



Minesing Wetlands Biological Inventory



February 2007



Prepared for:
Friends of Minesing Wetlands
& Nottawasaga Valley Conservation Authority

MINESING WETLANDS
BIOLOGICAL INVENTORY

Prepared by

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February 2007

Prepared for

**Friends of Minesing Wetlands
&
Nottawasaga Valley Conservation Authority**

FOREWARD

The Minesing Wetlands Biological Inventory and Evaluation was conducted during 2005-2006 field season. Technical investigations were conducted within the Minesing Wetlands by Bowles Environmental Consultants and Nottawasaga Valley Conservation Authority (NVCA) for the NVCA Minesing Wetlands Management Plan and for Friends of Minesing Wetlands (FOMW).

This report received technical review prior to its publication and does not necessarily signify that its contents reflect the views and policies of the Friends of Minesing Wetlands or their partners; nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

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EXECUTIVE SUMMARY

The first biological inventory of Minesing Wetlands (formerly Minesing Swamp) was undertaken in the mid 1970's by Bobbette and Maycock (1975). The area has gone through some significant changes over the past 30 years. Recognizing these changes, an updated biological inventory was deemed necessary by conservation partners to assess current ecological conditions and pressures and aid in the creation of future management strategies, recommendations and projects.

Overview

The Minesing Wetlands has been designated as an internationally significant natural area under the RAMSAR convention and is a Provincially Significant Wetland and Life Science Area of Natural and Scientific Interest. It is generally protected from land-use change through provincial, municipal and Conservation Authority planning policies and regulations.

Minesing Wetlands is vast wetland complex consisting of a mosaic of swamp, marsh and fen communities. It encompasses approximately 6000 hectares (15,000 acres) within Springwater, Clearview and Essa Townships. Over 3,900 ha (9,660 acres) of this area is owned and/or managed by Nottawasaga Valley Conservation Authority (NVCA) while the remainder is owned by the Ministry of Natural Resources (MNR), the County of Simcoe and private landowners. Nature Conservancy of Canada (NCC) is largely responsible for acquiring the lands now owned and managed by the NVCA with both organizations working together as Partners in Preservation.

The wetland complex supports a diverse assemblage of plants and animals. Mixed and coniferous swamp communities and fens along the southern and eastern boundaries provide habitats similar to boreal forests much further north while the silver maple/hackberry and bur oak swamps at the north end share similar characteristics with communities found further south in the eastern United States. A constantly shifting mosaic of meadow marsh, shallow marsh and thicket/treed swamp communities provides an array of habitat opportunities throughout the remainder of the wetland complex.

Minesing Wetlands is an important area for many species of plants and animals. It supports rare vegetation communities and vascular plant species. The area acts as a major staging area for migratory birds and supports a diverse assemblage of breeding marsh, thicket and woodland bird species. Dead standing trees in drowned swamps support large heronries. Mixed and coniferous swamps support a significant deeryard during the winter months. The area also acts as a wildlife corridor for large mammal species such as Black Bear (*Ursus americanus*), Moose (*Alces alces*), White-tailed Deer (*Odocoileus virginianus*) which pass through in search of suitable cover, foraging sites and mates. The Minesing Wetlands is the hub of a provincially significant natural heritage system that extends from the Niagara Escarpment to the Canadian Shield.

Four significant watercourses – the Nottawasaga River, Mad River, Willow Creek and Coates Creek - bisect the wetlands, providing important migratory corridors for Rainbow Trout (*Oncorhynchus mykiss*), Chinook Salmon (*Oncorhynchus tshawytscha*) and Lake Sturgeon (*Acipenser fulvescens*; Special Concern¹), as well as resident habitat for a number of fish species. The watercourses and contiguous wetland and upland vegetation communities provide suitable interconnected habitat for several turtle species as well as a variety of other herpetofauna.

Study Description

The original purpose of this study was to:

- Document the biological features and functions of the Minesing Wetlands;
- Identify potential threats to biological features and functions; and,
- Provide recommendations for future management and monitoring.

Within the context of southern Ontario, the Minesing Wetlands is a vast wetland complex with much of the area inaccessible by road. The areal extent of the wetlands, access difficulties and project budget constraints led the study team to focus on four specific Sites of Interest within the wetland boundaries (Figure 1):

- Snow Valley
- Fen Complex
- McKinnon Bridge
- Carolinian Forest

These sites were chosen based on:

- Previous documentation of rare flora and fauna;
- Suspected/documented development and recreational impacts and pressures; and/or,
- Need to document biological features and functions within newly acquired properties.

A three-phase approach was used to collect, compile and analyze information in support of the Sites of Interest inventory. The first phase involved the development of a comprehensive historical database for the Minesing Wetlands. Field inventories were conducted in the second phase from late May 2005 through August 2006. Most field time was allocated to spring and summer sampling to maximize inventory collections and to document breeding species. The third phase consisted of analysis and reporting and included Ecological Land Classification mapping for the entire Minesing Wetlands.

¹ For Species At Risk and rare species, the Natural Heritage Information Centre's (OMNR) designation of significance is noted to features the significant species in the Minesing Wetlands

Turtle Survey

The discovery of a Wood Turtle (*Glyptemys insculpta*; Endangered-provincial/Special Concern-federal) during the 2005 field season provided the impetus for the second component of the study – the documentation of turtle species within the Minesing Wetlands. Recognizing the potential to update past records of Species At Risk turtles within the Minesing Wetlands, the study team prepared funding applications to undertake additional turtle surveys and develop appropriate management strategies. Additional project funding was obtained from Environment Canada (Habitat Stewardship Program) to carry out this study component in 2006.

Field work was conducted during favourable survey conditions to document a range of turtle species in suitable habitats within, and adjacent to, the Minesing Wetlands. The study area was expanded to include a full range of turtle habitats in these areas.

Results

Diverse vegetation communities are present within the Minesing Wetlands. One vegetation community type – Hackberry Deciduous Swamp – is not documented in the provincial Ecological Land Classification system and is likely very rare or unique in southern Ontario. Two other community types – Buttonbush Thicket Swamp and Bur Oak Deciduous Swamp – are considered provincially rare.

Over 500 vascular plant species were recorded during the biological inventory. The Eastern Prairie White Fringed Orchid (*Platanthera leucophaea*; Endangered) and the Hybrid Orchid (*Platanthera X reznicekii*; status unknown) were observed during the inventory; however, numbers appear to have declined. Several Butternut (*Juglans cinerea*; Endangered) were documented; however, they appear to be in decline due to canker that is affecting populations throughout the province. The provincially rare Marsh Valerian (*Valeriana sitchensis*) and Beaked Spike-rush (*Eleocharis rostellata*) were also found. Although not documented during this study, American Ginseng (*Panax quinquefolius*; Endangered) and Ram's-head Lady's-slipper (*Cypripedium arietinum*; globally and provincially rare) likely persist on adjacent lands.

The following provincially rare butterfly, dragonfly and damselfly species were recorded during the study period:

- Giant Swallowtail (*Papilio cresphontes*; provincially very rare)
- Zebra Clubtail (*Stylurus scudderii*; provincially rare)
- Moustached Clubtail (*Gomphus adelphus*; provincially rare)
- Delta-spotted Spiketail (*Cordulegaster diasatops*; provincially rare)
- Blue-tipped Dancer (*Argia tibialis*; provincially rare)

However, the rare Hackberry Emperor (*Asterocampa celitis*) butterfly, which requires Hackberry as a host for its larval stage, was not found. It had been previously observed in 1997 and 2000.

Five turtle species, including three Species At Risk, were documented in various locations within the Minesing Wetlands. Wood Turtle was identified in 2005. Gravid Blanding's Turtles (*Emydoidea blandingii*; Threatened) were recorded near nesting sites adjacent to the wetland. A basking Map Turtle (*Graptemys geographica*; Special Concern) – a species usually associated with large waterbodies – was observed in June 2006. This is the first documented sighting of this species within the Minesing Wetlands. No Spotted Turtles (*Clemmys guttata*; Endangered) were found during the survey; the last documented sighting was in 2003. Mayer's Marsh provides excellent habitat for Snapping Turtle (*Chelydra serpentina*) and Painted Turtle (*Chrysemys picta*) with large numbers observed - particularly in 2005 - though nest predation is high. A Milksnake (*Lampropeltis triangularis*; Species of Concern) was observed in Fall 2006.

A Black Tern (*Chlidonias niger*; provincially rare) colony and an active Bald Eagle (*Haliaeetus leucocephalus alascanus*; Endangered-provincial (southern Ontario)) nest was observed during the 2006 field season. Two heronries remain active in the Minesing Wetlands, though nest counts have declined in recent years. Though not identified in this study, Least Bittern (*Ixobrychus exilis*; Threatened) and Cerulean Warbler (*Dendroica cerulea*; Special Concern) have been recently documented within the Minesing Wetlands.

Threats

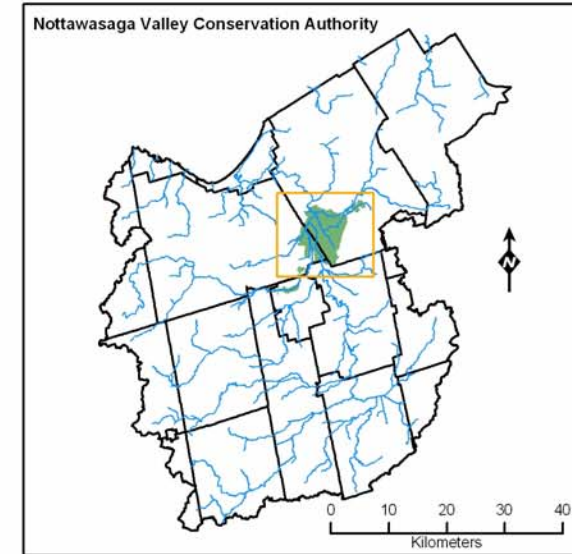
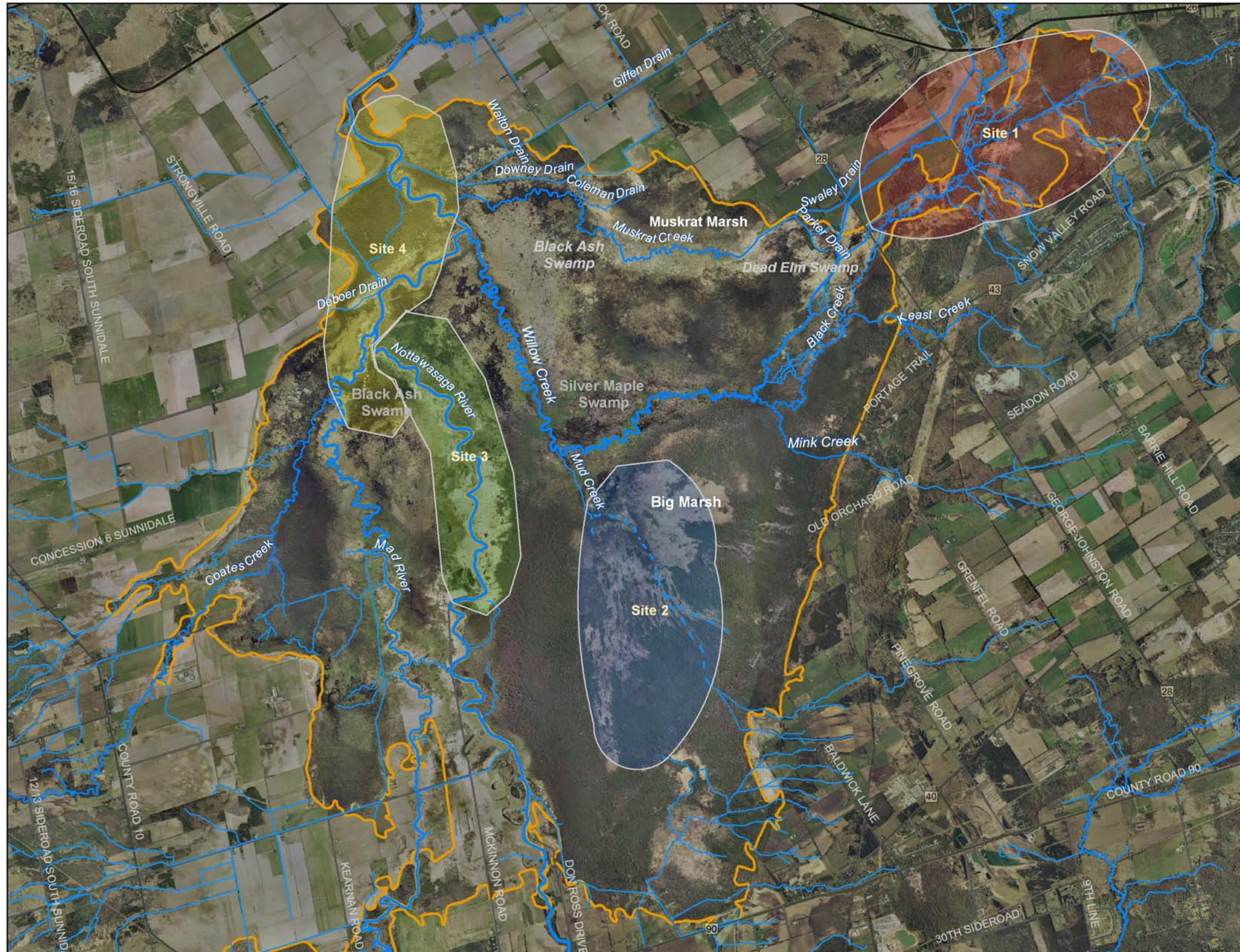
The study confirms that the Minesing Wetlands remains a repository of biodiversity within Southern Ontario. However, the following threats were identified based on inventory findings and ongoing management issues:

- Non-native species
- Illegal access and activities
- Log jams (habitat and access issues)
- Private land management
- Wildlife mortality
- Wildlife imbalances

Recommendations

Monitoring and management recommendations have been developed to aid in our understanding of the Minesing Wetlands ecosystems and to address potential threats to the wetlands. Partnerships are identified as a key priority for successful implementation of these recommendations. Education is an important component of both monitoring and management within the Minesing Wetlands.

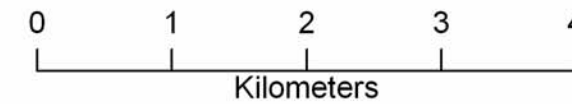
Nottawasaga Valley Conservation Authority - Minesing Wetlands



Legend

 Minesing Wetlands

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August, 2006
Universal Transverse Mercator
Zone 17 North
North American Datum 1983

Figure 1: Minesing Wetlands

1.0 INTRODUCTION

The Ojibway meaning of 'Minesing' is Island, referring to the Minesing Island which is located to the north of the Minesing Wetlands near what is now the Village of Minesing. Minesing Island was an island in Lake Edenvale which covered the present day wetlands and adjacent areas about 4,000 years ago.

Minesing Wetlands (formerly Minesing Swamp) is a provincially significant and internationally recognized wetland complex located approximately 16 kilometers west of Barrie and lying within three townships (Clearview, Springwater and Essa) in Simcoe County (Figure 1.1). This wetland complex covers approximately 6,000 ha (15,000 acres) of land; Nottawasaga Valley Conservation Authority (NVCA) owns over 3,900 ha (9,660 acres) while the remainder is owned by the Ministry of Natural Resources (MNR), the County of Simcoe and private landowners. Nature Conservancy of Canada (NCC) is largely responsible for acquiring the lands now owned and managed by the NVCA with both organizations working together as Partners in Preservation.

The wetland complex consists of a range of habitat types that support a diverse assemblage of plants and animals (Figure 1.2). Mixed and coniferous swamp communities and fens along the southern and eastern boundaries provide habitats similar to boreal forests much further north while the silver maple/hackberry and bur oak swamps at the north end share similar characteristics with communities found further south in the eastern United States. A constantly shifting mosaic of meadow marsh, shallow marsh and thicket/treed swamp communities provides an array of habitat opportunities throughout the remainder of the wetland complex. The area contributes significantly to biodiversity in the Great Lakes ecoregion - the NCC has identified the Minesing Wetlands as a Designated Natural Heritage Area (both Terrestrial and Aquatic Conservation Blueprints) in its *Great Lakes Conservation Blueprint for Aquatic/Terrestrial Biodiversity* reports (Phair et al., 2005; Henson and Brodribb, 2005).

Minesing Wetlands is an important area for many species of plants and animals. It supports rare vegetation communities and vascular plant species. The area acts as a major staging area for many migratory birds and is a wealth of activity in the spring. A diverse assemblage of marsh, thicket and woodland bird species breeds in the wetlands. Dead standing trees in drowned swamps support large heronries. Mixed and coniferous swamps support a significant deer yard during the winter months. The area also acts as a wildlife corridor for large mammal species such as White-tailed Deer (*Odocoileus virginianus*), Black Bear (*Ursus americanus*) and Moose (*Alces alces*) which pass through in search of suitable cover, foraging sites and mates.

The watercourses and contiguous wetland and upland vegetation communities provide suitable interconnected habitat for several turtle species as well as an array of other herpetofauna. Four significant watercourses – the Nottawasaga River, Mad River, Willow Creek and Coates Creek - bisect the wetlands, providing important migratory corridors for Rainbow Trout (*Oncorhynchus mykiss*), Chinook Salmon (*Oncorhynchus tshawytscha*)

and Lake Sturgeon (*Acipenser fulvescens*; Special Concern¹), as well as resident habitat for a number of fish species.

From a human perspective, the Minesing Wetlands provide an important flood control function, acting as a natural reservoir which protects downstream communities, particularly the Town of Wasaga Beach, from significant annual flooding. As flood waters spill out into the wetlands, nutrients and contaminants are filtered, resulting in improved downstream water quality.

Since the early 1970's, public agencies including the Nottawasaga Valley Conservation Authority (NVCA), Nature Conservancy of Canada (NCC) and Ministry of Natural Resources (MNR) have acquired lands within the Minesing Wetlands to safeguard its significant natural features and functions.

