraw** |
| *3. Galium triflorum* | |
| *6. Galium boreale* | Northern Bedstraw |
| *18. Galium trifidum* | |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| *20. Galium tinctorium* | |
| **4. Mitchella** | |
| *1. Mitchella repens* | Partridge-berry |
| **162. CAPRIFOLIACEAE** | **HONEYSUCKLE FAMILY** |
| **2. Symphoricarpos** | **Snowberry** |
| *3. Symphoricarpos albus* | Snowberry |
| **3. Lonicera** | **Honeysuckle** |
| *5. Lonicera dioica* | Glaucous Honeysuckle |
| *12. Lonicera tatarica* | Tartarian Honeysuckle |
| **4. Sambucus** | **Elderberry** |
| *1. Sambucus canadensis* | Common Elder |
| *2. Sambucus racemosa* | Red-berried Elder; Red Elderberry |
| **5. Viburnum** | **Viburnum; Arrow-wood** |
| *1. Viburnum trilobum-opulus (see V. opulus)* | Highbush-cranberry; Guelder-rose |
| *6. Viburnum dentatum* | Arrow-wood |
| *8. Viburnum cassinoides* | Wild-raisin |
| *10. Viburnum lentago* | Nannyberry |
| **6. Linnaea** | |
| *1. Linnaea borealis* | Twinflower |
| **7. Diervilla** | |
| *1. Diervilla lonicera* | Bush-honeysuckle |
| **166. CUCURBITACEAE** | **GOURD FAMILY** |
| **4. Echinocystis** | |
| *1. Echinocystis lobata* | Wild Cucumber |
| **167. CAMPANULACEAE** | **BELLFLOWER FAMILY** |
| **2. Campanula** | **Bellflower** |
| *3. Campanula aparinoides C. uliginosa (same as above)* | Marsh Bellflower |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **168. COMPOSITAE (ASTERACEAE)** | **ASTER OR DAISY FAMILY** |
| Group A | |
| **8. Tragopogon** | **Goat's-beard** |
| *2. Tragopogon dubius (T. major included in above)* | |
| **11. Hieracium** | **Hawkweed** |
| *3. Hieracium aurantiacum* | Orange Hawkweed; Devil's-paintbrush |
| *4. Hieracium florentinum (see H. piloselloides)* | King Devil; Yellow Hawkweed |
| *6. Hieracium venosum* | Rattlesnake-weed; Veined Hawkweed |
| **13. Sonchus** | **Sow-thistle** |
| *1. Sonchus arvensis* | Field or Perennial Sow-thistle |
| **16. Lactuca** | |
| *6. Lactuca serriola* | Prickly Lettuce |
| Group B | |
| **17. Megalodonta** | |
| *1. Megalodonta beckii* | Water-marigold |
| **20. Bidens** | **Beggar-ticks** |
| *1. Bidens cernuus* | Nodding Beggar-ticks |
| **26. Chrysanthemum** | **Chrysanthemum** |
| *1. Chrysanthemum leucanthemum* | Ox-eye Daisy |
| **27. Achillea** | **Yarrow** |
| *3. Achillea lanulosa (see A. millefolium)* | Yarrow; Milfoil |
| **28. Tanacetum** | **Tansy** |
| *2. Tanacetum huronense* | Lake Huron Tansy; "golden buttons" |
| **35. Bellis** | |
| *1. Bellis perennis* | English Daisy |
| **50. Rudbeckia** | **Coneflower; Rudbeckia** |
| *5. Rudbeckia hirta* | Black-eyed Susan |
| Group C | |
| **55. Eupatoriu** | |
| *4. Eupatorium perfoliatum* | Boneset |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **56. Senecio** | |
| *9. Senecio pauperculus* | Northern Ragwort |
| **58. Euthamia** | |
| *1. Euthamia graminifolia (see Voss description of Solidago, p.460)* | Flat-topped, Bushy, or Grass-leaved Goldenrod |
| **59. Solidago** | **Goldenrod** |
| * *Solidago graminifolia* | (see Euthamia graminifolia) |
| *10. Solidago canadensis* | Canada Goldenrod |
| *13. Solidago rugosa* | Rough-leaved Goldenrod |
| *19. Solidago hispida* | Hairy Goldenrod |
| *20. Solidago uliginsa* | Bog Goldenrod |
| **65. Erigeron** | **Fleabane** |
| *7. Erigeron strigosus* | Daisy Fleabane |
| **66. Aster** | **Aster** |
| *2. Aster macrophyllus* | Large- or Big-leaved Aster |
| *9. Aster laevis* | Smooth Aster |
| *19. Aster umbellatus* | Flat-topped Aster |
| *21. Aster pilosus* | Frost Aster |
| *28. Aster lanceolatus* | Panicled Aster |
| **67. Arctium** | **Burdock** |
| *2. Arctium minus* | Common Burdock |
| **68. Centaurea** | **Star-thistle; Knapweed** |
| *2. Centaurea maculosa* | Spotted Knapweed |
| *3. Centaurea diffusa* | White-flower or Tumble Knapweed |
| **71. Carduus** | **Plumeless Thistle** |
| *1. Carduus nutans* | Nodding or Musk Thistle |
| **72. Cirsium** | **Thistle** |
| *2. Cirsium vulgare* | Bull Thistle |
| *4. Cirsium muticum* | Swamp Thistle |
| *5. Cirsium arvense* | Canada or Field Thistle |
| **75. Anaphalis** | |
| *1. Anaphalis margaritacea* | Pearly Everlasting |