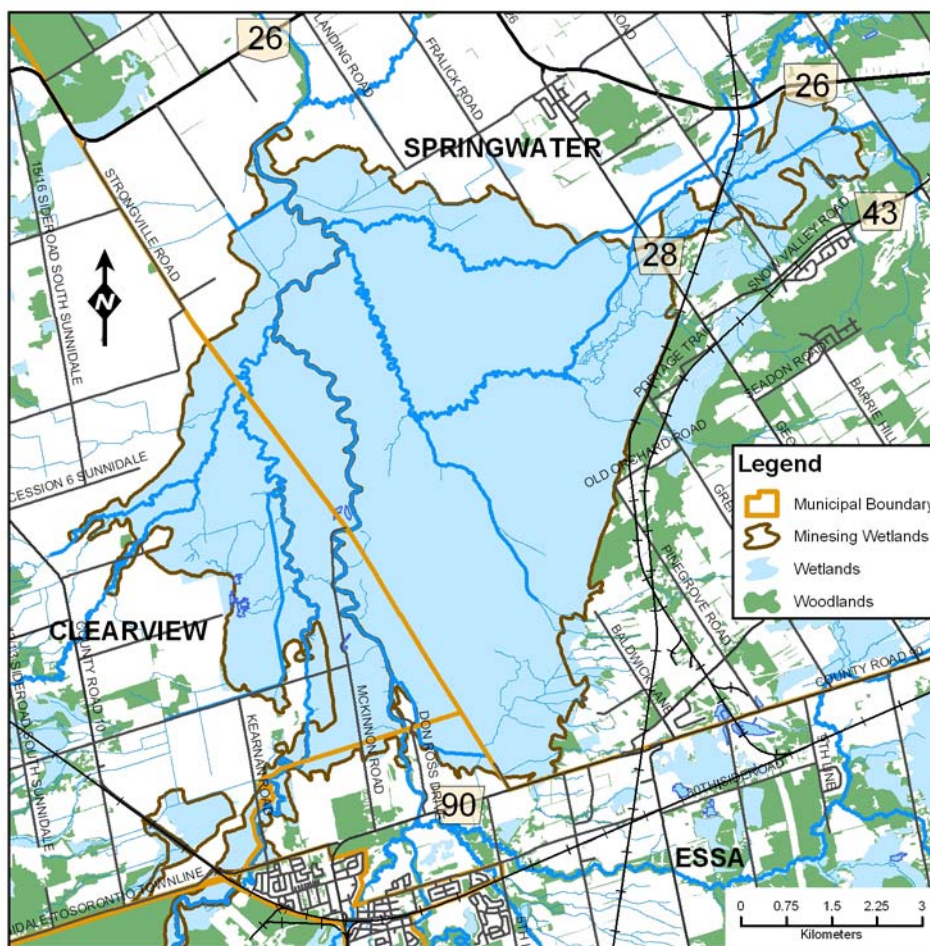


FIGURE 1.1: TOWNSHIPS OF MINESING WETLANDS

¹ For Species At Risk and rare species, the Natural Heritage Information Centre's (OMNR) designation of significance is noted to features the significant species in the Minesing Wetlands

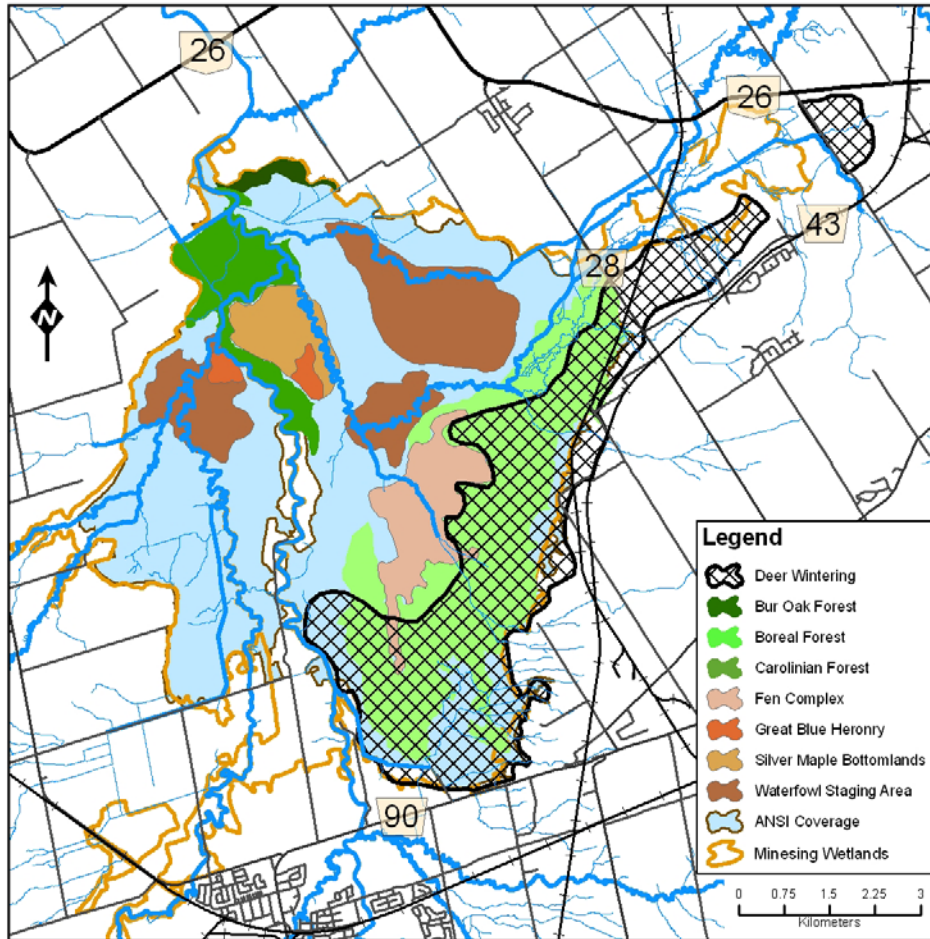


FIGURE 1.2 MINESING WETLANDS SIGNIFICANT AREAS

1.1 Study Purpose and Objectives

The first biological inventory of Minesing Wetlands was undertaken in the mid 1970's (Bobbette, 1975). The area and associated anthropogenic pressures have changed over the past 30 years. Documentation of these changes and effects on significant communities and species was deemed necessary by conservation partners such as the NCC and Friends of Minesing Wetlands (FOMW) to aid in the creation of future management strategies and projects.

The original purpose of this study was to:

- document the biological features and functions of the Minesing Wetlands;
- identify potential threats to biological features and functions; and,
- provide recommendations for future management and monitoring.

The discovery of a Wood Turtle (*Glyptemys insculpta*) during the 2005 field season provided the impetus for the second component of the study - the documentation of turtle species within the Minesing Wetlands. Funding applications were prepared by the study team and approved by Environment Canada (Habitat Stewardship Program). The turtle

survey project was undertaken during the 2006 field season using the study protocols approved within the funding applications.

1.2 Study Area

Within the context of southern Ontario, the Minesing Wetlands is a vast wetland complex covering approximately 6,000 ha (15,000 acres) of land with much of this area inaccessible by road. The areal extent of the wetlands, access difficulties and project budget constraints led the study team to focus on specific Sites of Interest within the wetland boundaries. These areas were chosen based on:

- previous documentation of rare flora and fauna;
- suspected/documentated development and recreational impacts and pressures; and/or,
- need to document biological features and functions within newly acquired properties.

Figure 1.3 displays the Sites of Interest (not to scale; for display purposes only) chosen by the study team. The rationale for each Site of Interest is described in Table 1.1.

The scope of the study area was expanded in 2006 to encompass potential rare turtle habitat within the Minesing Wetlands. Areas searched included:

- Nottawasaga River
- Fen Complex
- Fort Willow Trail
- Simcoe Rail Trail
- Mayer's Marsh
- Various roads (George Johnston Road, Portage Trail Road, Grenfel Road and Pine Grove Road)

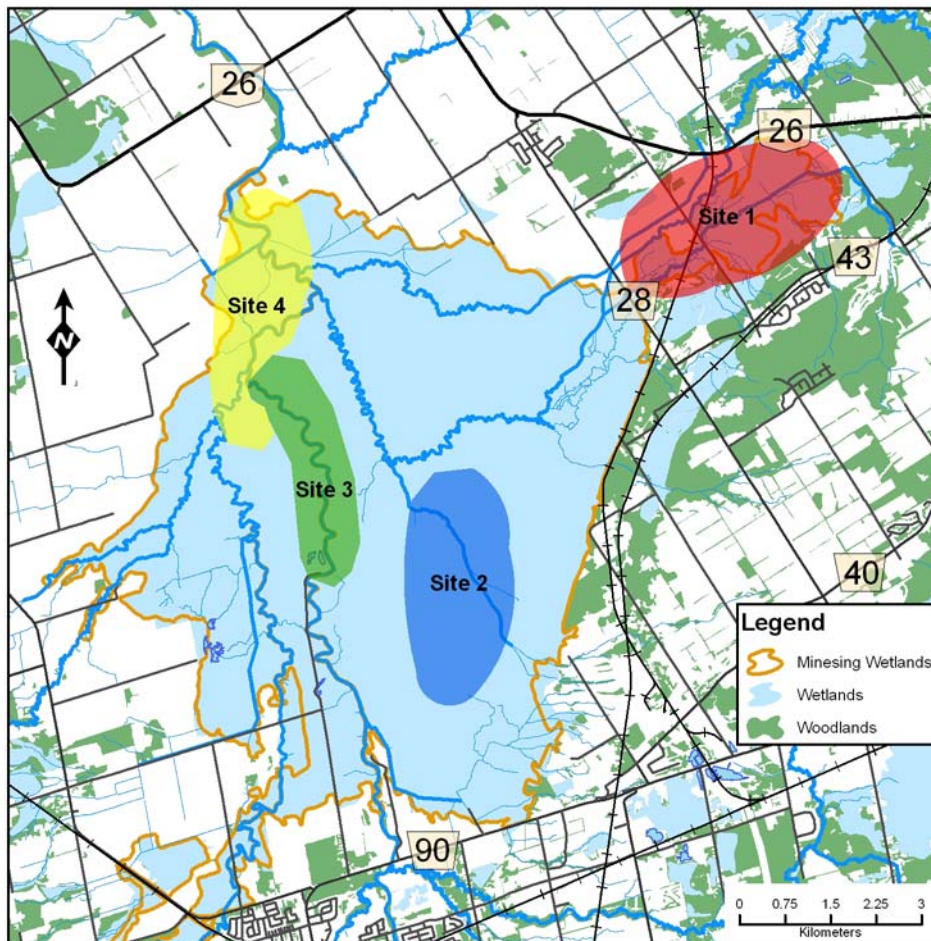


FIGURE 1.3 SITES OF INTEREST

Table 1.1 Sites of Interest Description

Sites	Location	Study Justification
1	Snow Valley Area	Development Pressure*
2	Fen Complex Area	Recreational Impacts, Rare Flora and Fauna
3	McKinnon Bridge Area	Recreational Impacts, Rare Flora and Fauna
4	Carolinian Forest Area	Potential for Rare Flora and Fauna

* though proposed development lies at least 120m from the existing MNR wetland boundary, inclusion of this area reflects a need to refine wetland boundaries in this area and to acknowledge that critical life history functions for some species may extend beyond the conventional 120m study area for lands adjacent to provincially significant wetlands.

1.3 Study Team

The project was spearheaded by the Friends of Minesing Wetlands. A Steering Committee was formed to provide study direction and advice throughout the course of the project. This committee included representatives from:

- Ontario Ministry of Natural Resources (Graham Findlay);
- Nottawasaga Valley Conservation Authority (Byron Wesson and David Featherstone);
- Brereton Field Naturalists (Brian Gibbon); and,
- Friends of Minesing Wetlands (Harold Parker).

Field work was undertaken by Robert L. Bowles (Bowles Environmental Consulting) with the assistance of Jolene Laverty (NVCA) and volunteers.

2.0 MINESING WETLANDS OVERVIEW

2.1 Physiographic Setting

The Minesing Wetlands began their formation after the retreat of the Wisconsin glaciers approximately 12,000 years ago. Glacial Lake Algonquin inundated much of the north and central portions of the Nottawasaga River watershed, including the area presently covered by the Minesing Wetlands, for a period of 1,400 years (Thornbush, 2001) before draining north through an outlet in the North Bay-Algonquin Park-Mattawa region (Lewis, et al., 2006). The Minesing Wetlands emerged from this inundation approximately 8,000 years ago (Thornbush, 2001). As lands to the north rebounded following the recession of the weighty glaciers, drainage was once again re-established to the south.

The inundated area associated with Lake Algonquin is known as the Simcoe Lowlands (Chapman and Putnam, 1996). Soils in this area are strongly influenced by the glaciolacustrine deposits left behind following the retreat of the glaciers. The Minesing Wetlands lies within the Minesing Flats - a low basin within this larger unit (Chapman and Putnam, 1996).

Approximately 4,000 years ago, most of the Minesing basin was re-submerged within Lake Edenvale as water levels in Lake Huron/Georgian Bay rose during the Nipissing introgression (Thornbush, 2001). A gradual lowering of lake levels to their present-day elevation was achieved approximately 2,500 years ago. Soils within the Minesing Wetlands are a product of this post-glacial lacustrine history. Much of the wetland is filled with deep organic deposits (peat), with areas along the western perimeter consisting of a poorly drained, marly silt/clay loam.

Present-day water levels within the Minesing Wetlands are controlled by flows entering the wetlands from the major watercourses and the Edenvale moraine at the downstream terminus of the wetlands. The Edenvale Moraine, deposited during glaciation in the vicinity of Highway 26, is a high ridge feature that separates the Minesing Wetlands from downstream lowland areas. The Nottawasaga River has cut a sharp valley nearly 30 m deep to drain through this feature (Chapman and Putnam, 1996). This natural flow constriction forces river flows to back up into the Minesing Wetlands during the spring runoff and other major storm events. This provides significant flood control for downstream communities, including the Town of Wasaga Beach, and strongly influences the formation and dynamics of vegetation communities within the Minesing Wetlands.

2.2 Cultural History

2.2.1 Native Settlements

It is believed that three native hunting and fishing settlements were located along the eastern periphery of the Minesing Wetlands. Evidence of these settlements has been found along the Lake Payette shoreline (a recessional shoreline feature located below the

Lake Algonquin shoreline). Remnants of native pottery, arrowheads and scrapers dating back to the Archaic Period (approximately 2000 B.C.) have been discovered in this area.

Two settlements located at the northern end on the Nottawasaga River are more complex and appear to be part of a multi-component fishing area where artifacts such as pottery, pipes, a stone gouge, stone axes and flint fragments were found. These artifacts date back to between 2000 B.C. and 1600 B.C. (Minesing Wetlands Information Booklet, 1996).

During this era, native villages generally moved every 10 to 15 years after resources were exhausted. Trails were developed for easy travel between communities. The Natives knew their homeland well and became guides for the influx of European settlers. The trails that were developed by the Natives were used widely by the Europeans; one in particular, the Nine Mile Portage, was used during the War of 1812. Many of the trails created by the Natives are now established as trails and roads that are still used today (Vespra Township Council, 1987).

2.2.2 European Contact to Settlement

During the Late Woodland period, prior to European contact, the Hurons to the northeast and the Petuns of the Niagara Escarpment to the west appeared to share the resources of the lower Nottawasaga River (fish, waterfowl, fur-bearers) to supplement their diet and facilitate trade (Morrison, undated). The Nottawasaga River was an important part of the Nine-Mile Portage used by aboriginal peoples (and fur traders and settlers) to travel between Nottawasaga Bay and Lake Simcoe.

Following European contact, up to 90% of the aboriginal population was lost through disease, displacement and intertribal warfare (Larson *et al.*, 1999). Two-thirds of the Huron nation died in the plagues of the mid-1630s (Drury, 1972) and the remainder were destroyed and scattered by the Iroquois in the late-1640s. Over the next 200 years, human presence was marked by sparse populations of Ojibways who used the area for hunting and fishing. Temporary campsites were established in sunny glades near the mouth of the Nottawasaga River (Morrison, undated).

Prior to settlement and land clearing, the fur trade boomed in Simcoe County with marten, otter, beaver and muskrat commonly trapped and traded. There is anecdotal evidence of a trading post being established near the mouth of Nottawasaga River prior to 1800 (Drury, 1972).

The Nine Mile Portage came into prominence during the War of 1812. It was utilized as part of an overland supply route that extended from Lake Ontario to Kempenfelt Bay to Willow Landing to Georgian Bay (Fort Michilimackinac). Prior to the war, this route was also used as a pathway connecting the Indian Alliance and fur trade operators in the Northwest. Fort Willow (also known as the Willow Creek Depot) was established as a docking area along the portage route and, at its height, consisted of eight buildings and a palisade. In 1820, it was reported that five of the eight buildings in Fort Willow had burned to the ground and, by 1835, it was reported that all buildings had been burnt. With restoration of the site in mind, Fort Willow was purchased by the Barrie Chamber of

Commerce in the 1950s and eventually by the NVCA in 1973. A group of volunteers formed the Fort Willow Improvement Group in 1995 and, in a joint effort with the NVCA, Fort Willow continues to be restored as a local historic site and utilized for educational purposes (Fort Willow Management Plan, 2003).

In 1833, the first European settlers in the area established the village of Minesing. With the influx of pioneers came the clearing and working of the land and building of homesteads. Minesing Wetlands became a thriving area for harvesting the needed lumber. Logging practices began in the 1850's and thrived in the 1860's with the establishment of Cook Brothers Ltd (now Georgian Bay Lumber Co.) and the building of the railway. Early settlers considered Minesing Wetlands to be a "Hunter's Paradise" (Vespra Township Council, 1987).

In 1878, the North Simcoe Railway was expanding towards the village of Minesing which led to the construction of Minesing Station. The railway line was constructed by man and horsepower. The labour intensive process involved horse drawn equipment, two men to lay railway ties and four men to lay the rails. The railway station was located on what is now Highway 26 and was commonly used to transport lumber, livestock, merchandise and mail. On June 27, 1978, the last train went through Minesing Station (Vespra Township Council, 1987).

The Minesing Basket Factory began in the 1900's and became the village of Minesing's biggest industry for over 50 years. Teams of at least 6 horses were used to remove the logs. Workers would head into the logging areas before sunrise and would leave after dark. Carloads of baskets were also shipped all over Canada from the Minesing Basket Company through Minesing Station. Logs were taken from Minesing Wetlands as a source material for the baskets (Vespra Township Council, 1987). Discussions with local residents indicate that 30,000 board feet of logs were removed from the wetlands each year at the peak of operations to keep up with the demand for baskets. The introduction of cardboard boxes resulted in the demise of the Minesing Basket Company (Parker and Gibbon, pers. comm., 2006).

An agricultural settlement area was established in the vicinity of McKinnon Bridge. The remnants of six farms and one mill site are located along the Nottawasaga River in this area. Subject to significant annual flooding, these farm sites supported marginal farming opportunities and were eventually abandoned.

2.2.3 Present Day

Since the early 1970's, public agencies including the Nottawasaga Valley Conservation Authority (NVCA), Nature Conservancy of Canada (NCC) and Ministry of Natural Resources (MNR) have acquired properties within the Minesing Wetlands to safeguard its significant natural features and functions (Figure 2.1).

Over 3,900 ha (9,600 acres) are owned and managed by NVCA and additional lands continue to be acquired with the assistance and support of NCC. These lands are managed by the NVCA in partnership with Friends of Minesing Wetlands (FOMW).

Access to these lands is limited to specific entry points and restricted to users who have purchased annual memberships or day passes.

Seven access areas are located around the wetlands for canoe trips, hiking trails, hunting and other outdoor activities. Several of these areas have access barriers intended to restrict motorized vehicle access. Special hunting permits are issued during the spring and fall for management purposes (NVCA lands only). Public lands within the Minesing Wetlands are closely tied to the Fort Willow Conservation Area, located east of the wetlands on Grenfel Road, and Edenvale Conservation Area which is located north of the wetlands on Highway 26 along the Nottawasaga River.

The public do not require a pass to access other public lands within the Minesing Wetlands, provided they are not crossing onto NVCA properties.

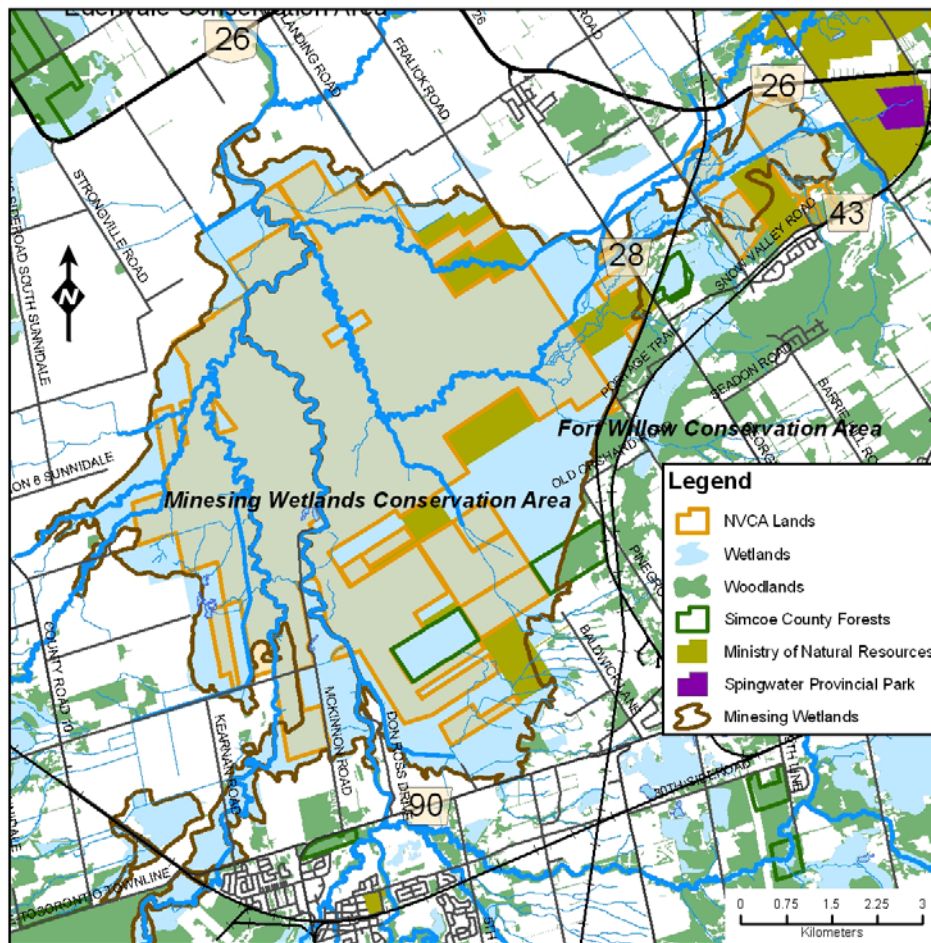


FIGURE 2.1 MINESING WETLANDS – LAND OWNERSHIP



Dave Featherstone

FIGURE 2.2 HERONRY HIKE



FIGURE 2.3 ADOPT-A-BIRD BOX

The Friends of Minesing Wetlands - a non-profit organization – plays an important role in wetland management and in educating the public about the significant features and functions of the wetlands. FOMW raises funds for management purposes and for various education-related projects such as interpretive trails, information kiosks and viewing platforms. Public awareness and education are essential to the survival of Minesing Wetlands and each year FOMW hosts educational events such as Snowshoe Hikes through the Heronry (Figure 2.2), Adopt-A-Bird Box (Figure 2.3), Cross-country Ski trips and Canoe Outings (MSMP, 2003) to inform the public about the wetlands.

The Minesing Wetlands is protected from development and site alteration by provincial and municipal natural heritage designations and policies. Land use adjacent to the wetlands continues to be dominated by rural uses to the north and west; however, urban encroachment threatens adjacent areas to the south and east. Active recreational uses (such as four-wheel drive and ATV vehicle access) and indiscriminate forestry practices threaten portions of the wetlands.

2.3 Planning Designations

The Minesing Wetlands is recognized internationally, provincially and at the municipal level as a significant natural heritage feature. This section describes the significant natural heritage designations associated with the wetlands.

2.3.1 RAMSAR

RAMSAR is a worldwide convention on wetlands formed in 1971 in Ramsar, Iran, which designates areas of international importance based on their meeting a set of specific criteria. In 1996, Minesing Wetlands was designated by RAMSAR as a wetland complex of international importance (Frazer, 1999). It shares this designation with a number of internationally reknown areas such as the Florida Everglades and the Baltic Marshes. The RAMSAR classification system recognizes three types of significant areas within the Minesing Wetlands (RAMSAR, 1996):

TYPE M-	Riverine Wetlands
TYPE P-	Perennial, emergent floodplain wetland
TYPE U-	Peatland bog and fen

2.3.2 Areas of Natural and Scientific Interest (ANSI)

The Minesing Wetlands is classified as a provincially significant Life Science ANSI. ANSIs are designated by the OMNR and are defined as an “area of land and water containing natural landscapes or features that have been identified as having life science values related to protection, natural heritage appreciation, scientific study or education (Environment Canada, 2006).” The MNR has identified a number of Life Science and Earth Science ANSIs as part of a program “to identify areas which best illustrate unique and representative biological and physical features within Ontario” (Riley *et al.*, 1997).

Section 2.1 of the Provincial Policy Statement states that development and site alteration shall not be permitted in provincially significant ANSIs and adjacent areas (within 50 m) unless it has been “demonstrated that there will be no negative impacts on the natural features or the ecological functions” of the ANSI (MMAH, 2005).

2.3.3 Provincially Significant Wetland Designation

Evaluation of wetlands in southern Ontario began in 1984 in an attempt to recognize and protect provincially significant wetlands on the landscape. Scoring is based on a wetland’s biological, hydrological, social and special features attributes. Wetlands which are connected by local surface flows or proximity are grouped together and evaluated as a wetland complex.

The Minesing Wetlands has been designated as a “Provincially Significant Wetland” (Parker and Dawson, 1984). Provincially significant wetlands in southern Ontario (south of the Canadian Shield) are protected from development by Section 2.1 of the Provincial Policy Statement which states “development and site alteration shall not be permitted within provincially significant wetlands” and shall not be permitted on adjacent lands (within 120 m) unless it has been demonstrated that there will be no negative impacts on the wetland or its ecological functions (MMAH, 2005).

2.3.4 Simcoe County Greenland

The County of Simcoe Greenland system is based on a background report entitled “Development of a Natural Heritage System for the County of Simcoe” (Gartner Lee, 1996). Section 3.7 of the County of Simcoe Official Plan (2000) states that “the purpose of the Greenland designation is to ensure that the scale, form and location of development is such that the features and functions of the natural heritage system are sustained for future generations.”

The Minesing Wetlands Greenland designation (ECP1) includes the entire Minesing Wetlands study area and extends northeast up the Willow and Matheson Creek valleys through Midhurst. The Minesing Wetlands Greenland unit is noted for its important

flood storage function and provincially significant wetland and ANSI status. The wetland “acts as a hub for an extensive network of greenspace corridors which extend to the north, northeast, south and southwest (Gartner Lee, 1996).”

Greenland areas are subject to several policies within the County Official Plan which seek to protect these areas from incompatible development. The County Official Plan encourages local initiatives to augment the County Greenland system stating that “locally significant features and functions which support the County Greenland system are to be identified and protected in local municipal official plans...”.

2.3.5 Local Official Plans

The Townships of Clearview, Springwater and Essa all have progressive environmental planning schedules and policies within their respective Official Plans which conform with and build upon provincial and County planning policies. Combined, the Township Official Plans protect the Minesing Wetlands and require studies for any development within 120 m of the wetland boundary.

2.4 Natural Heritage Overview

2.4.1 Significant Features

Minesing Wetlands consists of three wetland types - swamp, marsh and fen – with complex areas of transition between these broad habitat types. Adjacent lands consist of a mix of successional fields, agricultural/rural lands and upland forest. A myriad of corridors connects the wetlands to nearby natural heritage features. The mosaic of habitats within, and adjacent to, the Minesing Wetlands supports a wide range of wildlife. Significant features within the Minesing Wetlands include:

- Waterfowl Staging Areas - During the spring migration when the area floods, thousands of waterfowl and other wetland bird species use the marshes and flooded swamps as stopover habitat where they feed voraciously on invertebrates and emerging vegetation prior to resuming their journey to distant breeding areas. To a lesser extent, waterfowl also use the wetland as a staging area during their southern fall migration. Minesing Wetlands is considered a Regionally Significant Waterfowl Staging Area (Parker and Dawson, 1984)
- Deer Yard –The dense conifer and mixed swamps within the south and east portions of the Minesing Wetlands provide suitable winter cover habitat adjacent to food sources (browse) during periods of extreme cold and deep snow (G. Findlay, pers.comm., 2007)
- Great Blue Heronries - Located in two locations where dead tree stands are present (More information is available in the Fauna section).
- Fen Complex – Minesing Wetlands hosts the largest fen complex in southern Ontario.
- Silver Maple Bottomlands – The area encompasses the Great Blue Heronry and was once one of the largest pure stands of Silver Maple in Southern Ontario.

- Bur Oak Forest - A small area in the northern portions of the Wetlands, it forms an unusual habitat type since Bur Oak is typically an upland species.
- Carolinian Forest – This area supports one of the most northern stands of southern tree species such as Hackberry.
- Boreal Forest – More typical of swamp forests in central and northern Ontario, this habitat type is dominated by conifers, peat fen, and a rich assemblage of forbs, sedges and grasses.

2.4.2 Hydrology and Hydrogeology

Two distinct hydrologic systems influence the Minesing Wetlands (Hanna, 1982). Cyclic surface water flows feed the deciduous swamps and fertile marshes along the major river systems while groundwater discharge influences the boreal forest and fen communities in the southeastern portion of the Wetlands.

The Minesing Wetlands drains an area of approximately 2600 km². The Nottawasaga River bisects the wetlands from north to south. The Mad River parallels the Nottawasaga River to the west, entering the Nottawasaga River 5 km south of Edenvale. Willow Creek and its tributaries enter the wetlands from the northeast and flow through an extensive marsh before entering the Nottawasaga River 3.6 km south of Edenvale. Coates Creek, a major tributary of the Mad River, enters the wetlands east of New Lowell and discharges to the Mad River approximately 1 km upstream from its confluence with the Nottawasaga River. The Edenvale Moraine, at the north end of the Minesing Wetlands, acts as a natural flow constriction forcing river flows to back up into the Minesing Wetlands during the spring runoff and other major storm events. This backwater effect strongly influences the formation and dynamics of vegetation communities within the Minesing Wetlands.

Significant drainage alterations have occurred along the periphery of the Minesing Wetlands since the early 1900's to facilitate agriculture on adjacent lands (Hanna, 1982). These alterations had significant impacts on wetland hydrology and vegetation communities. Huge tracts of floodplain forest along Willow Creek were flooded and drowned. Smaller areas of floodplain forest along the Mad River and Coates Creek have been similarly affected (Hanna, 1982). Over time, the extensive floodplain swamps have retreated and marsh communities have become dominant.

Groundwater discharge areas are associated with stream and river corridors, particularly where these features cut into the landscape and intersect shallow, local aquifers. Discharge areas are also associated with large expanses of wetlands such as the Minesing Wetlands. The South Simcoe Groundwater Study (Dixon et al., 2004) indicates that the entire Minesing Wetlands is a large discharge zone with strongest discharge located along the east boundary of the wetlands and the vicinity of Snow Valley where the Algonquin Bluffs contact the wetland boundary.

Numerous springs and seepages (and coldwater fish habitat) at the bluff/wetland interface attest to significant groundwater discharge in this area. The boreal swamp and calcareous

fen vegetation communities in the southeast portion are strongly associated with this constant discharge (and lack of surface water flooding). These discharge areas are fed by recharge areas located on the Simcoe Uplands and upper portions of the Algonquin Bluffs.

2.4.3 Corridors and Linkages

Ecosystems cannot be considered in isolation because life moves and changes across landscapes. The connections between habitat patches and the distances between patches are important. Biodiversity can only be maintained if effective dispersal between patches is occurring (Larson *et al.*, 1999). In southern Ontario, the density of forest fragments on the landscape and the overall proportion of habitat may be more critical to long-term stability of populations than the size of individual habitat blocks (Riley and Mohr, 1994). Effective dispersal between patches occurs through natural corridors and linkages.

Corridors are generally elongated, naturally-vegetated areas that link or border natural areas within and between watersheds (Riley and Mohr, 1994). They allow the movement and reproductive interchange between populations of plant and animal species and can buffer natural areas and processes from adjacent land-use activities (Riley and Mohr, 1994).

Properly designed corridors and linkages may counter the effects of habitat fragmentation since the viability of habitat islands (i.e. woodlots) as suitable wildlife habitat often depends on outside recruitment of animals (Noss, 1987a,b). In southern Ontario, the re-establishment of corridors over time may lead to the re-colonization and range expansion of species which were extirpated or suffered significant range contractions since European settlement (i.e. river otter and fisher). Corridors with a minimum width of 200 m are of highest value and facilitate the safe movement of most wildlife species (Gartner Lee, 1996; MNR, 2000)

Corridors in the vicinity of the Minesing Wetlands exist at different scales (Figure 2.4). Local and regional corridors link the Minesing Wetlands to significant natural heritage features associated with:

- Jack's Lake/Marl Lake wetland complex and Wasaga Beach Provincial Park to the northwest;
- The Upper Marl Creek and Orr Lake greenlands to the north;
- Matheson Creek and the Oro Moraine/Copeland Forest to the northeast;
- Willow Creek and Little Lake to the east;
- Base Borden and the Pine and Mad River valleys to the southwest;
- the Nottawasaga River valley to the south; and,
- the Algonquin Bluffs and lowland complex to the southwest

From a watershed perspective, the Minesing Wetlands is the hub of a natural heritage system that radiates outward along major river valley and other landform features throughout the Nottawasaga Valley watershed. These features, in turn, are linked to

significant natural features in adjacent watersheds to the north (Severn Sound) and west (Beaver, Saugeen and Grand River) that form a provincial-scale corridor which extends northeast from the Niagara Escarpment (headwaters of the Pine River) to the Canadian Shield (at Matchedash Bay).

Wildlife Corridor Linkages



- Lakes & Ponds
- NVCA Jurisdiction
- Municipalities
- Minessing Wetlands
- Woodlands and Wetlands
- Watercourses

This map has been produced for illustrative purposes only. While every effort has been made to accurately depict the information, data/mapping errors may exist.

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August, 2006
 Universal Transverse Mercator
 Zone 17 North
 North American Datum 1983

FIGURE 2.4 NATURAL HERITAGE CORRIDORS

These corridors are loosely based on established natural heritage systems such as the Simcoe County Greenlands and the Ministry of Natural Resources Big Picture 2002 initiative. These conceptual corridors are not intended to show *exact* corridor locations or the location of *all* corridors associated with Minessing Wetlands.

3.0 STUDY METHODOLOGY

This section describes the methodologies and protocols used to conduct the biological inventories in the Sites of Interest as well as the protocols used in support of the Turtle Survey.

3.1 Minesing Wetlands Inventory (Sites of Interest)

A three-phase approach was used to collect, compile and analyze information in support of the Sites of Interest inventory:

Phase I – Background Data Collection - consisted of 5 days effort and involved gathering all publications with any information regarding Minesing Wetlands (formerly known as Minesing Swamp) from sources such as NVCA, OMNR and Field Naturalist groups (Brereton). Historical texts, technical reports, scientific sighting reports, newspaper articles and newsletters were collected. Information about the area was also received through correspondence and conversations with local residents. Key studies and sources include:

- Bobbette, R.S.W. (1975). *Minesing Swamp Surveys*.
- Bowles, R.L. (1992). *Vascular Plants of Minesing Swamp* (and other titles)
- Brereton Field Naturalist's Club. *The Blue Heron* (monthly newsletters)
- Hanna, R. (1982). *A Detailed Life Science Inventory Check-sheet for Minesing Swamp*.
- Moriyama, R. (1976). *Final Draft Master Plan for Minesing Swamp*.
- Litzgus, Dr. J. 2006. Assistant Professor. Department of Biology. Laurentian University

Following review of background data, the Steering Committee discussed study logistics pertaining to the areal extent of the wetlands, access difficulties and project budget constraints. As an outcome, the study team decided to focus on four specific Sites of Interest within the wetland boundaries (Section 1.2; Figure 1.3):

Site 1: Snow Valley Area

Site 2: Fen Complex Area

Site 3: McKinnon Bridge Area

Site 4: Carolinian Forest Area

Sites of Interest are described in broad detail in Section 3.1.1.

Phase II – Field Work – This was the most exciting but the most challenging part of the study. Twenty-five field days were initially allocated; though field work was undertaken throughout the year, most time was allotted for spring and summer sampling to maximize inventories and to document breeding species in the Minesing Wetlands.

Field work began in late May 2005 and continued through August 2006. Initially, the project was to have been completed in Spring 2006 but was extended for an additional 18 days through Summer 2006 to accommodate the Turtle Research and Inventory component of the study.

Data collection was the most important and labour intensive part of the project and involved a number of volunteers to make the tasks easier. Days started in early morning with a focus area in mind. Each area was hiked and/or canoed based on the terrain and target species of interest. Most field days extended into early evening and, with the field work dependent on the weather and seasonal characteristics of vascular plants and wildlife, some field work was undertaken on weekends to maximize data capture.

Sites were surveyed extensively for all flora and fauna over the study period. Some areas were visited at specific times of the year to target particular species when they were more active/visible. Species checklists were completed each day; species requiring additional confirmation were noted and documented through photos or collected samples for later identification/verification.

The number of field days spent at each location is presented in the table below. The site labeled “Other” represents all other areas covered including newly acquired lands, new species accounts and areas where a land owner acted as an interpretive guide.

Table 3. 1 Number of Field Days at Site Locations

Biological Inventory (25 days)						
Date	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
April, 2005				1		1
May, 2005	1			1		
June, 2005	1	1	1	1		
July, 2005		1		1		1
Aug, 2005				1		1
Sept, 2005					1	
Oct, 2005						1
Dec, 2005						1
April, 2006			1	1		1
May, 2006			1	1		
June, 2006				1		
July, 2006				1		1
Aug, 2006					1	
totals	2	2	3	9	2	7
Turtle Monitoring (18 days)						
April, 2006				1		1
May, 2006			1			
June, 2006	2	1	2	2		3
July, 2006	2			1		1
Aug, 2006				1		
totals	4	1	3	5	0	5

Phase III – Analysis and Reporting - Ten days were allocated for the compilation of findings, report writing and publication of this document. The report writing for this document began as soon as the project was initiated and was an ongoing process throughout the project. Days that could not be utilized in the field became working days for research, updating field lists, report writing and map creation. Overall, significantly more than 10 days were utilized for this phase of the project.

As part of Phase III, Ecological Land Classification (ELC) approximation mapping was developed for the entire wetland through vascular plant data analysis and orthophotograph (2002 data) interpretation. Site logistics and time constraints did not allow for forestry prism sweeps or soil sampling; however, dominant canopy, understory and ground cover species were recorded in each inventoried vegetation unit and spatially oriented using a GPS unit to provide an approximation of ELC Vegetation Community types. Interpreted ELC Vegetation Community Type polygons were then mapped as a .shp file within the ArcGIS software package.

3.1.1 Sites of Interest

Site 1 – Snow Valley Area

Snow Valley is a northeast spur of the Minesing Wetlands that extends upstream along Willow Creek toward Midhurst (Figure 3.1) connecting to significant corridors that extend northeast to the Canadian Shield. This area supports a mosaic of marsh, thicket swamp and mixed swamp habitats. The wetlands are bordered by upland slope and lowland terrace forests along the ancient bluffs associated with Lake Algonquin.

This area is subject to urban development pressure which is expected to increase as the City of Barrie, Snow Valley and Midhurst settlement areas continue to expand. A section of the Simcoe Rail Trail system and a Hydro One right-of-way bisect the wetlands. The trail system passes through Mayer's Marsh and is popular with local walkers/runners, nature enthusiasts and cyclists. A Marsh Viewing Platform is located along the trail. Snapping Turtle and Painted Turtle are commonly observed nesting along the trail. Wildlife and vegetation in this area are impacted by unauthorized motorized vehicles on trails, loss of habitat due to urban development and an influx of species related to urban development, such as raccoons, skunks, dogs and cats, which predate on other animals and/or their young (turtle eggs).

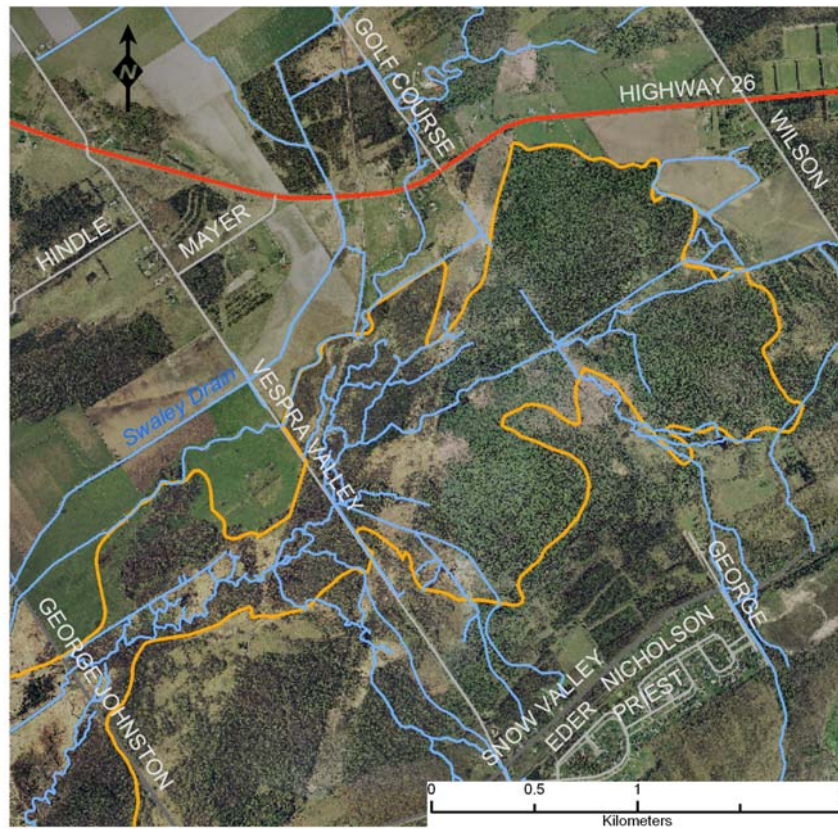


FIGURE 3.1 SNOW VALLEY AREA

Site 2 – Fen Complex

The Fen Complex (Figure 3.2) is located in the interior of the Minesing Wetlands. Fens are relatively rare in southern Ontario and are defined as wetlands “with a peat substrate and nutrient-rich waters, and primarily vegetated by shrubs and graminoids” (ELC, 1998).