# Seney NWR Herbarium[1] (Continued)

| Taxonomy | Common Name |
|---|---|
| **76. Gnaphalium** | **Cudweed** |
| *4. Gnaphalium macounii* | Clammy Cudweed |
| **80. Conyz** | |
| *1. Conyza canadensis* | Horseweed |

1. All family-level numbering follows Gray's Manual of Botany; taxonomy and nomenclature according to Voss Michigan Flora, Parts 1-3.

# Appendix D: Compatibility Determinations

In accordance with the Refuge Improvement Act of 1997, no uses for which the Service has authority to regulate may be allowed on a unit of Refuge System unless it is determined to be compatible. A compatible use is a use that, in the sound professional judgment of the refuge manager, will not materially interfere with or detract from the fulfillment of the National Wildlife Refuge System mission or the purposes of the national wildlife refuge. Managers must complete a written compatibility determination for each use, or collection of like-uses, that is signed by the manager and the Regional Chief of Refuges in the respective Service region.

Draft compatibility determinations applicable to uses described in the CCP were included in the Draft CCP and available for a 30-day review period.

The signed compatibility determinations are available for review at Refuge Headquarters. Compatibility determinations were prepared and approved for:

- Hunting
- Fishing
- Wildlife Observation and Photography
- Environmental Education and Interpretation
- Research
- Haying
- Mushroom and Berry Picking

# Appendix E: Priority Refuge Operations and Maintenance Costs

# Appendix E: Priority Refuge Operational and Maintenance Needs

Chapter 5 of the CCP contains a listing and description of the priority operational and maintenance needs of the Seney National Wildlife Refuge.

# Appendix F: Compliance Requirements

# Appendix F: 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 of 1906. 16 U.S.C. 431 et seq.

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, 16 U.S.C. 703 et seq.

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, 16 U.S.C. 715 et seq.

Establishes procedures for acquisition by purchase, rental, or gift of areas approved by the Migratory Bird Conservation Commission.

### Fish and Wildlife Coordination Act 16 U.S.C. 661 et seq. (1934)

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 Stamp Act. Also known as the Duck Stamp Act, 16 U.S.C. 718 et seq. (1934)

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

### Historic Sites, Buildings and Antiquities Act. Also known as the Historic Sites Act of 1935, 16 U.S.C. 461 et seq.

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,16 U.S.C. 715s (1935)

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, 16 U.S.C. 667b-667d (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 of 1950, 44 U.S.C. 31

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 of 1956, 16 U.S.C. 742a et seq.**

Established a comprehensive national fish and wildlife policy and broadened the authority for acquisition and development of refuges.