The Fen Complex is one of the most unique areas in the Wetlands and is relatively inaccessible due to private landownership and difficult terrain. The complex is supported by shallow groundwater originating from the Algonquin Bluff complex. Seasonal surface runoff entering from Mud Creek is a minor contributor to fen hydrology.

Vegetation communities consist of a mosaic of alternating sweet gale shrub fens and string-like strips of tamarack fen. These communities support a variety of rare flora and fauna.

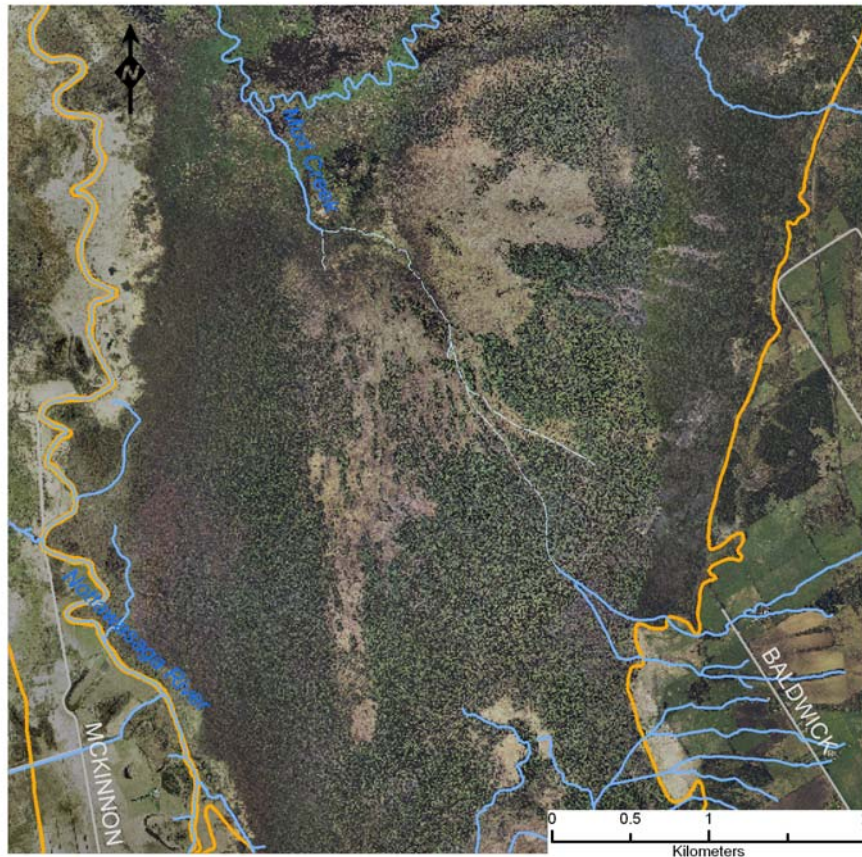


FIGURE 3.2 FEN COMPLEX

Site 3 – McKinnon Bridge Area

Associated with an historical agricultural settlement area, the McKinnon Bridge area (Figure 3.3) lies between the Mad and Nottawasaga Rivers. The existing steel bridge which is the namesake for this area was built in 1927 and is often used as a landmark while traveling in the Wetlands. The McKinnon Bridge area has remnants of farm settlements and one mill site, all of which are located along the Nottawasaga River.

Wetland habitat consists of a mosaic of meadow, marsh, swamp thicket and deciduous swamp communities. Unauthorized motorized vehicles are a major concern in this area as they are breaking new trails, disturbing wildlife and destroying vegetation. Log jams in the rivers are a natural component of the wetlands ecosystem that contribute to functional habitat shifts that benefit some species but may impact others.

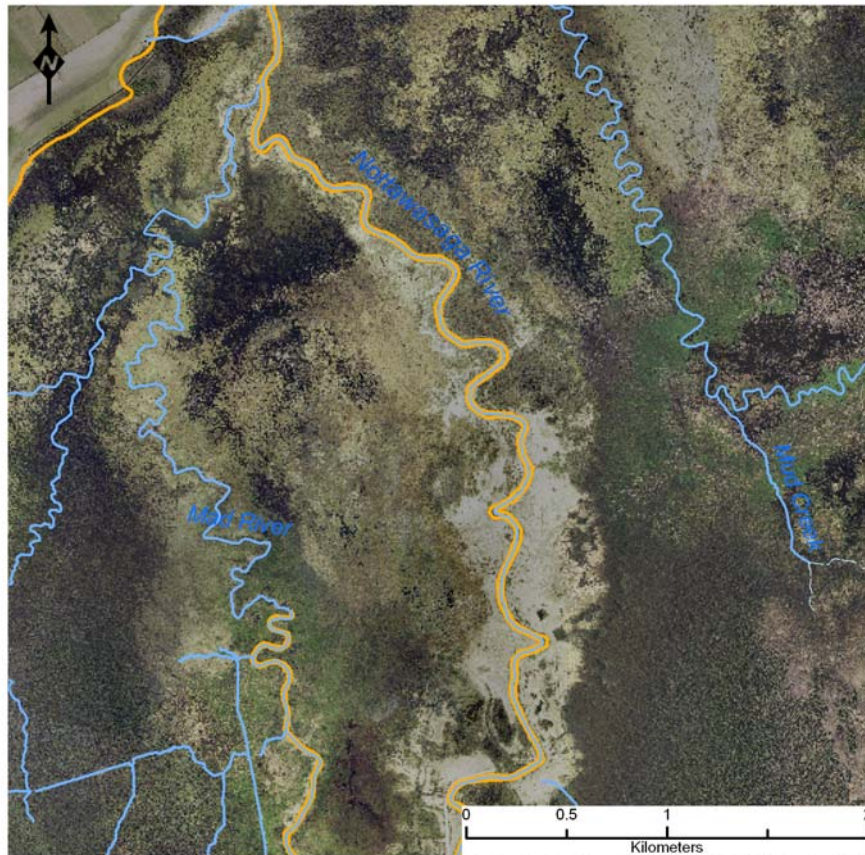


FIGURE 3.3 MCKINNON BRIDGE AREA

Site 4 – Carolinian Forest Area

Located in the northwest corner of the Minesing Wetlands (Figure 3.4), the Carolinian Forest Area consists of trees species such as Silver Maple, Hackberry and Bur Oak, the latter two species which are typically found in southwestern Ontario and the eastern United States. Where the Nottawasaga River and the Mad River converge, a mosaic of treed and open wetland habitat types support a large waterfowl staging area, a small heronry and nesting sites for a number of wetland bird species. The vegetation and wildlife in this area are impacted by dam construction (on tributary drains), log jams and unauthorized motorized vehicle use.

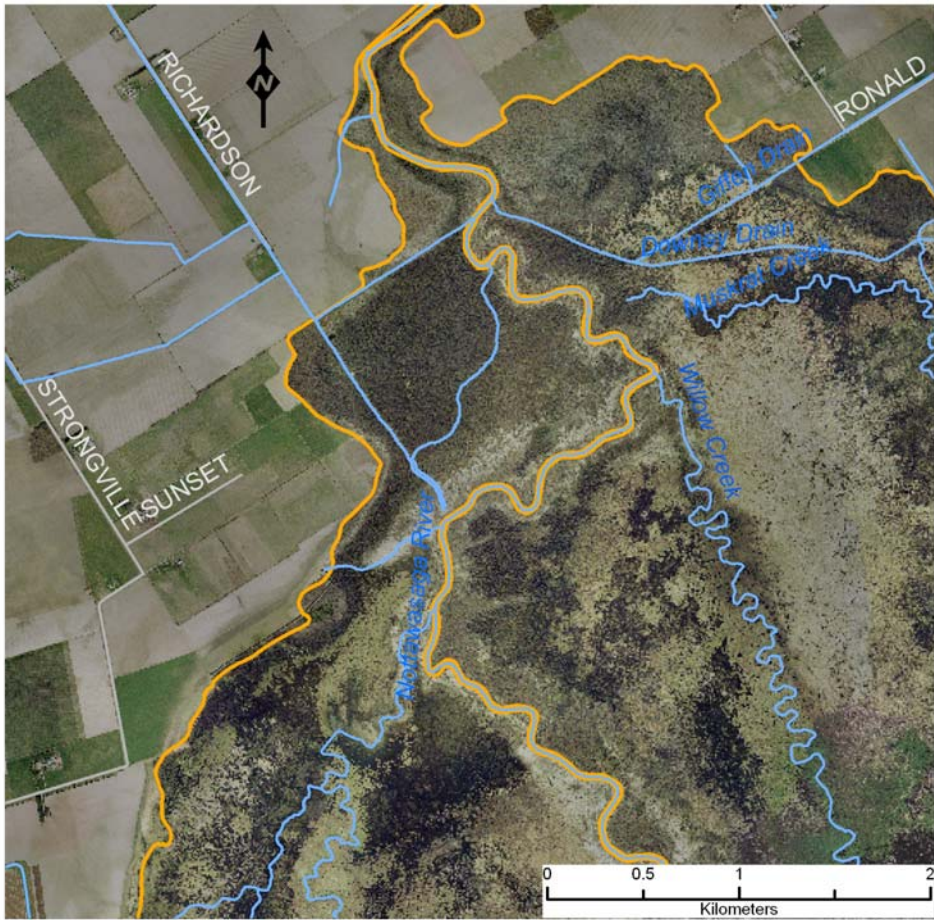


FIGURE 3.4 CAROLINIAN FOREST AREA

3.2 Turtle Survey

The observation of a Wood Turtle (*Glyptemys insculpta*) on May 26, 2005 was the catalyst for the Turtle Survey project. Wood Turtle is designated provincially as an Endangered species and is federally designated as a Threatened species. Given the presence of Wood Turtle and the past documentation of other Species At Risk turtles within the Minesing Wetland, the study team prepared funding applications to undertake additional turtle surveys and develop appropriate management strategies. Additional project funding was obtained from Environment Canada (Habitat Stewardship Program). Survey protocols were developed for various parts of the turtle project and were completed under the authority of Bob Bowles and Jolene Laverty. The study team worked closely with Greg Cull, MNR to address data sensitivity issues pertaining to rare turtles.

Eighteen field days were allotted and completed for the turtle survey portion of the inventory where special searches were conducted to look for all turtle species in suitable habitats. In addition, turtle habitats were also checked and turtle species documented during the initial 25 days allotted to the larger study. Therefore, a total of 43 field days were spent within the wetland complex with some degree of turtle inventory work.

With variable habitat and difficult terrain in Minesing Wetlands, turtle surveys were often in areas where travel took up to two hours of hiking just to reach the survey area. Areas searched included:

- Nottawasaga River
- Fen Complex
- Fort Willow Trail
- Simcoe Rail Trail
- Mayer's Marsh
- Various roads (George Johnston Road, Portage Trail Road, Grenfel Road and Pine Grove Road)

Field work was conducted during weather conditions that were favorable to turtle surveys. Due to time constraints and weather conditions, field work was often undertaken on hot, humid days during early mornings, evenings and weekends.

Additional funding for the Turtle Survey project allowed for the formation of the Minesing Wetlands Monitoring Team. Initiated in May 2006, the team was used to aid in the collection process of flora and fauna and record unauthorized motorized vehicle activity. Other activities initiated by the turtle survey project included the posting of restricted activities at access along the periphery of the Minesing Wetlands, increased enforcement presence in sensitive areas, education of ATV dealers and discussion of strategic barriers to prohibit recreational vehicle access.

4.0 RESULTS

The findings of the 2005/2006 field inventories are presented in this section. Sites of Focus are discussed, followed by vegetation community analysis and presentation of key vascular plant and wildlife data

4.1 Vegetation Communities

The Ecological Land Classification (ELC) system was developed to standardize the classification of vegetation communities using a set of quantitative and qualitative sampling protocols (OMNR, 1998). Forestry prism sweeps and soil testing provide the quantitative data used for classification while other features such as shrub cover and ground cover are used to refine community descriptions. This system has been used as a provincial standard for vegetation community mapping and description since the late 1990's.

The study team and Nature Conservancy Canada identified ELC mapping of the Minesing Wetlands as an important study objective; however, it was recognized that full use of the ELC protocols was impractical given the scale of the wetlands and project time constraints. An ELC approximation approach was developed whereby vegetation communities were delineated on orthophotographic mapping, then classified using georeferenced vegetation community data collected through the study (where available) and Simcoe County soils mapping (Department of Agriculture, 1959).

Although vegetation communities were identified to ELC Community Series (Figure 4.5; Table 4.1), this mapping should be viewed as approximation mapping only and should be updated as additional data becomes available. Community boundaries were often difficult to delineate due to broad transition zones between communities (i.e. swamp to marsh). Conditions continue to become wetter in portions of the Wetlands resulting in die-off of swamp forests and expansion of marsh communities.

ELC approximation mapping underscores the unique character of the Minesing Wetlands. One new community series was tentatively described since it was not previously identified in the Ecological Land Classification for Southern Ontario manual (OMNR, 1998). Two provincially rare vegetation communities – Buttonbush Organic Thicket Swamp and Bur Oak Mineral Deciduous Swamp – were also identified in the study area.

The vegetation community tentatively identified is: Hackberry Deciduous Organic Swamp Type (SWD 8-1). This community type is unique due to its atypical location within the Wetlands.

Hackberry (*Celtis occidentalis*; Figure 4.1) stands are usually found in areas with dry to moist soils in southern Ontario and are generally not found in areas with permanently high water tables. Hackberry stands at the north end of the Minesing Wetlands are strongly associated with the Nottawasaga River floodplain and are inundated for several

weeks during the spring flood. High water marks up to 1.5 m above the trunk base are evident and soils remain wet throughout the summer (Figure 4.2).



FIGURE 4.1 HACKBERRY TREE



FIGURE 4.2 FLOOD WATERS

The Bur Oak stand (Figure 4.3) is found in the same floodplain area as the Hackberry swamp but is smaller in areal extent. The Bur Oak (Figure 4.4) is tolerant of a variety of soil moisture conditions but is rarely a dominant canopy species in wetland settings. The Minesing stand is a mixed age stand with very old individual stems occasionally present. Some evidence of past disturbance was noted. This stand is seasonally inundated by floodwaters from the Nottawasaga River and high water marks are readily visible on tree trunks.



FIGURE 4.3 BUR OAK STAND



FIGURE 4.4 BUR OAK

The Buttonbush Organic Thicket Swamp at the confluence of the Mad and Nottawasaga Rivers is considered a provincially rare vegetation community. Since Buttonbush in this community is part of a complex vegetation assemblage, further study should be undertaken to confirm the presence and extent of this community.

Table 4.1 Minesing Wetland Vegetation Communities

ELC Community Code	ELC Community Description
CUM 1-1	Dry – Moist Old Field Meadow Type
FES 1-1	Sweet Gale Shrub Fen Type
FOM 5-2	Dry – Fresh Poplar Mixed Forest
MAM 3-2	Reed-Canary Grass Organic Meadow Marsh Type
MAM 3-4	Fowl Manna Grass Organic Meadow Marsh Type
MAM 3-8	Rice Cut-Grass Organic Shallow Marsh Type
SWC 4-1	Tamarack- Black Spruce Organic Coniferous Swamp Type
SWC 4-2	Tamarack Organic Coniferous Swamp Type
SWD 1-2	Bur Oak Mineral Deciduous Swamp Type
~ SWD 6-3	Swamp Maple Organic Deciduous Swamp Type
* SWD 8-1	Hackberry Deciduous Swamp Type
SWM 1-1	White Cedar – Hardwood Mineral Mixed Swamp Type
~ SWM 5-2	Swamp Maple – Conifer Organic Swamp Type
SWT 3-2	Willow Organic Thicket Swamp Type
SWT 3-4	Buttonbush Organic Thicket Swamp Type
~ CUP 3-8	White Spruce-European Larch Coniferous Plantation Type

* Denotes new (tentative) Community Types identified for this project
 ~ Silver Maple (*Acer saccharinum*) was the dominant soft maple within the Swamp Maple stands. European Larch (*Larix decidua*) is not present in the CUP 3-8 community. Only native Tamarack (*Larix laricina*) was observed in the study area.

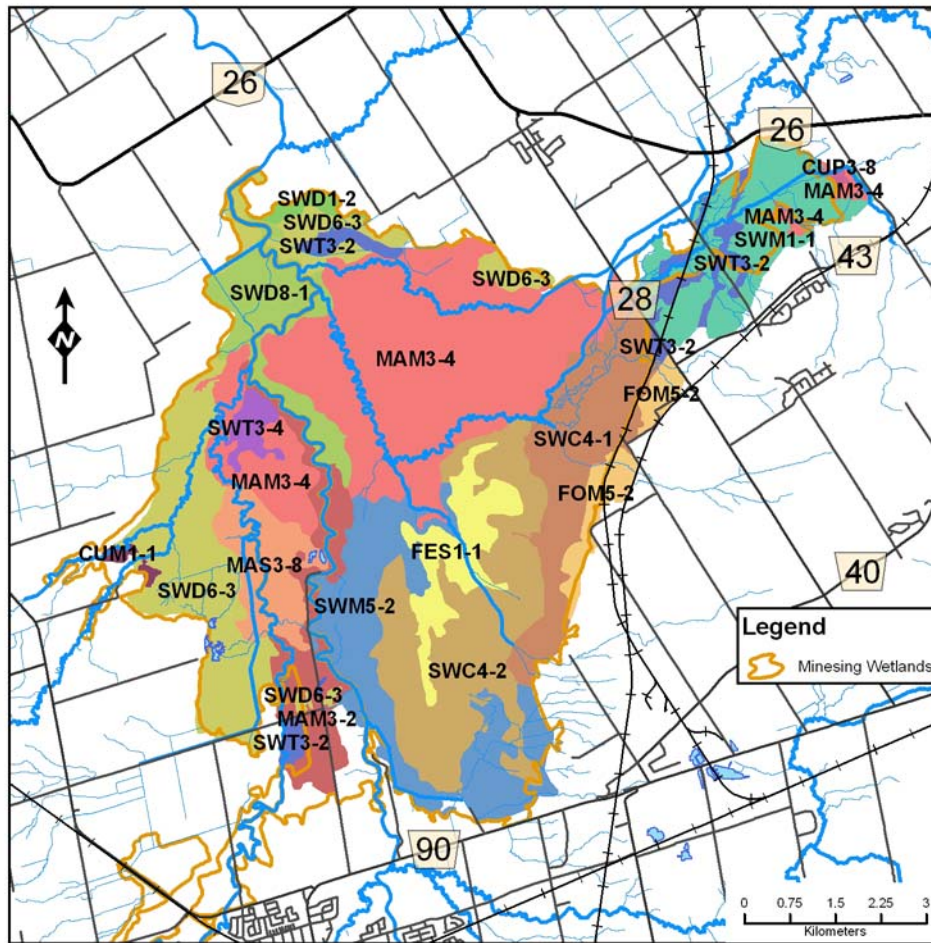


FIGURE 4.5 MINESING WETLAND VEGETATION COMMUNITIES

4.2 Vascular Plants and Wildlife

The Minesing Wetland biological inventory was conducted from April 2005 to August 2006. During this time the surveyors made several long field trips into difficult-to-reach areas within the interior of the wetland complex. During this same time period, individual naturalists, naturalist groups and residents visited areas on the edge of the wetland complex and made observations - usually from roads along the wetland edge or along the North Simcoe Rail Trail. Observations from naturalists were either received by email or posted on the Simcoe County Nature Board operated by Bob Bowles with a confirming photo or written description report. Unusual species not confirmed by a posted photo were either confirmed in the field by the authors of this report or, if not confirmed, were removed from report lists.

This section documents the key findings of the 2005 and 2006 field studies and results of extensive review of background documents. Full lists of vascular plants and wildlife are provided in Appendices A through G.

General information is provided for Species at Risk and provincially rare species; however, to protect these species from illegal collection and disturbance, detailed information has been withheld. Detailed information is provided in a separate appendix (Appendix H). This appendix is available to the general public and outside agencies only via specific request to the Nottawasaga Valley Conservation Authority.

4.2.1 Vascular Plants

527 vascular plant species have been identified in Minesing Wetlands (Appendix A). The 2005/2006 field studies added 67 species to the Minesing flora. A number of these additions are upland species that were encountered as field crews journeyed through fields and forests toward the wetlands (i.e. along southeast bluffs); however, several new wetland/wetland fringe species were also documented (Table 4.2).

Table 4.2 Vascular Plants – New Wetland Records

Scientific Name	Common Name	Srank
<i>Acer freemanii</i> (<i>saccharum</i> X <i>rubrum</i>)	Freeman's Maple	
<i>Alliaria petiolata</i>	Garlic Mustard	SE5
<i>Apocynum cannabinum</i>	Indian Hemp	S5
<i>Aster lanceolatus</i>	Tall White Aster	S5
<i>Cardamine diphylla</i>	Two-leaved Toothwort	S5
<i>Carex scabrata</i>	Rough Sedge	S5
<i>Ceratophyllum demersum</i>	Common Coontail	S5
<i>Dalibardia repens</i>	Dewdrop	S4S5
<i>Eleocharis obtuse</i>	Blunt Spike-rush	S5
<i>Gaylussacia baccata</i>	Black Huckleberry	S4
<i>Glyceria canadensis</i>	Rattlesnake Grass	S4S5
<i>Hesperis matronalis</i>	Dame's Rocket	SE5

<i>Impatiens glandulifera</i>	Glandular Touch-me-not	SE5
<i>Lobelia kalmii</i>	Kalm's Lobelia	S5
<i>Rhamnus frangula</i>	Glossy Buckthorn	SE5
<i>Rhus vernix</i>	Poison Sumac	S4
<i>Salix X rubens (alba X fragilis)</i>	Hybrid Willow	SE4
<i>Scirpus atrovirens</i>	Dark-green Bulrush	S5
<i>Scirpus microcarpus</i>	Small-fruited Bulrush	S5
<i>Scirpus validus</i>	American Great Bulrush	S5
<i>Sisyrinchium montanum</i>	Common Blue-Eyed Grass	S5
<i>Sisyrinchium mucronatum</i>	Slender Blue-Eyed Grass	S4S5
<i>Typha X glauca (angustifolia X latifolia)</i>	Glaucous Cattail	S5

The Natural Heritage Information Centre assigns subnational ranks (SRANKS) for species and vegetation communities in Ontario (NHIC website). These SRANKS parallel the global ranks (GRANKS), and range from S1 (extremely rare in Ontario, generally 5 or fewer locations) to S5 (demonstrably secure in Ontario).

- S4** **Common** and apparently secure in Ontario; usually with more than 100 occurrences in the province.
- S5** **Secure**—Common, widespread, and abundant in the nation or state/province.
- SE** **Exotic**; not believed to be a native component of Ontario's flora.

The Minesing Wetlands continues to be a bastion of biodiversity in southern Ontario. Key species of interest are discussed below.

Rare Orchids (Eastern Prairie White Fringed Orchid and Hybrid)

Rare orchid surveys were undertaken just after their prime flowering period in mid-summer 2005. The survey purpose was to document the presence and numbers of Eastern Prairie White Fringed Orchid (*Platanthera leucophaea*; Endangered; Figure 4.6), Purple Fringed Orchid (*Platanthera psycodes*, common) and their hybrid (*Platanthera X reznicekii*; unclassified) within the Minesing Wetlands. The hybrid species - formed by cross-pollination of Eastern Prairie White Fringed Orchid and Purple Fringed Orchid - is unique to Minesing Wetlands, but currently has no protection status.

With the extreme heat conditions during the 2005 summer study period, accessing the orchids was not an easy task. The orchids are only present in two locations – both of which involve a 1-3 hour hike through rugged wetland terrain. Easier to distinguish while in bloom towards the middle of the summer, the rare orchids were past their prime when weather conditions and scheduling logistics allowed for the survey.

On July 21, 2005, inventory staff found 10 Eastern Prairie White Fringed Orchids, 1 Purple Fringed Orchid but no Hybrid Orchids; however, earlier that month, OMNR staff documented 68 Eastern Prairie White Fringed Orchids, 5 Purple Fringed Orchids and 14 Hybrid Orchids in the same area.

Eastern Prairie White Fringed Orchid numbers appeared to be in decline from previous years. Purple Fringed Orchid and Hybrid Orchid were also relatively scarce. Based on OMNR data (Table 4.3), this declining trend continued in 2006.

Through discussions with OMNR staff, it has been determined that further studies on the *Platanthera* species should be considered since the decline of these species is unknown. This decline may be associated with invasive species encroachment or may be part of a natural dormancy cycle. As part of their Species At Risk monitoring program, OMNR staff continue to undertake annual orchid inventories in Minesing Wetlands to assess population trends.



FIGURE 4.6 EASTERN PRAIRIE WHITE FRINGED ORCHID

Table 4. 3 OMNR Historical Orchid Numbers in Minesing Wetlands

	1997	1999	2000	2002	2003	2004	2005	2006
Eastern Prairie White Fringed Orchid	119	104	3	94	102	36	68	25
*Purple Fringed Orchid	n/a	n/a	n/a	n/a	n/a	n/a	5	n/a
Hybrid Orchid	10	2	0	54	18	7	14	4
Total	129	106	3	148	120	43	87	29

* Purple Fringed Orchid was not actively searched; these were incidental sightings (OMNR, 2006).

American Ginseng (*Panax quinquefolius*; Endangered)

The American Ginseng (*Panax quinquefolius*; Figure 4.7) is a long-lived, perennial herb which has a centrally greenish-white flow that develops into bright red berries by late summer. This herb has medicinal properties similar to those of the Oriental Ginseng (Environment Canada, 2006).

In Ontario, American Ginseng grows in rich, moist, undisturbed and relatively mature deciduous woods in areas of neutral soil (such as over limestone or marble bedrock). Colonies of ginseng are often found near the bottom of gentle south-facing slopes, where the microhabitat is warm and well-drained (Environment Canada, 2006).

In southern Ontario, the main limiting factors for ginseng are small population size, habitat loss and degradation from clearing and logging, and over-harvesting. Small populations are extremely vulnerable to changes in the environment (Environment Canada, 2006).

Though not within the project study area, American Ginseng has previously been documented adjacent to Minesing Wetlands (Hanna, 1982). Unless disturbed by logging or illegal collection activities, these populations likely persist.



Photo: Don Kirk

FIGURE 4.7 AMERICAN GINSENG



FIGURE 4.8 RAM'S-HEAD LADY'S SLIPPER

Ram's-head Lady's-slipper (*Cypripedium arietinum*; provincially/globally rare)

The Ram's-head Lady's-slipper (*Cypripedium arietinum*; Figure 4.8) is the smallest and most inconspicuous member of the Lady's-slipper family (Owen Sound Field Naturalists, undated). This is a Great Lakes endemic species (hence the globally rare designation) typically associated with coniferous woods along the Great Lakes shoreline (Brunton, 1989).

Though not within the project study area, Ram's-head Lady's-slipper has previously been documented adjacent to the Minesing Wetlands (Hanna, 1982). These populations likely persist since their habitat is relatively undisturbed and difficult to access.

Beaked Spike-rush (*Eleocharis rostellata*; provincially rare)

Beaked Spike-rush (*Eleocharis rostellata*; Figure 4.9) is chiefly an inhabitant of salt marshes along the Atlantic coast with rare inland occurrences in localized habitats. This species appears to be confined to calcareous seepage fens that are maintained by the surface discharge of calcareous groundwater. The groundwater typically has a high pH and high mineral content. (Minnesota Department of Natural Resources, 2006). It has a disjunct distribution in southern Ontario.

Beaked Spike-rush has been recorded in the Minesing Wetlands on several occasions including the 2005/2006 Biological Inventory.

Marsh Valerian (*Valeriana sitchensis*; provincially very rare)

Similar to Beaked Spike-rush, Marsh Valerian (*Valeriana sitchensis*; Figure 4.10) typically inhabits salt marshes along the Atlantic coast with rare inland occurrences in localized habitats. This species appears to be confined to calcareous seepage fens that are maintained by the surface discharge of calcareous groundwater. It has a disjunct distribution in southern Ontario.

Marsh Valerian has been recorded in the Minesing Wetlands on several occasions including the 2005/2006 Biological Inventory.



FIGURE 4.9 BEAKED SPIKE-RUSH



FIGURE 4.10 MARSH VALERIAN



FIGURE 4.11 BUTTERNUT (with canker)

Butternut (*Juglans cinerea*; Endangered)

The Butternut (Figure 4.11) is part of the walnut family and has recently been designated as an Endangered species due to the spread of Butternut Canker. Butternut Canker is caused by an introduced fungus that has been present in North America for at least 50

years but only discovered in Ontario Butternut trees in 1991. The fungus attacks the trees by entering through cracks and wounds in the bark. The infected trees usually die within a few years of exposure. Five Butternut trees were observed within Minesing Wetlands during the study period. Similar to many locations within the Nottawasaga River watershed, all trees appear to be in the early stages of the canker infection (Figure 4.11).

4.3.2 Invertebrates

A vast array of aquatic and terrestrial invertebrates are present within Minesing Wetlands. Butterflies, dragonflies and damselflies (Lepidoptera and Odonata) were actively surveyed during the study. Benthic invertebrate monitoring is the cornerstone of the NVCA water quality monitoring program and species records are available within and adjacent to the Minesing Wetlands. The results of these studies are provided below.

Odonata and Lepidoptera

Butterflies, dragonflies and damselflies were the focus of terrestrial invertebrate surveys for this study. Forty-one butterfly and 46 dragonfly/damselfly species have been documented in the Minesing Wetlands (Appendix B). Species from these phylogenetic orders were identified each field day when an incidental observation occurred. Several new species from these orders were observed during the study (Table 4.4).

Table 4.4 Odonata and Lepidoptera – New Wetland Records

Scientific Name	Common Name	Status
Odonata		
<i>Lestes disjunctus disjunctus</i>	Spotted Spreadwing	S5
<i>Chromagrion conditum</i>	Aurora Damsel	S5
<i>Ischnura posita posita</i>	Fragile Forktail	S4
<i>Boyeria vinosa</i>	Fawn Darner	S5
<i>Gomphus adelphus</i>	Moustached Clubtail	S3
<i>Stylus scudderi</i>	Zebra Clubtail	S3
<i>Epitheca cynosure</i>	Common Baskettail	S5
<i>Epitheca spinigera</i>	Spiny Baskettail	S5
<i>Erythemis simplicicollis</i>	Eastern Pondhawk	S5
<i>Libellula incesta</i>	Slaty Skimmer	S4
<i>Pachydiplax longipennis</i>	Blue Dasher	S5
Lepidoptera		
<i>Papilio cressphontes</i>	Giant Swallowtail	S2
<i>Feniseca tarquinius</i>	Harvester	S4
<i>Everes comyntas</i>	Eastern Tailed Blue	S5
<i>Glaucopsyche lygdamus</i>	Silvery Blue	S5
<i>Nymphalis milberti</i>	Mibert's Tortoiseshell	S5
<i>Megisto cymela</i>	Little Wood-satyr	S5
<i>Erynnis juvenalis</i>	Juvenal's Duskywing	S5
<i>Erynnis lucilius</i>	Columbine Duskywing	S4
<i>Pompeius verna</i>	Little Glassywing	S3S4

<i>Poanes hobomok</i>	Hobomok Skipper	S5
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The NHIC assigns subnational ranks (SRANKS) for species and vegetation communities in Ontario (NHIC website). These SRANKS parallel the global ranks (GRANKS), and range from S1 (extremely rare in Ontario, generally 5 or fewer locations) to S5 (demonstrably secure in Ontario). Non-native species are not ranked.

- S1** **Extremely rare** in Ontario; usually 5 or fewer occurrences in the province, or very few remaining hectares.
- S2** **Very rare** in Ontario; usually between 5 and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.
- S3** **Rare to uncommon** in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.
- S4** **Common** and apparently secure in Ontario; usually with more than 100 occurrences in the province.
- S5** **Secure**—Common, widespread, and abundant in the nation or state/province.
- SE** **Exotic**; not believed to be a native component of Ontario's flora.

Rare species observed during the study are discussed below.

Hackberry Emperor (*Asterocampa celtis*; provincially very rare)

The Hackberry Emperor (Figure 4.12) has been documented in Minesing Wetlands on two occasions - once on August 16, 1997 and again on August 17, 2000. The Hackberry Emperor is a medium size butterfly that is dark to light tawny brown in color. Its larval stages are dependent on Hackberry leaves for food and it is restricted to forests with abundant Hackberry. A significant effort was made during the inventory to search the Hackberry stands at the north end of the Wetlands; unfortunately, efforts to locate the Hackberry Emperor were unsuccessful.



Photo Courtesy Toledo-Bend.Com
FIGURE 4.12 HACKBERRY EMPEROR



Photo Courtesy Toledo-Bend.Com
FIGURE 4.13 MONARCH

Monarch (*Danaus plexippus*; Special Concern)

The Monarch Butterfly (*Danaus plexippus*; Figure 4.13) can be found in Ontario wherever there are milkweed plants for its larval food source and wildflowers for a nectar source (adults). Monarchs are often found on abandoned farmland and roadsides, but also in city gardens and parks. The eastern North American population migrates to Mexico each fall to overwinter at 12 sites in the central mountains (ROM, 2005).

Declines in provincial Monarch populations are due to logging and disturbance of overwintering sites in Mexico and widespread biocide use in Ontario (ROM, 2005).

In the Minesing Wetlands, Monarchs frequent meadow marsh and cultural meadow communities where Swamp Milkweed (*Asclepias incarnata*) and Common Milkweed (*Asclepias syriaca*) provide larval food sources. An array of wildflowers in these areas also provides important nectar sources for migrating adults.

Giant Swallowtail (*Papilio cresphontes*; provincially very rare)

The very rare Giant Swallowtail (Figure 4.14) is the largest butterfly in Canada and was documented in the Minesing Wetlands on August 17, 2005. It has a wing span of 83 to 113mm and has to constantly vibrate its wings while feeding to avoid tilting its flower nectar sources (CBIF, 1998). The Giant Swallowtail's main larval food source is Prickly Ash (*Xanthoxylum americanum*; Figure 4.15) which is found in several areas along the Nottawasaga River. Attempts to locate additional adults and larvae in these habitats were unsuccessful.

The Giant Swallowtail is typically a southern species that sometimes strays north but in the last few years there have been more reports of this species north of its normal range including a few reports in Simcoe County. Research on the Giant Swallowtail and its relation to Prickly Ash is being performed by Dr. Paul Aird, a Forest Management Professor at the University of Toronto. Dr. Aird is hoping to determine if Giant Swallowtail has the potential of establishing a permanent resident population in Minesing Wetlands (Aird, pers. comm., 2005).



Point Pelee National Park, Ont. J. Cossey.

FIGURE 4.14 GIANT SWALLOWTAIL



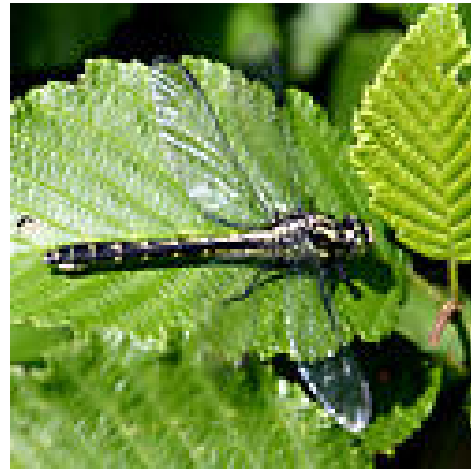
FIGURE 4.15 PRICKLY ASH

Zebra Clubtail (*Stylurus scudderi*; provincially rare)

The Zebra Clubtail (*Stylurus scudderi*; Figure 4.16) was documented on the Nottawasaga River on August 17, 2005. It is typically found in areas of sand-bottomed streams and small rivers with riffles from mid-July to late September.



FIGURE 4.16 ZEBRA CLUBTAIL



[HTTP://BUGGUIDE.NET/NODE/VIEW/17852](http://bugguide.net/node/view/17852)
FIGURE 4.17 MOUSTACHED CLUBTAIL

Moustached Clubtail (*Gomphus adelphus*; provincially rare)

The Moustached Clubtail (*Gomphus adelphus*; Figure 4.17) was recorded near the Nottawasaga River on June 16, 2006. It prefers clear, rocky, swiftly-flowing rivers and streams in late May to early August. Habitat near the sighting appears to be atypical for this species (turbid, slow moving river).

Delta-Spotted Spiketail (*Cordulegaster diasatops*; provincially rare)

On June 6, 2006 a Delta-Spotted Spiketail (*Cordulegaster diasatops*; Figure 4.18) was observed in the Minesing Wetlands. This species utilizes a variety of habitat areas in the spring and summer months including small marshy streams and seeps, small shaded forest streams, spring runs, brooks with rapids and pools and clearings and bushy pastures (Nikula et al, 2002).



FIGURE 4.18 DELTA-SPOTTED SPIKETAIL



FIGURE 4.19 BLUE-TIPPED DANCER

Blue-Tipped Dancer (*Argia tibialis*; provincially rare)

A Blue-Tipped Dancer (*Argia tibialis*; Figure 4.19) was documented on the Nottawasaga River on July 10, 2006. Typical adult habitat for this species consists of slow moving rivers and streams, small to medium sized streams with rapids or riffles and pools and shaded banks (Westfall and May, 1996).

Halloween Pennant (*Celithemis eponina*; provincially rare)

A Halloween Pennant (*Celithemis eponina*; Figure 4.20) was observed by a nature enthusiast northeast of the Minesing Wetlands study area during the study period. Photo documentation was used to positively identify the species. This dragonfly has not been recorded in the Minesing Wetlands; however, they may be present since the wetlands are connected to the sighting area via natural corridors.



Chris Evans, 2006.

FIGURE 4.20 HALLOWEEN PENNANT MATING PAIR

Benthic Invertebrates

Benthic invertebrate monitoring is a key tool used by NVCA to evaluate stream health. Recent wetland records are available for Willow Creek, Black Creek and the Nottawasaga River (just upstream of the Minesing Wetlands in Angus). One field day was spent collecting aquatic invertebrates for analysis within the Nottawasaga River near the upstream end of the Wetlands. Appendix C provides a full listing of benthic invertebrates collected in stream systems within and adjacent to the Minesing Wetlands.

The Willow Creek benthic community exhibits “fair” stream health. Species characteristic of coolwater stream systems are well-represented though signs of stress, possibly from upstream agricultural activity, are evident.

The Black Creek benthic community exhibits “good” stream health. Stonefly, mayfly and caddisfly genera associated with coolwater and coldwater stream systems such as stoneflies are abundant.

Midges (Chironomidae) are the dominant species at the Nottawasaga River sampling site. This family of small flies is often associated with impaired water quality; however, within the Minesing Wetlands, their presence likely reflects low gradients and fine sediments within the river channel as well as nutrient enrichment.

4.3.3 Fish

No formal surveys were performed for fish species but incidental observations were recorded for this study. Common Carp (*Cyprinus carpio*) and Northern Pike (*Esox lucius*) were observed during various field days. In spring 2006, MNR and NVCA staff, guided by Harold Parker, attempted to document grass-spawning Walleye (*Stizostedion vitreum*), which is unique to the Minesing Wetlands. Only one Walleye was observed during this effort. A list of fish species known to occur within the Minesing Wetlands is provided in Appendix D.

The watercourses within the Minesing Wetlands provide a diverse array of fish habitat and corridor functions. The Nottawasaga and Mad Rivers provide a migratory corridor for Rainbow Trout (*Oncorhynchus mykiss*) (spring and fall) and Chinook Salmon (*Oncorhynchus tshawytscha*) (fall) which spawn further upstream in these river systems. Juvenile Rainbow Trout and Chinook Salmon then move downstream through the Minesing Wetlands on their way to Georgian Bay. These species provide a significant recreational fishery - the Essa Annual Salmon Festival and Riverbank Derby are held each fall just upstream of the wetlands.

The upstream portions of Willow Creek within the Minesing Wetlands support a resident Brown Trout (*Salmo trutta*) population. Keast Creek and Black Creek receive significant groundwater discharge along the Algonquin Bluffs/wetlands interface and support resident populations of Brook Trout (*Salvelinus fontinalis*) – a species that requires pristine, coldwater habitats for survival.

The marshes of the Minesing Wetlands provide important spawning, nursery and resident habitat for Northern Pike (*Esox lucius*). These marshes also support one of the few marsh-spawning populations of walleye in North America although this population appears to have declined in recent years. The cause of this decline is unknown. The Nottawasaga and Mad Rivers and Coates and Willow Creeks within the Minesing Wetlands support a number of resident warmwater fish species.