**Refuge Recreation Act, 16 U.S.C. 460k et seq. (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 of 1964, 16 U.S.C. 1131 et seq.**

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 of 1965, 16 U.S.C. 460 et seq.**

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 of 1966, 16 U.S.C. 668dd, 668ee**

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, 16 U.S.C. 470 et seq. (1966)**

Establishes as policy that the Federal Government is to provide leadership in the preservation of the nation's prehistoric and historic resources. 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 to 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.

**Architectural Barriers Act of 1968, 42 U.S.C. 4151 et seq.**

Requires federally owned, leased, or funded buildings and facilities to be accessible to persons with disabilities.

**National Environmental Policy Act of 1969, 42 U.S.C. 4321 et seq.**

Requires the disclosure of the environmental impacts of any major Federal action significantly affecting the quality of the human environment.

**Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, 42 U.S.C. 4601 et seq.**

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 of 1973, 16 U.S.C. 1531 et seq.**

Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

**Rehabilitation Act of 1973, 29 U.S.C. 701 et seq.**

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 16 U.S.C.469-469c**

Directs the preservation of historic and archaeological data in Federal construction projects.

**Clean Water Act of 1977, 33 U.S.C. 1251**

Requires consultation with the Corps of Engineers (404 permits) for major wetland modifications.

**Surface Mining Control and Reclamation Act of 1977, 30 U.S.C. 1201 et seq.**

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, 42 U.S.C. 1996, 1996a (1976)**

Directs agencies to consult with native traditional religious leaders to determine appropriate policy changes necessary to protect and preserve American Indian religious cultural rights and practices.

**Fish and Wildlife Improvement Act of 1978, 16 U.S.C. 742a**

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 of 1979, 16 U.S.C. 470aa et seq.**

Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

**Farmland Protection Policy Act, Public Law 97-98, 7 U.S.C. 4201 (1981)**

Minimizes the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses.

**Emergency Wetlands Resources Act of 1986, 16 U.S.C. 3901 et seq.**

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 of 1974, 7 U.S.C. 2801 et seq.**

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, 25 U.S.C. 3001 et seq. (1990)**

Requires Federal agencies and museums to inventory, determine ownership of, and repatriate cultural items under their control or possession.

**Americans with Disabilities Act of 1990, 42 U.S.C. 12101 et seq.**

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 of 1997, 16 U.S.C. 668dd

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. 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.

**National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1998, 16 U.S.C. 742a** 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, 16 U.S.C. 1241 et seq. (1968)

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, Pub. L. 106-554, §1(a)(3), Dec. 21, 2000, 114 Stat. 2763, 2763A–125

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 related 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 responsibilities which may result in 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 G: Research History at Seney NWR

| Author(s) Last Name | Author(s) First/ Middle Initials | Year | Title | Publisher | Volume (Issue): Page Number | .pdf on file on Corace computer (2007) | Hardcopy on file in Refuge Library (2007) |
|---|---|---|---|---|---|---|---|
| Walkinshaw | L.H. | 1937 | Le Conte's Sparrow Breeding in Michigan and South Dakota. | Auk | 54(3):309-320 | ✓ | |
| Sypulski | J.L. | 1941 | Stomach Collections and Records. | Unpublished, Seney NWR | | | |
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| Beard (Losey) | E.B. | 1953 | The Importance of Beaver in Waterfowl Management at the Seney National Wildlife Refuge. | Journal of Wildlife Management | 17(4):398-436 | ✓ | |
| Lagler | K.F. | 1956 | The Pike, Esox lucius (Linnaeus), in Relation to Waterfowl on the Seney National Wildlife Refuge, Michigan. | Journal of Wildlife Management | 20(2):114-124 | ✓ | |
| Sherwood | G.A. | 1963 | A Study of Family Group Relationships and Breeding Behavior in a Wild Population of Canada Geese. | Unk. | | | |
| Sherwood | G.A. | 1963 | A Critical Evaluation of Some Possible Limiting Factors of the Seney Goose Flock. | Unk. | | | |
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| Heinselman | M.L. | 1965 | String Bogs and Other Patterned Organic Terrain Near Seney, Upper Michigan. | Ecology | 46(1,2):185-188 | ✓ | |
| Sherwood | G.A. | 1965 | Recent Modifications in Banding Equipment for Canada Geese. | Journal of Wildlife Management | 29(3):640-643 | ✓ | |

| Author(s) Last Name | Author(s) First/ Middle Initials | Year | Title | Publisher | Volume (Issue): Page Number | .pdf on file on Corace computer (2007) | Hardcopy on file in Refuge Library (2007) |
|---|---|---|---|---|---|---|---|
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# Appendix H: Mailing List

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The following is a list of government offices, private organizations, and individuals who received notice of the availability of this CCP.