Northern Brook Lamprey (*Ichthyomyzon fossor*; Special Concern)

The Northern Brook Lamprey (*Ichthyomyzon fossor*; Figure 4.21) has the characteristic features of lampreys - a round mouth and teeth arranged in a circle. However, this species is non-parasitic and the larvae feed on diatoms and protozoans. Adults spawn in gravelly riffles and then die. When the larvae hatch, they burrow into soft silts, sands and

mud where they remain for up to 6 years. They emerge as non-feeding adults then disperse to their spawning grounds (ROM, 2005).

Ontario populations have declined because of the application of lampricides in streams to control the introduced, parasitic Sea Lamprey (*Petromyzon marinus*) which is a parasitic species and a threat to Great Lakes fisheries. The species persists in untreated streams, and above barriers and in backwater areas which are not affected by the treatments.

Northern Brook Lamprey has recently (2002) been documented in typical stream habitats in the Minesing Wetlands.

Lake Sturgeon (*Acipenser fulvescens*; Special Concern)

The Minesing Wetlands provides a migratory corridor for Lake Sturgeon (*Acipenser fulvescens*; Figure 4.22) which move upstream from Georgian Bay through the wetlands to spawn each spring in the gravelly rapids between Angus and Nicolston Dam. Nicolston Dam marks the upstream limit for Lake Sturgeon passage in the Nottawasaga River system.

The Lake Sturgeon is a specialized bottom feeder - its barbells are used for sensing its surrounding environment and detecting food. A wide variety of organisms are consumed including insect larvae, crayfish, molluscs and small fish (ROM, 2006).

A general decline in numbers in portions of its range reflects human over-exploitation in the latter half of the nineteenth century. Overall, over-harvesting for meat and caviar forms the most significant threat to the Lake Sturgeon. Additional threats include:

- the construction of dams, which may disrupt habitat and interrupt spawning movements and timing;
- habitat degradation resulting from human activities;
- habitat contamination caused by chemicals, toxins, and fertilizers; and,
- the introduction of non-native species that include competing and predatory fishes, and plants that may modify habitat (ROM, 2006).

These threats have not been assessed and validated for the Nottawasaga River population.



Photo: Erling Holm
FIGURE 4.21 NORTHERN BROOK LAMPREY



FIGURE 4.22 LAKE STURGEON

4.3.4 Reptiles and Amphibians

Due to the secretive nature of various species of reptiles and amphibians, very few individuals were noted. Aside from the Turtle Survey, formal herpetile surveys were not conducted; all observations were incidental. Frogs and toads were often documented by hearing their breeding vocalizations. Other amphibians and reptiles tend to be secretive and are difficult to document even with focused investigations.

Ten amphibian species, six turtle species and two snake species have been recorded in the Minesing Wetlands (Appendix E). Eight species of amphibians, two reptiles and five turtle species were recorded during the study period. The Map Turtle (*Graptemys geographica*; Species of Concern) is a new record for the Minesing Wetlands.

This section documents the findings of the extensive Turtle Survey undertaken as part of the study. Although turtles and evidence of turtle activity were documented, they were very challenging to locate. The majority of sightings were along turtle migration routes to nesting sites; however, some turtles were observed basking on the river banks and logs. Evidence of nesting turtles was found in several locations within the wetlands – often the remains of nests that had been predated by raccoons and skunks. This section concludes with a recent record for Milksnake (*Lampropeltis triangulum*; Special Concern) which was submitted by Peter Mills in Fall 2006 after the formal study period.

Turtles

Eight turtle species are present in Ontario - six of these are on the Species at Risk list. A total of six species have been recorded in the Minesing Wetlands, however, only five species were observed during the 2005/2006 field seasons.

Turtles are very secretive and are often spooked when approached; however, they can be observed laying eggs and basking on logs and banks of rivers. Significant mortality is associated with roadkill as gravid female turtles migrate to and from nesting areas. Since turtles live for several decades, but have very low egg and hatchling survival rates, adult turtle survival is critical for population maintenance – the turtles must survive long enough to replace themselves or populations will decline to unsustainable levels.

Wood Turtle (*Glyptemys insculpta*; Endangered-provincial/Special Concern-federal)

The Wood Turtle (Figure 4.23) has a ridged sculpted carapace which distinguishes it from all other turtle species in Ontario. The carapace, head and limbs are brown in colour and its skin colour ranges from red to orange (see Figure 4.24). It is the most terrestrial species of turtle in Ontario and can be found among the ferns in forested areas, when not in rivers and streams. Unlike other turtle species, the Wood Turtle feeds on land where vegetation, berries, worms and insects are its main food source (Behler and King, 1979).



FIGURE 4.23 WOOD TURTLE



FIGURE 4.24 WOOD TURTLE CLOSE-UP

To date there have been five Wood Turtle observations in the Minesing Wetlands. The first Wood Turtle recorded during the study period was observed on May 26, 2005. The turtle was measured and photographed before its release. The individual was documented as a male and measured 18.6 centimetres from front centre notch to back centre notch on the carapace. No other tracks or sign of Wood Turtles were recorded in the survey area on that day.

A May 14, 2006 Wood Turtle observation by an NVCA staff member was documented by photographs (Figure 4.26) and compared to the individual found by inventory staff in 2005 (Figure 4.25). The comparison has determined that the two observations were of the same individual. The observations were made approximately 500 metres from each other around the same time of year.



FIGURE 4.25 WOOD TURTLE FOUND IN 2005



FIGURE 4.26 WOOD TURTLE FOUND IN 2006

While performing turtle surveys on June 16, 2006, inventory staff located a disturbed nesting site (Figures 4.27 and 4.28). Four eggs were found but determined to be non-viable (Litzgus pers. comm., 2006). The eggs measured 32 mm in length and 18 mm wide and were oval in shape. With the assistance of Dr. Jacqueline Litzgus, the species of eggs were determined to be one of two species, Wood Turtle or Blanding's Turtle.

Inventory staff hypothesize that the eggs belonged to a Wood Turtle, based on the history of observations in the area. No Blanding's Turtles have ever been documented in the site location. Unfortunately, the nesting site was unsuitable as the sand area was too damp for the eggs to properly develop. It is unknown if the eggs perished before the mother had laid them or while incubated in the unfavourable nest site. The mother may have withheld the eggs in her body cavity too long while searching for a suitable nesting site and laid them at this location to avoid a critical survival situation (Litzgus, pers. comm., 2006).



FIGURE 4.27 TURTLE EGG MEASUREMENT



FIGURE 4.28 TURTLE NESTING SITE WITH EGGS

Spotted Turtle (*Clemmys guttata*; Endangered)

The Spotted Turtle (Figure 4.29) is a small turtle with a maximum shell length 13 cm. It is dark brown or black with yellow spots on its carapace. These turtles prefer marshy/boggy habitat and are most active from early to late spring when they aggregate in shallow marshes for breeding, forage for invertebrates and nest along sand/gravel peripheries or wetland hummocks (COSEWIC, 2004).

In Canada, the range of Spotted Turtle is restricted to southern Ontario. Its distribution is patchy and many populations have been extirpated or significantly reduced in numbers (COSEWIC, 2004). Within Minesing Wetlands, four sightings of Spotted Turtle were recorded between 1984 and 1994.

During late summer 2005 and from early April-June 2006, several field days focused on locating Spotted Turtle. Efforts focused on preferred habitat areas, unfortunately, these efforts failed to locate Spotted Turtles.



Photo: David Featherstone

FIGURE 4.29 SPOTTED TURTLE

Blanding's Turtle (*Emydoidea blandingii*; Threatened)

Blanding's Turtles (*Emydoidea blandingii*; Figure 4.30) have high, dome-shaped shells with yellow flecks; the shells are often described as “army helmet” in shape (Figure 4.31). The head and limbs are dark with no distinguishing marks, the neck and underside of the neck and chin are bright yellow. Blanding's Turtle within the Great Lakes/St. Lawrence area tend to utilize interconnected lake, river, stream, marsh and pond habitats. They can travel over 6 km during a season (COSEWIC 2006). Through this study, we have found that gravid females will travel up to 4 km to find adequate nesting locations.

Blanding's Turtles are widespread and fairly numerous but are on the decline due to human influences spreading into their habitat (COSEWIC, 2006). Like most turtles, Blanding's Turtles have delayed maturity, extreme longevity and low reproduction rates which raises concerns regarding excessive rates of adult mortality.



FIGURE 4.30 BLANDING'S TURTLE



FIGURE 4.31 BLANDING'S TURTLE CARAPACE

Blanding's Turtle has been previously documented in the Minesing Wetlands study area with migrating turtles observed as recently as 1993. While scouting the area for other turtles, contacts were made with several landowners in the area. These contacts were fortuitous - the first sighting of a Blanding's Turtle during the study was by one of the landowners on the evening of June 6, 2006. Other landowners also volunteered information, informing the survey team when Blanding's Turtles were on their properties searching for nesting sites.

Seven female Blanding's Turtles were notched, measured and weighed in 2006. At the time of weighing, it was unknown which individuals were still carrying eggs.

Blanding's Turtle Hatchlings

On August 24, 2006, inventory staff received a phone call from a local resident inquiring about turtles hatching on her property (Figures 4.32 and 4.33). Jolene Laverty and Steve Green responded to the call and, under the recommendations of Dr. Jacqueline Litzgus, they notched the eight Blanding's Turtle hatchlings with a notch code using a pair of dissecting scissors. All hatchlings were measured and marked with notch code #8; all were marked with the same code because of anticipated low survival rates.



FIGURE 4.32 BLANDING'S TURTLE HATCHLING



FIGURE 4.33 LOCAL TURTLE ENTHUSIASTS

The total hatchling count at this location was 12. One made its way out of the nest the previous day, five hatchlings were captured by the residents and three were assisted out of the nest. All were processed by NVCA staff. Two were in full stages of development but did not survive the hatch, while one was still entirely enclosed and moving in the egg. The live un-hatched egg was re-buried and watched by the residents. It was moved to a nearby wetland area when it emerged from the nest area. The other eight turtle hatchlings were also moved to a nearby wetland connected to Minesing Wetlands in the hopes that the extra help would aid in their survival.

Two additional hatchlings were observed on September 24 and 25, 2006 (Chris Evans and Bob Bowles). Under direction from Bob Bowles, the hatchlings were measured and marked with notch code #9. A third hatchling was observed along a roadside on September 28; however, it had been run over by a car.

Map Turtle (*Graptemys geographica*; Species of Concern)

Map turtles (*Graptemys geographica*) are so-named due to the yellow vermiculation patterns that can be seen on the carapace that are often described as contour lines on a map. They are typically found in large water bodies in Southern Ontario, Quebec and Northeastern United States, especially areas like the Great Lakes region, upper Mississippi River, and Arkansas and Missouri River drainage basins (EcoFieldGuide, 2006).

On Monday, June 26, 2006, Bob Bowles, Jolene Laverty and Peter Mills came across a Map Turtle basking on a log on the Nottawasaga River (Figure 4.34). Photographs were taken by Bob Bowles before the turtle dropped into the water. Subsequent discussions have led us to hypothesize that the Map Turtle was a male. This is believed to be the first documented sighting of a Map Turtle within Minesing Wetlands.



FIGURE 4.34 MAP TURTLE

Snapping Turtle (*Chelydra serpentina*)

The Snapping Turtle (*Chelydra serpentina*; Figure 4.35) is often regarded as one of Ontario's most common turtles; however, the sustainability of populations is of concern due to significant road mortality and nest predation (Figure 4.36). Leading researchers in southern Ontario suggest that snapping turtles may soon be added to the Species At Risk list (Dr. Ron Brooks, pers.comm.).

Within Minesing Wetlands, the majority of snapping turtles were observed in Site 1-Snow Valley Area. The Simcoe Rail Trail system through Mayer's Marsh provides adequate nesting substrate for both snapping and painted turtles. Observations and records were taken concerning nest numbers and predation. These observations took place from May 24 to July 28, 2006. Of the located nests along the trail, 100% had been raided by predators. One such observation was made in June 2006 – as a female snapping turtle was laying her eggs on one side of the trail, two raccoons were observed waiting for her to finish on the other side of the trail.



FIGURE 4.35 SNAPPING TURTLE NESTING



FIGURE 4.36 DISTURBED SNAPPING TURTLE NEST

In discussions with local residents/frequent trail walkers; they have noticed an increase of predated nests and the decline in hatchlings crossing their path. They recall at times in the late 80s/early 90s when it was difficult to walk the trail without coming across a turtle hatchling. To slow the further decline of the snapping turtle population, nesting enclosures should be installed over nesting locations during the spring and removed during late Summer to early Fall.

Milksnake (*Lampropeltis triangulum*; Species of Concern)

The Milksnake (*Lampropeltis triangulum*) is a shiny, relatively slender, large snake with smooth scales. Although individuals can vary somewhat in colour, the base colour is tan, brown, or grey, with numerous black-bordered brown, copper, or red saddles down the back, alternating with smaller irregular blotches on the sides (Environment Canada, 2006).

The Milksnake inhabits rural areas and is frequently reported in and around buildings, especially old structures. It is found in a wide variety of habitats, from prairies, pastures, and hayfields, to rocky hillsides and a wide variety of forest types. Two key habitat features are proximity to water, and suitable locations for basking and egg-laying (Environment Canada 2006).

Observations in Ontario suggest that it has maintained much of its historical range, although the species has likely been extirpated from some large urban centres or areas of intensive agricultural use. The two greatest causes of population decline are likely road mortality and deliberate killing by humans (Environment Canada, 2006).

A Milksnake was observed in Minesing Wetlands on October 9, 2006 (Peter Mills, pers. comm.; Figure 4.37). Recent reports suggest that Milksnake is widely distributed throughout the Nottawasaga River watershed (D. Featherstone, pers.comm.).



Credit: Peter Mills

FIGURE 4.37 MILKSNAKE

4.3.5 Birds

The vast size, habitat diversity and relatively undisturbed character of the Minesing Wetlands provide a number of significant habitat functions including migration staging, nesting, and feeding grounds. The wetlands are home to the second-oldest and fifth-largest Great Blue Heron Colony in southern Ontario (Brereton Field Naturalists). The wetlands provide a regionally significant waterfowl staging area (Parker and Dawson, 1984) that is particularly important for spring migrants. Marsh-breeding species such as Least Bittern (*Ixobrychus exilis*), Sora (*Porzana carolina*) and Virginia Rail (*Rallus limicola*) nest in the extensive marshes. Neotropical warblers nest in interior forests within the wetlands. Open meadows and abandoned farm lands provide nesting habitat for a number of edge species, as well as seasonal hunting grounds for many raptor species such as Rough-Legged Hawk (*Buteo lagopus*), Red-Tailed Hawk (*Buteo lineatus*), Sharp-Shinned Hawk (*Accipiter striatus*) and Broad-winged Hawk (*Buteo platypterus*).

226 bird species have been documented in the Minesing Wetlands (Appendix F). Over 140 species of birds, including nine new records (Table 4.5) were documented through the study.

Table 4.5 Birds – New Wetland Records

Scientific Name	Common Name	Status
<i>Cygnus buccinator</i>	Trumpeter Swan	S2S3 – migrant?
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	S4B,SZN – foraging
<i>Charadrius semipalmatus</i>	Semipalmated Plover	SZN – migrant
<i>Pluvialis squatarola</i>	Black-bellied Plover	S4B,SZN – migrant
<i>Calidris minutilla</i>	Least Sandpiper	S4B,SZN – migrant
<i>Calidris melanotos</i>	Pectoral Sandpiper	SHB,SZN – migrant
<i>Calidris alpina</i>	Dunlin	S3B,SZN – migrant
<i>Chlidonias niger</i>	Black Tern	S3B,SZN – breeding
<i>Corvus corax</i>	Common Raven	S5 – probable breeding

The NHIC assigns subnational ranks (SRANKS) for species and vegetation communities in Ontario (NHIC website). These SRANKS parallel the global ranks (GRANKS), and range from S1 (extremely rare in Ontario, generally 5 or fewer locations) to S5 (demonstrably secure in Ontario). Non-native species are not ranked.

- S1** **Extremely rare** in Ontario; usually 5 or fewer occurrences in the province, or very few remaining hectares.
- S2** **Very rare** in Ontario; usually between 5 and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.
- S3** **Rare to uncommon** in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.
- S4** **Common** and apparently secure in Ontario; usually with more than 100 occurrences in the province.
- S5** **Secure**—Common, widespread, and abundant in the nation or state/province.
- SE** **Exotic**; not believed to be a native component of Ontario's flora.
- SZB** **Breeding migrants/vagrants.**
- SZN** **Non-breeding migrants/vagrants.**

Several Species At Risk and provincially rare species were observed or investigated during the study. These species, and the significant heronry, are discussed in more detail below.

Black Tern (*Chlidonias niger*; Species of Concern)

Black Terns (*Chlidonias niger*; Figure 4.39) are found scattered throughout Ontario usually nesting along the Great Lakes. Colonies of Black Terns can be found nesting in marshy areas. Nests are usually located on vegetation debris close to the water's edge (see Figure 4.38). Declines in Black Tern populations can be attributed to disruptions to habitat such as wetland drainage and alteration, water pollution and recreational water activities (ROM, 2006).



FIGURE 4.38 BLACK TERN NEST



FIGURE 4.39 BLACK TERN

Previously unrecorded within the Minesing Wetlands, a nesting colony of Black Terns was documented in 2006. A total of three nests were identified; more nests were present, but the terns were clearly agitated by the presence of survey staff, therefore, additional efforts to document nest numbers were curtailed.

Bald Eagle (*Haliaeetus leucocephalus alascanus*; provincially Endangered – southern Ontario population)

The Latin word *Haliaeetus* translates to *Sea Eagle* which is appropriate for the Bald Eagle (*Haliaeetus leucocephalus alascanus*) since it is typically found nesting along ocean coastlines and lakeshores (CWS, 2006). According to Bird Studies Canada, Bald Eagles are relatively common in Northern Ontario, but are just starting their comeback in Southern Ontario, where they were nearly extirpated as a result of bioaccumulating pesticides in the environment. On June 4, 2006 two adult Bald Eagles were observed (Figure 4.41). Their nest was located on June 21, 2006 (Figure 4.40) and two developing eaglets were observed in the nest on June 30, 2006.



FIGURE 4.40 BALD EAGLE NEST



FIGURE 4.41 BALD EAGLE

Least Bittern (*Ixobrychus exilis*; Threatened)

The Least Bittern (*Ixobrychus exilis*; Figure 4.42) is a smaller cousin of the American Bittern (*Botaurus lentiginosus*) which is also present in the wetlands. A secretive marsh bird that is mainly identified by its call, no visual sightings were recorded during the study but it is believed that the Minesing Wetlands supports several breeding territories. There are currently no management strategies in place within the wetlands for this species.



Photo: Mark Peck

FIGURE 4.42 LEAST BITTERN



Photo: George Peck

FIGURE 4.43 CERULEAN WARBLER

Cerulean Warbler (*Dendroica cerulean*; Special Concern)

The Cerulean Warbler (*Dendroica cerulean*; Figure 4.43) is a small songbird with long wings and a short tail. During breeding season, the Cerulean Warbler is found in mature deciduous forests that feature large, tall trees and an open understorey. These forests may be in wet bottomland areas or on dry ridges in upland locations (Environment Canada, 2006). The Minesing Wetlands is near the northern edge of its breeding range. Though not observed during this study, two singing males were documented in the Minesing Wetlands in 2003 (D. Featherstone, pers.comm.).

Habitat destruction on breeding, migration, and wintering grounds is the major threat to the Cerulean Warbler. Fragmentation of existing habitats, and environmental degradation such as acid rain, also threaten this species (Environment Canada, 2006).

Prothonotary Warbler (*Protonotaria citrea*; Endangered)

The Prothonotary Warbler (*Protonotaria citrea*; Figure 4.44) is a Carolinian species that is at the northern limit of its breeding range in this area. The last documented sighting of this species in Minesing Wetlands was in June 1972, but no firm documentation on its breeding status was provided. The Prothonotary Warbler is the only cavity nesting warbler in North America and prefers nesting in dead trees of flooded woodlands or deciduous swamp forests. Loss of habitat is a major threat to this species.



FIGURE 4.44 PROTHONOTARY WARBLER

Great Blue Heron Heronry

Great Blue Herons (*Ardea herodias*) are colonial nesters (Figure 4.45) and often choose the same nesting location each year. Two Great Blue Heron heronries exist in Minesing Wetlands - one of which is the fifth largest in Southern Ontario (Jacques, 2005). Other

species often utilize abandoned Great Blue Heron nests including Great Horned Owls (*Bubo virginianus*; Figure 4.46). The drowned forests preferred for nesting are likely associated with significant drainage changes that occurred in the 1900s along the wetland periphery (Hanna, 1982).

Wyman Jacques, a local resident and long-time member of the Brereton Field Naturalists, has been leading heronry walks and completing heron counts for the past 14 years. Over this time period, nest counts have ranged from 107 to 340, with the highest count recorded in 1991 (Table 4.6). The number of nests appears to be declining based on these counts (Jacques, 2005).

Table 4. 6 Great Blue Heron Nest Counts

Year	Number of Nests
Early 1970's	300-400
1991	340
2003	107
2004	187
2005	116

Several hypotheses have been postulated for this decline. If a nesting Great Blue Heron feels intimidated by an intruder, it will often abandon its eggs or young. Great Blue Heron adults have few natural predators but intimidation by Bald Eagles may be a potential cause of decline in one of the colonies.

Poor survival of young may also be a factor in the decline. Young are susceptible to predation by crows, birds of prey, gulls and raccoons. Cold weather, heavy rain and pesticide use may also negatively affect survival of nestlings (CWS, 2006).

Natural decline of the drowned swamps preferred for nesting may force herons to abandon declining sites and select “fresher” drowned forests which provide sturdier branch structures for nest construction. Although floodplain swamp peripheries (at least in some areas) appear to be senescing and providing potential habitat for nesting, this process may be slowing thereby reducing available nesting habitat over the long term.



FIGURE 4.45 GREAT BLUE HERON ON NESTS



FIGURE 4.46 GREAT HORNED OWLET IN NEST

4.3.6 Mammals

Various mammal species live or travel through the boundaries of Minesing Wetlands. Some of the animals that have been recorded as part of this inventory report include: Moose (*Alces alces*), Deer (*Odocoileus virginianus*), Raccoon (*Procyon lotor*), River Otter (*Lutra canadensis*), Beaver (*Castor Canadensis*), Muskrat (*Ondatra zibethicus*), Striped Skunk (*Mephitis mephitis*), Grey Squirrel (*Sciurus carolinensis*) and Eastern Chipmunk (*Tamias striatus*). All recorded animals were noted either by presence or by sign (tracks, scat or other activity).

All observations were incidental sightings as formal mammal surveys were not undertaken as part of this project. A number of additional mammal species that undoubtedly inhabit the Minesing Wetlands were not observed due to the size of the study area, secretive character and the various activity peaks of various species. Brush Wolves (*Canis latrans X lycaon*) and Red Fox (*Vulpes vulpes*) are rarely seen at present possibly due to the presence of mange, but population numbers are on the rise. According to local residents, Virginia Opossums (*Didelphis virginiana*) are becoming more common in the area. Historical accounts of mammals from local residents and naturalists include: Black Bear (*Ursus americanus*), Fisher (*Mares pennanti*) and Lynx (*Lynx canadensis*); however, these sightings are rare.

Large numbers of deer and bedding areas were observed during the study period. Deer populations are, in part, controlled through two, one-week long, controlled deer hunts and an archery season each year, administered by the OMNR (G. Findlay, pers.comm.) in accordance with the Provincial *Fish and Wildlife Conservation Act*. Hunting on NVCA-managed lands within the Minesing Wetlands is managed through the sale of hunting access permits (to clarify – NVCA does not manage the hunt as per the provincial hunting regulations, only access is managed).

Trapping has decreased in the wetlands. Two trap lines were abandoned in the mid 1990s and recent requests for trapping on NVCA lands have been turned down by the NVCA Executive Committee (B. Wesson, pers.comm.). Reduced trapping, combined with habitat shifts from swamp forest to shrub thicket/marsh, appears to have led to an increase in Beaver and Muskrat activity in the Minesing Wetlands. Several incidences were noted where vegetation had been consumed, paths worn down and dams and tunnels constructed.

5.0 THREATS

Although the Minesing Wetlands has been impacted to some extent by human activities, and associated shifts in vegetation communities, this study confirms that the Minesing Wetlands continues to provide a rich mosaic of vegetation communities that supports regional and provincial biodiversity, including a number of species designated as provincially rare and/or Species At Risk. It continues to be the hub of an extensive natural heritage system that extends from the Niagara Escarpment to the Canadian Shield.

Though biodiversity within the Minesing Wetlands remains high, it is under pressure from an array of human impacts. This section describes these impacts. Section 6 provides a set of monitoring and management recommendations focused (in part) on understanding and appropriately managing these impacts to ensure the long-term sustainability of significant ecological functions within the wetlands.

5.1 Non-native Species

Reports dating back to the mid-1970s document Common Reed within the Minesing fen, suggesting that the native phenotype may be naturally present. However, there is a perception that the fen has become drier in recent years (B. Bowles, pers.comm.) and that Common Reed may be impacting habitat (Figure 5.1). There is also a possibility that the aggressive European phenotype may have invaded the fen and other wetland areas. Monitoring studies (Section 6.1.2) are recommended to better understand this potential impact.



FIGURE 5.1 PHRAGMITES IN FEN

5.2 Illegal Access

Unauthorized motorized vehicle access, illegal structures (Figure 5.2) and illegal dumping (Figure 5.3) are a major concern in the Minesing Wetlands. These activities are impacting the wetlands through habitat destruction and potential contamination (dumping). Current NVCA enforcement capacity is insufficient to adequately address these threats.

Motorized vehicles, with the exception of emergency vehicles and snowmobiles on designated trails, are prohibited from NVCA-owned lands in the Minesing Wetlands. Signs are posted at all gated entrances to this effect (Figure 5.4). Snowmobile access on designated trails is a long-standing use and has a minimal impact on vegetation communities due to frozen soil conditions and deep snow cover.

Unfortunately, some portions of the Minesing Wetlands are heavily impacted by illegal recreational vehicle activity (Figure 5.5). This activity disrupts soils and can devastate vegetation communities and associated wildlife habitat.

A number of structures have been installed at access points to curtail recreational vehicle access; however, success has been limited with destruction and/or circumvention of these structures occurring within a short time period. Section 6.2.2 provides recommendations to help address these impacts.



FIGURE 5.2 ILLEGAL STRUCTURE



FIGURE 5.3 ILLEGAL DUMPING



FIGURE 5.4 WETLANDS MONITORING SIGNAGE



FIGURE 5.5 UNAUTHORIZED VEHICLE IN MINESING

5.3 Log Jams

Log jams on the major watercourses within the Minesing Wetlands may be affecting wetland hydrology and canoeing access. Tree fall and fluvial transport is a natural part of riverine and wetland processes; however, log jams became a major problem in the 1950s as large numbers of dead elm (victims of Dutch Elm Disease) fell within watershed floodplains and were transported into river systems during flood events. Log jam removal was historically carried out on the Nottawasaga and Mad River systems; however, it was costly and labour intensive and has not been undertaken for a number of years.

Log jams continue to build on the Nottawasaga River (Figure 5.6). Spring floods and major storm events provide an annual supply large branches, trees and other debris that add to existing log jams and/or create new jams. Springwater Township funds annual log jam removal on Willow Creek between the George Johnston Road access point and the Nottawasaga River to maintain a barrier-free canoe route through the Minesing Wetlands.

These log jams restrict canoe passage through otherwise-navigable portions of the Minesing Wetlands. During the summer of 2006, FOMW saw a decline the number of recreational day passes through the Wetlands, but it is uncertain whether this is due to canoe route obstruction or to road construction on George Johnston Road.

Through the Biological Inventory, the primary researchers developed a hypothesis that log jams may be extending the duration of wet soil conditions along the Nottawasaga River levee and impacting important habitat functions (Figure 5.7). Additional investigations, including discussion of this hypothesis with water resources engineering staff, should be undertaken (Section 6.1.6 and Section 6.2.1).



FIGURE 5.6 LOG JAM ON NOTTAWASAGA RIVER



FIGURE 5.7 MOIST LEVEE HABITATS

5.4 Private Land Management

Despite significant protection of the wetlands from land use change through provincial and municipal policies, private lands within the Minesing Wetlands can still be impacted by permitted activities such as logging operations.

Portions of the remaining floodplain swamps remain in private ownership. Though many private landowners are currently excellent stewards of their lands, there is no guarantee that this level of stewardship will continue in the future as lands change hands over time. The significant cut proposed in 2006 on a large parcel of private land in the core of the floodplain swamps near the confluence of the Mad and Nottawasaga Rivers is an example of land management practices that may potentially impact the wetlands.

Significant areas outside of the wetland boundaries have lesser levels of protection though they provide essential ecological functions that support the Minesing Wetlands such as:

- recharge/discharge areas (Algonquin Bluffs/Wetland interface);
- wildlife habitat (i.e. Blanding's Turtle nesting habitat); and,
- significant corridor connections to nearby natural heritage features.

Inappropriate land use activities in these areas may affect ecological features and processes within the Minesing Wetlands.

Sections 6.2.8 and 6.2.9 provide recommendations to address private land management issues.

5.5 Turtle Mortality

Significant roadkill mortality occurs as gravid female turtles migrate to and from nesting areas. Sand and gravel shoulders are also attractive as nesting sites. Since turtles live for

several decades, but have very low egg and hatchling survival rates, adult turtle survival is critical for population maintenance – the turtles must survive long enough to replace themselves or populations will decline to unsustainable levels. Busy arterial roads that cut through wetlands (such as George Johnston Road) often result in significant mortality and are a threat to local populations. Section 6.2.4 provides recommendations to address this issue.

5.6 Wildlife Imbalance

Changes in natural food web dynamics associated with the loss of top predators and anthropogenically-altered energy inputs, may potentially result in ecological imbalances that may affect wetland management objectives. Two potential examples of these changes were observed during this study.

The sustainability of turtle populations is affected by nest predation. Adult turtles breed and nest on multiple occasions during their lifetimes; only one of these nesting efforts needs to be successful to replenish the local population. Nesting failures are common and are often associated with Raccoon and Skunk predation. This mesopredator predation was observed at the Snow Valley site. Additional development in the Snow Valley and Midhurst area may result in further increases in mesopredator populations in the vicinity of the Minesing Wetlands. Additional nesting predation pressures may affect the long-term viability of local turtle populations.

Reduced trapping and lack of natural predators combined with habitat shifts from swamp forest to shrub thicket/marsh, appear to have increased Beaver and Muskrat activity in the Minesing Wetlands. Several incidences were noted where vegetation had been consumed, paths worn down and dams and tunnels constructed. An overabundance of Beaver and Muskrat in the Wetlands may result in further changes to floodplain vegetation dynamics and habitat function.

Section 6.2.5 provides recommendations for potential wildlife management to address these issues.

6.0 RECOMMENDATIONS

Study findings have been used to generate a set of recommendations to aid in:

- Monitoring vascular plant and wildlife populations;
- Protecting wetland habitats from illegal activities;
- Enhancing wildlife habitat;
- Educating the public about the importance of the Minesing Wetlands;
- Protecting wetlands from adjacent land use changes (urban development); and,
- Developing acquisition priorities.

These recommendations can be divided into two categories: Monitoring and Management. Educational opportunities should be a key component within both these categories to inform the public of the importance of the Minesing Wetlands and cultivate community stewardship.

6.1 Monitoring

Monitoring is labour-intensive and requires innovative partnerships to be successful – no one agency or group can do it alone. Research and monitoring in the Minesing Wetlands has benefited from partnership projects in the past and will need to rely on these synergies in the future.

The Minesing Wetlands Monitoring Team, formed through this study, should be kept in place to record any incidental or formal surveys of flora and fauna. This team will aid in the maintenance and update of biological databases. The monitoring team should be supported/guided by NVCA (or other agency) staff.

NVCA and other conservation partners should liaise with post-secondary education institutions to develop research partnerships which benefit the Minesing Wetlands.

6.1.1 *Vegetation Communities*

Changes to drainage within and adjacent to the Minesing Wetlands has resulted in significant changes to wetland hydrology. Large areas of swamp forest have been converted to marsh. Anecdotal observations by knowledgeable wetlands observers (W. Jacques, pers. comm.) and field work undertaken during this study suggest that floodplain swamp forests in some areas continue to die back and revert to marsh. Additional work should be undertaken to identify the extent of these changes through:

- Additional ground truthing of vegetation community boundaries in marsh/wetland transition areas;
- Identification of spatial change in forest cover over time using air photos and orthophotography; and,
- Monitoring of transition areas to identify potential causes of vegetation community shifts.

Coarse Ecological Land Classification (ELC) mapping has been undertaken for the Minesing Wetlands; however, finer resolution mapping utilizing the full ELC protocol would provide more accurate mapping and provide a better baseline for future monitoring efforts.

6.1.2 Common Reed (*Phalaris australis*)

Reports dating back to the mid-1970s document Common Reed within the Minesing fen, suggesting that the native phenotype may be naturally present. However, there is a perception that the fen has become drier in recent years (B. Bowles, pers.comm.) and that Common Reed may be impacting orchid habitat. There is also a possibility that the aggressive European phenotype may have invaded the fen and other wetland areas. The following monitoring studies are recommended:

- The extent of the Common Reed population in the Minesing fen has been delineated through this study and provides an excellent benchmark to track potential future expansion. Annual monitoring of this population should be undertaken to track trends.
- Density-based monitoring should also be considered to track community dynamics (i.e. potential trend toward monoculture) within the population area.
- Common Reed should be collected from the fen and other locations within the Minesing Wetlands for analyses to determine phenotypes and potential future management actions

6.1.3 Rare Orchids

OMNR staff plan to continue their Eastern Prairie White Fringed Orchid inventories in Minesing Wetlands to assess populations trends and potential causes of the observed decline. The presence of the hybrid orchid raises several potential research questions:

- What is the genetic relationship between Eastern Prairie White Fringed Orchid and the more common Purple Orchid?
- What is the genetic vigour of the hybrid orchid compared to the parent species?
- Could the hybrid orchid possibly impact the Eastern Prairie White Fringed Orchid? If so, what management action should be taken, if any?
- Should the hybrid be designated as a Species At Risk?

Continued monitoring and research, coordinated with the Species Recovery Team, is recommended to assess rare orchid populations and and potential management actions.

6.1.4 Invertebrates

In-season monitoring should continue to determine the status of Hackberry Emperor within the Minesing Wetlands. Other provincially rare Odonates should also be periodically monitored.

NVCA staff should continue to monitor benthic invertebrates in watercourses within and adjacent to the Minesing Wetlands to assess the health of these systems.

6.1.5 Fish

The Minesing Wetlands supports a unique, grass-spawning population of Walleye. Anecdotal evidence suggests that this population has been in decline for a number of years. Additional research is needed to verify the status of the walleye population. This would likely require research both within, and outside of, the Minesing Wetlands.

6.1.6 Turtles

This study has documented the presence of three turtle species designated as Species At Risk:

- Wood Turtle
- Blanding's Turtle
- Map Turtle

A fourth Species At Risk, Spotted Turtle, has historically inhabited the Minesing Wetlands though its presence was not confirmed through this study. Populations of snapping turtle may be at risk due to excessive predation and road mortality. Recommendations (to be coordinated with Species Recovery Teams) include:

- Additional monitoring to assess status of the Wood Turtle population (with an emphasis on habitat conditions at potential nesting sites);
- Additional monitoring to determine the presence/absence of Spotted Turtle (emphasis on potential breeding aggregation areas in early/mid spring);
- Identification of Critical Habitat (particularly important for Blanding's Turtles which may move hundreds of meters from the wetland boundary); and,
- Monitoring of nesting success (Blanding's and Snapping Turtles).

6.1.7 Birds

Minesing Wetlands provides a diverse range of habitats for bird species that breed in forest, thicket and marsh habitats. Several of these species are provincially rare and/or Species At Risk. Standard breeding bird monitoring protocols should be used to monitor breeding bird populations within the Minesing Wetlands. The Marsh Monitoring Protocol should be employed at several marsh stations (as many stations as logistically possible including known breeding areas for rare species/Species At Risk). The Forest Bird Monitoring Program should be set up for several forest stations covering a range of habitat types (ensuring that the Carolinian swamp forest is well represented).

6.2 Management

The *Minesing Swamp Management Plan 2003-2008* (NVCA, 2002) identifies and provides actions for specific wetland management issues. Field investigations undertaken in support of the *Minesing Wetland Biological Inventory* have identified several potential issues that should be considered for management direction in future management plan updates.

6.2.1 Log Jams

Log jams on the major watercourses within the Minesing Wetlands may be affecting wetland hydrology. Through this study, the primary researchers developed a hypothesis that log jams may be extending the duration of wet soil conditions along the Nottawasaga River levee and impacting important habitat functions.

Additional investigations, including discussion of this hypothesis with water resources engineering staff, should be undertaken to better understand the dynamics and potential ecological impacts (positive and negative) of log jams within the Minesing Wetlands. The results of these investigations should be used to guide future management actions.

6.2.2 Illegal Access/Activities

Unauthorized motorized vehicle access, illegal dumping and illegal structures are a major concern in the Minesing Wetlands. These activities are impacting the wetlands through habitat destruction and potential contamination (dumping). Current NVCA enforcement capacity is insufficient to adequately address these threats.

Structural Control Recommendation

Additional research should be pursued to determine a suitable structure to control unauthorized motorized vehicles. Construction of significant structures to control access to the Minesing Wetlands is very challenging from an ecological and economic perspective. Structures would have to be designed to control access while protecting ecological communities and functions. Funding and maintenance of the structure would have to be addressed.

Enforcement Recommendation

The Minesing Wetlands Monitoring Team or similar community watch program should be kept in place to record and report unauthorized activities within the NVCA and other publically-owned lands. This program could be coordinated by an NVCA staff member or a volunteer with support from NVCA staff.

Additional funding should be secured to enforce existing regulations and curtail illegal activities.

6.2.3 Wildlife Habitat Enhancement

Bird Boxes (for various species)

Although not specifically a wildlife enhancement (since natural tree cavities are abundant in the Minesing Wetlands), construction and erection of nesting boxes is an important educational tool.

Education through various activities is the most effective way to inform the public about the importance of the Minesing Wetlands and involve them in the long-term stewardship of this area. Through Friends of Minesing Wetlands, an annual Bird Box Day has been established to educate parents and children about Minesing Wetlands and its wildlife habitat. This Bird Box Day program should be continued.

Boxes have been designed to target the Eastern Bluebird (Figure 6.1), Wood Duck (Figure 6.2) and other cavity nesters that may utilize the boxes for nesting purposes. The rare Prothonotary Warbler, once recorded in Minesing Wetlands, is a cavity nester; erection of nest boxes in suitable habitat could encourage this species to nest in the future.



FIGURE 6.1 BLUE BIRD BOX



Toronto Region Conservation Authority, 2005
FIGURE 6.2 WOOD DUCK IN BOX

Fort Willow Wildlife Habitat Initiatives

Enhancement of wildlife habitat is being undertaken by volunteers of the Fort Willow Improvement Group and NVCA to aid Monarch butterfly and turtles.

Monarch gardens are being planted at Fort Willow. Milkweed (*Asclepias syriaca*) plantings will provide a key food source for Monarch butterfly larvae.

Turtle habitat enhancement at Fort Willow is in the development stages. The development plans involve moving a sand/gravel mix into a well-drained clearing where sunlight will be able to warm the sand. This will provide excellent nesting and incubation habitat for turtles.

These habitat initiatives should continue to be supported.

6.2.4 Turtle Mortality

Turtle roadkill is a significant source of mortality and a significant threat to turtle populations throughout Southern Ontario. Establishing a “Kids For Turtles” chapter (B.Bowles, founder) in this area is essential to protect the herpetiles of Minesing Wetlands. This group should be encouraged to erect Turtle Crossing Signs in a number of locations around Minesing Wetlands - particularly George Johnston Road - and be expanded throughout the NVCA watershed.

6.2.5 Wildlife Management

Two potential wildlife management issues were identified during the study:

- Excessive turtle nest predation (Raccoons and Skunks)
- Vegetation community impacts associated with high Beaver and Muskrat populations

Public landowners and interest groups should work closely with the MNR (wildlife management mandate) to develop a better understanding of these potential issues and identify appropriate management solutions.

6.2.6 Hydrology Meters

In 2000, a Masters student from Queen’s University undertook a hydrology study in Minesing Wetlands. A tower station and 45 water level meters were installed for the project. Many of the pipes have lost their caps and pose a contamination risk to underlying groundwater supplies. These pipes also impact wetland aesthetics.