*Federal Officials*

- U.S. Senator Debbie Stabenow
- U.S. Senator Carl Levin
- U.S. Representative Bart Stupak

*Federal Agencies*

- USDA/Natural Resource Conservation Service
- USDA/ Forest Service, Hiawatha National Forest
- USDI/Fish and Wildlife Service, Albuquerque, New Mexico; Anchorage, Alaska; Atlanta, Georgia; Denver, Colorado; Fort Snelling, Minnesota; Hadley, Massachusetts; Portland, Oregon; Sacramento, California; Washington, D.C.
- USDI/East Lansing Private Lands Office; East Lansing Field Office; Alpena Fishery Resources Office; Ann Arbor Law Enforcement Field Office; Great Lakes Science Center, Biological Resources Division, USGS
- USEPA, Great Lakes National Program Office, Chicago, Illinois

*State Officials*

- Governor Jennifer Granholm
- Senator Michael Prusi
- Representative Steven Lindberg

*State Agencies*

- Director, Michigan Department of Natural Resources
- Area Managers and Biologists, Michigan DNR
- State Historic Preservation Officer, Lansing, Michigan

*City/County/Local Governments*

- City of Germfask, Michigan
- City of Blaney Park, Michigan
- City of Newberry, Michigan
- City of Curtis, Michigan
- City of Seney, Michigan
- Chairman, Schoolcraft County Board of Commissioners

*Libraries*

- Manistique School and Public Library
- Tahquamenon Area Public Library, Newberry
- Peter White Public Library, Marquette

*Organizations*

- The Nature Conservancy
- National Audubon Society
- Conservation Fund
- Michigan United Conservation Clubs
- Wildlife Management Institute
- Ducks Unlimited
- Michigan Duck Hunters Association
- Great Lakes Commission
- Wildlife Management Institute
- PEER Refuge Keeper
- The Wilderness Society, Washington, D.C.
- National Wildlife Federation, Ann Arbor, Michigan
- The Conservation Fund, Arlington, Virgina

*Media*

Local Radio and TV Stations; Refuge Media Contacts

- Detroit News
- Detroit Free Press
- Michigan Radio News

*Federally-recognized Tribes and Historical Societies*

- Michigan State Historic Preservation Officer
- Michigan Office of the State Archeologist
- The Grand Traverse Band of Ottawa and Chippewa Indians
- Michigan Anishinabe Cultural Protection and Repatriation Alliance (Ojibwa)
- The Advisory Council on Historic Preservation

*Individuals*

- Individuals who participated in open houses, sent written comments, or requested to be on the mailing list.

# Appendix I: List of Preparers

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*Refuge Staff:*

- Tracy Casselman, Refuge Manager
- Greg Corace, Forester
- Greg McClellan, Deputy Refuge Manager
- Jennifer McDonough, Seasonal Park Ranger
- Dave Olson, Wildlife Biologist

*Regional Office Staff:*

- Gary Muehlenhardt, Wildlife Biologist/Refuge Planner, Region 3, USFWS
- Gabriel DeAlessio, Biologist-GIS, Region 3, USFWS
- John Dobrovolny, Regional Historian, Region 3, USFWS (Retired)
- Jane Hodgins, Technical Writer/Editor, Region 3, USFWS

*Michigan Department of Natural Resources:*

- Sherry Martine MacKinnon, Acting Threatened and Endangered Species Coordinator/ Wildlife Ecologist, Eastern Upper Peninsula Management Unit

# Appendix J: Bibliography and References Cited

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