Removal of these pipes would be time consuming and may result in some disturbance to nearby areas. Replacing caps with secure, permanent cap fittings would alleviate potential contaminant concerns and allow for future hydrogeological investigations. This

project could be taken on by FOMW members as a “volunteer for nature” initiative in conjunction with Ontario Nature. This would also educate other nature enthusiasts about the Minesing Wetlands.

6.2.7 Wetland Boundary Refinements

During the course of the study, several areas of unevaluated wetlands were identified contiguous with, and in close proximity to, the existing wetland boundaries:

- Contiguous unevaluated swamp forests, thickets and marshes were observed along Black Creek and its tributaries east of George Johnston Road
- Unevaluated swamp forests, thickets and marshes were observed along the base of the Lake Algonquin bluffs above the Payette shoreline.

MNR should consider refining wetland boundaries and adding unevaluated wetland units to the Minesing Wetlands complex.

6.2.8 Acquisition Priorities

Despite significant protection of the wetlands from land use change through provincial and municipal policies, private lands within the Minesing Wetlands can still be impacted by permitted activities such as aggressive logging. Significant contributing areas outside of the wetland boundaries have lesser levels of protection - inappropriate land use activities in these areas may affect ecological features and processes within the Minesing Wetlands.

Though many private landowners are currently excellent stewards of their lands, there is no guarantee that this level of stewardship will continue in the future as lands change hands over time. Property acquisition continues to be a key tool for the protection of the Minesing Wetlands and adjacent lands.

NVCA staff should continue to work closely with NCC and other conservation partners to identify acquisition priorities within, and adjacent to, the Minesing Wetlands. Priority ranking should be based on ecological criteria and potential threats assessment.

6.2.9 Corridors and Land Use Planning

Though the Minesing Wetlands is protected from planning-driven land use changes, land use changes on adjacent lands can have significant effects on wetland functions. Continued development in the Snow Valley settlement area may impact Blanding’s Turtle nesting habitat while urban expansion in Midhurst may threaten corridor connections to Little Lake, the Oro Moraine and the Canadian Shield. Planning agencies at all levels need to consider land use change from a landscape ecology perspective to ensure that significant natural heritage systems are protected at a local, regional and provincial scale.

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GLOSSARY

This glossary defines some of the terms used in the Minesing Wetlands Biological Inventory. The definitions were obtained from sources cited in the reference section of this report. The definitions are in context of this report.

ArcGIS	ArcGIS is an integrated collection of geographic information system (GIS) software products used to compile, author, analyze, map and publish geographic information and knowledge.
Area of Natural and Scientific Interest (ANSI)	Areas of land and water containing natural landscapes or features that have values related to protection, natural heritage appreciation, scientific study or education. Depending on the features of particular areas, they may be referred to as life science or earth science sites.
biodiversity	Variability of and among living organisms including genetic and species differences. Also includes ecosystem diversity.
Boreal Forest	Characterized by evergreen conifers and long winters.
carapace	Hard outer covering or case, the top portion a turtle's shell,
Carolinian Forest	Characterized primarily by a predominance of deciduous or broad-leaf trees.
coniferous forest (FOC)	A forest community with tree cover made up of 75% or more coniferous trees.
coniferous swamp (SWC)	A swamp community with tree cover > 25%, trees > 5m in height and coniferous tree species > 75% of canopy cover.
cultural community	A vegetation community originating from or maintained by anthropogenic influences and culturally based disturbances.
cultural meadow (CUM)	Open terrestrial communities characterized by grasses or forbs; usually originating or maintained by cultural disturbances such as mowing, burning or grazing.
cultural plantation (CUP)	A deciduous or coniferous treed community in which the majority of trees have been planted.
cultural savanna (CUS)	Treed communities with 11-35% cover of coniferous or deciduous trees.
cultural thicket (CUT)	A terrestrial vegetation type that is characterized by <10% tree cover and >25% tall shrub cover.
cultural woodland (CUW)	A treed community with 35% to 60% cover of coniferous or deciduous trees.
CWS	Canadian Wildlife Service
deciduous forest (FOD)	A forest community with a canopy cover of 75% or more deciduous trees.
deciduous swamp (SWD)	A swamp community with tree cover > 25%, trees > 5m in height and deciduous tree species > 75% of canopy cover.
Ecological Land Classification (ELC)	A classification system that uses tools and techniques developed for the consistent identification, classification, description and mapping of ecological land units in southern Ontario.
ecosystem approach	Studying the ecosystem (plants, animals, fungi, microorganisms and their environment) as a whole rather than studying any one of its individual components.
FOMW	Friends of Minesing Wetlands
forest	A treed community with tree cover >60%

	Grasses, sedges (grass-like plants), and rushes (marsh plants).
GPS Unit	Global Positioning System, a receiver that allows you to interact with the GPS satellite system for navigation and other applications.
Heronry	A breeding ground for herons. Also called a Rookery.
herpetiles	A term used to collectively describe reptiles and amphibians.
impervious area	An area where the surface can not infiltrate water as it once did with the presence of vegetation. Fish and wildlife habitat is significantly altered and/or destroyed and runoff processes are disturbed. Channel erosion and downstream flooding can result. Example: paved parking lot.
interior forest	Forest cover with a minimum of 100m from a forest edge.
meadow marsh (MAM)	An area at the wetland-terrestrial interface, which is seasonally inundated with water and usually dominated by grasses or forbes.
mixed forest (FOM)	A forest community with cover made up of 75% or more with a mixed composition of trees (deciduous and coniferous) where each component has a cover >25% but <75%.
mixed swamp (SWM)	A swamp with tree cover > 25%, trees > 5m in height and canopy cover with > 25% coniferous tree species and > 25% deciduous tree species.
MNR or OMNR	Ontario Ministry of Natural Resources.
natural heritage	Incorporates all living organisms, natural areas and ecological communities which we inherit and leave to future generations.
NCC	Nature Conservancy of Canada
NVCA	Nottawasaga Valley Conservation Authority
non-intensive agriculture (NAG)	Land that is used as pasture or for grazing (includes hay fields).
open fen (FEO)	A wetland with a peat substrate and nutrient-rich waters that is primarily vegetated by shrubs and graminoids. An open fen has <10% tree cover and <25% shrub cover.
physiography	The study of physical features on the earth's surface.
plastron	the ventral part of the shell of a tortoise or turtle
Provincial Policy Statement (PPS)	The Provincial Policy Statement sets out the Ontario government's interests in land-use planning and development and provides policy direction on matters of provincial interest.
Provincially Significant Wetland (PSW)	A wetland that has been deemed provincially significant by the Ministry of Natural Resources (MNR) utilizing criteria from the Ontario Wetland Evaluation System.
RAMSAR	The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 152 Contracting Parties to the Convention, with 1611 wetland sites, totaling 145.2 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance.
riparian zone	Areas of vegetated land located directly adjacent to a river or stream, also referred to as Buffers.
rural development (RUD)	Any type of development outside an urban area; generally less than or equal to three rooftops within close proximity to one another; may or may not exist within or adjacent to natural area.
shallow marsh (MAS)	Vegetation communities with a water table that rarely drops below the substrate surface and vegetation composed primarily of broad-leaved or narrow-leaved emergent species.

shallow water (SA)	Aquatic communities in which the permanent water is generally <2metres deep and in which there is a vegetation cover of 25% composed mainly of submerged or floating-leaved species.
sub-watershed	The land drained by an individual tributary to the main watercourse.
swamp	A natural community with > 25% tree or shrub cover that is dominated by hydrophytic shrub and tree species. Swamps have a variable flooding regime, water depth < 2m and 20% of the ground covered by standing or vernal pooling.
terrestrial	Anything living or growing on land.
thicket swamp(SWT)	A wetland characterized by <10% tree cover and >25% shrub cover.
treed fen (FET)	Wetland with a peat substrate and nutrient-rich waters that is primarily vegetated by shrubs and graminoids. A treed fen has >10% tree cover.
tributary	A smaller stream that contributes its waters and joins a larger river.
UNESCO	United Nations' Educational, Scientific and Cultural Organization which designates such things as World Biosphere Reserves.
urban development (URB)	Areas consisting of 4 or more rooftops within close proximity to one another.
wetland	A natural community characterized by hydric soils, hydrophytic plant species having a variable flooding regime; includes swamps, marshes, bogs and fens.
watershed	The land drained by a river and its tributaries.

APPENDICES

Appendix A: Vascular Plants

From Checklist of Vascular Plants of Simcoe County by R.L. Bowles revised July, 2003

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
1	<i>Abies balsamea</i> (L.) Miller	Balsam Fir		S5	X	X	X				X
2	<i>Acer fremanii</i> (saccharumXrubrum)	Freeman's Maple			O			X	X	X	X
3	<i>Acer negundo</i> L.	Manitoba Maple	X	S5	X	X				X	X
4	<i>Acer rubrum</i> L.	Red Maple	X	S5	X		X	X	X	X	X
5	<i>Acer saccharinum</i> L.	Silver Maple	X	S5	X		?	?		?	?
6	<i>Acer saccharum</i> Marshall ssp. <i>nigrum</i> (Michx. f.) Desmarais	Black Maple		S4?	X			X			
7	<i>Acer saccharum</i> Marshall ssp. <i>saccharum</i>	Sugar Maple	X	S5	X	X	X	X			X
8	<i>Acer spicatum</i> Lam.	Mountain Maple	X	S5	X	X		X			X
9	<i>Achillea millefolium</i> L. ssp. <i>millefolium</i>	Common Yarrow		SU	X						X
10	<i>Actaea pachypoda</i> Elliot	White Baneberry		S5	X	X	X			X	X
11	<i>Actaea rubra</i> (Aiton) Willd.	Red Baneberry	X	S5	X						X
12	<i>Adiantum pedatum</i> L.	Northern Maidenhair Fern	X	S5	X						X
13	<i>Agrimonia gryposepala</i> Wallr.	Tall Hairy Agrimony	X	S5	X						X
14	<i>Agrostis gigantea</i> Roth	Red-top	X	SE5	X						
15	<i>Agrostis scabra</i> Willd.	Fly-away Grass	X	S5	X	X					X
16	<i>Agrostis stolonifera</i> L.	Redtop	X	S5	X						
17	<i>Alisma plantago-aquatica</i> L.	Common Water-plantain		SR	X	X				X	X
18	<i>Alliaria petiolata</i> (M. Bieb.) Cavara & Grande	Garlic Mustard		SE5	O	X		X		X	X
19	<i>Allium tricoccum</i> Alton	Wild Leek	X	S5	X	X			X	X	X
20	<i>Alnus incana</i> ssp. <i>Rugosa</i> (Du Roi) Clausen	Speckled Alder	X	S5	X	X	X				X
21	<i>Alopecurus aequalis</i> Sobol.	Water Foxtail	X	S4S5	X						
22	<i>Amaranthus tuberculatus</i> (Moq.) Sauer	Rough-fruit Amaranth	X	S4	X						
23	<i>Ambrosia artemisiifolia</i> L.	Common Ragweed		S5	O	X			X	X	X
24	<i>Amelanchier spicata</i> (Lam.) K. Koch	Low Juneberry	X		X						X
25	<i>Amphicarpaea bracteata</i> (L.) Fern.	Hog Peanut		S5	X	X			X	X	X
26	<i>Anaphalis margaritacea</i> (L.) Benth. & Hook. f. ex C.B. Clarke	Pearly Everlasting		S5	X						
27	<i>Andromeda polifolia</i> L. ssp. <i>glaucophylla</i> (Link) Hultén	Bog Rosemary	X	S5	X		X				X
28	<i>Anemone acutiloba</i> (DC.) G. Lawson	Sharp-lobed Hepatica	X	S5	X						X
29	<i>Anemone canadensis</i> L.	Canada Anemone	X	S5	X	X		X		X	X
30	<i>Anemone cylindrica</i> A. Gray	Thimbleweed		S4	X						

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
31	<i>Anemone virginiana</i> L. var. ?	Thimbleweed	X	S5	X						
32	<i>Angelica atropurpurea</i> L.	Dark-purple Alexanders	X	S5	X		X	X	X		X
33	<i>Antennaria neglecta</i> Greene	Field Pussytoes	X	S5	X						
34	<i>Apocynum androsaemifolium</i> L. ssp. <i>Androsaemifolium</i>	Spreading Dogbane	X	S5	O						X
35	<i>Apocynum cannabinum</i> L. var. ?	Indian Hemp	X	S5	O						
36	<i>Aquilegia canadensis</i> L.	Wild Columbine	X	S5	X						X
37	<i>Aralia nudicaulis</i> L.	Wild Sarsaparilla	X	S5	X	X	X			X	X
38	<i>Aralia racemosa</i> L. ssp. <i>racemosa</i>	Spikenard		S5	X						
39	<i>Arctium minus</i> (Hill) Bernh. ssp. ?	Common Burdock		SE5	X	X	X	X	X	X	X
40	<i>Arethusa bulbosa</i> L.	Arethusa		S4	X						
41	<i>Arisaema triphyllum</i> (L.) Schott	Small Jack-in-the-Pulpit	X	S5	X	X	X	X	X	X	X
42	<i>Artemisia vulgaris</i> L.	Common Mugwort		SE5	O					X	
43	<i>Asarum canadense</i> L.	Wild Ginger	X	S5	X						X
44	<i>Asclepias incarnata</i> L. ssp. <i>incarnata</i>	Swamp Milkweed	X	S5	X	X	X	X	X	X	X
45	<i>Asclepias syriaca</i> L.	Common Milkweed		S5	X	X		X	X		X
46	<i>Aster borealis</i> (Torr. & A.Gray) Prov.	Rush Aster	X	S5	X						
47	<i>Aster laevis</i> L. var. <i>laevis</i>	Smooth Blue Aster		S5	X						
48	<i>Aster lanceolatus</i> Willd. ssp. <i>lanceolatus</i>	Tall White Aster	X	S5	O					X	
49	<i>Aster lateriflorus</i> (L.) Britton var. ?	Calico Aster	X	S5	X	X				X	X
50	<i>Aster novae-angliae</i> L.	New England Aster		S5	O						X
51	<i>Aster puniceus</i> L. var. ?	Purple-stemmed Aster	X	S5	X						
52	<i>Aster umbellatus</i> Miller var. ?	Flat-top White Aster		S5	X						X
53	<i>Aster urophyllus</i> Lindl.	Arrow-leaved Aster		S4	X						
54	<i>Athyrium filix-femina</i> (L.) Roth ex Mert var. <i>angustum</i> (Willd.) G. Lawson	Northern Lady Fern	X	S5	X		X				X
55	<i>Barbarea vulgaris</i> R. Br.	Yellow Rocket		SE5	X			X	X		X
56	<i>Berberis thunbergii</i> DC.	Japanese Barberry		SE5	O				X		
57	<i>Betula alleghaniensis</i> Britt.	Yellow Birch		S5	X		X				X
58	<i>Betula papyrifera</i> Marsh.	White Birch	X	S5	X	X	X				X
59	<i>Bidens cernua</i> L.	Stick-tight		S5	X						X
60	<i>Bidens frondosa</i> L.	Devil's Beggar-ticks	X	S5	X						X
61	<i>Boehmeria cylindrica</i> (L.) Sw.	False Nettle	X	S5	X	X	X	X	X	X	X
62	<i>Botrychium virginianum</i> (L.) Swartz	Rattlesnake Fern	X	S5	X						
63	<i>Brachyelytrum erectum</i> (Schreb.) P. Beauv.	Bearded Short-husk		S4S5	X						

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
64	<i>Bromus ciliatus</i> L.	Fringed Brome	X	S5	X						
65	<i>Bromus inermis</i> Leyss. Ssp. <i>inermis</i>	Awnless Brome		SE5	O	X			X		X
66	<i>Bromus latiglumis</i> (Shear) Hitchc.	Broad-glumed Brome	X	S4	X						
67	<i>Calamagrostis canadensis</i> (Michx.) P. Beauv.	Blue-joint Grass	X	S5	X		X		X		X
68	<i>Calamagrostis stricta</i> (Timm) Koeler ssp. <i>inexpansa</i> (A. Gray) C.W. Greene	Narrow Reed Grass	X	S5	X						
69	<i>Calopogon tuberosus</i> (L.) B.S.P.	Tuberous Grass-pink	X	S4S5	X		X				X
70	<i>Caltha palustris</i> L.	Marsh Marigold	X	S5	X	X	X				X
71	<i>Calystegia sepium</i> (L.) R.Br. ssp. <i>Americanum</i> (Sims) Brummitt	Hedge Bindweed		S5	X	X		X	X		X
72	<i>Campanula aparinoides</i> Pursh	Marsh Bellflower	X	S5	X	X	X		X		X
73	<i>Capsella bursa-pastoris</i> (L.) Medik.	Shepherd's Purse		SE5	X						
74	<i>Cardamine bulbosa</i> (Schreb. ex Muhlenb.) B.S.P.	Bulbous Cress		S4	X						
75	<i>Cardamine diphylla</i> (Michx.) Alph. Wood	Two-leaved Toothwort		S5	O		X	X			
76	<i>Cardamine pensylvanica</i> Muhlenb. ex Willd.	Pennsylvania Bitter-cress		S5	X						
77	<i>Carex albursina</i> E. Sheld.	White Bear Sedge	X	S5	X						X
78	<i>Carex alopecoidea</i> Tuckerm.	Foxtail Sedge	X	S5	X						
79	<i>Carex amphibola</i> Steud.	Narrow-leaved Sedge	X	S2	X						
80	<i>Carex aquatilis</i> Wahlenb.	Aquatic Sedge	X	S5	X						
81	<i>Carex arctata</i> Boott	Drooping Wood Sedge	X	S5	X						
82	<i>Carex aurea</i> Nutt.	Golden-fruited Sedge	X	S5	X						X
83	<i>Carex bebbii</i> (L.H. Bailey) Olney ex Fern.	Bebb's Sedge	X	S5	X						
84	<i>Carex blanda</i> Dewey	Woodland Sedge	X	S5	X						
85	<i>Carex bromoides</i> Schkuhr ex Willd.	Bromelike Sedge	X	S5	X						
86	<i>Carex buxbaumii</i> Wahlenb.	Brown Sedge	X	S5	X						
87	<i>Carex cephaloidea</i> (Dewey) Dewey	Thin-leaved Sedge	X	S5	X						
88	<i>Carex chordorrhiza</i> Ehrh. ex L. f.	Creeping Sedge		S5	X						
89	<i>Carex comosa</i> Boott	Bristly Sedge	X	S5	X						
90	<i>Carex crinita</i> Lam.	Fringed Sedge		S5	X						
91	<i>Carex cristatella</i> Britton	Crested Sedge	X	S5	X						
92	<i>Carex cryptolepis</i> Mack.	Small Yellow Sedge	X	S4	X					X	
93	<i>Carex deweyana</i> Schwein.	Dewey's Sedge	X	S5	X						
94	<i>Carex diandra</i> Schrank	Lesser Panicked Sedge	X	S5	X						

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
95	<i>Carex disperma</i> Dewey	Soft-leaved Sedge		S5	X						
96	<i>Carex echinata</i> Murray ssp <i>echinata</i>	Prickly Sedge		S5	X						
97	<i>Carex exilis</i> Dewey	Coast Sedge	X	S5	X						
98	<i>Carex flava</i> L.	Yellow Sedge	X	S5	X		X				X
99	<i>Carex folliculata</i> L.	Long Sedge	X	S3	X						
100	<i>Carex formosa</i> Dewey	Handsome Sedge		S3S4	X						
101	<i>Carex gracillima</i> Schwein.	Graceful Sedge	X	S5	X					X	
102	<i>Carex granularis</i> Muhlenb. ex Willd.	Meadow Sedge	X	S5	X						
103	<i>Carex grayi</i> Carey	Gray's Sedge	X	S4	X						
104	<i>Carex gynocrates</i> Wormsk. ex Drejer	Northern Bog Sedge	X	S5	X						
105	<i>Carex hitchcockiana</i> Dewey	Hitchcock's Sedge	X	S5	X						
106	<i>Carex hystericina</i> Muhlenb. ex Willd.	Porcupine Sedge	X	S5	X						X
107	<i>Carex interior</i> L.H. Bailey	Inland Sedge	X	S5	X						X
108	<i>Carex intumescens</i> Rudge	Bladder Sedge	X	S5	X	X				X	X
109	<i>Carex lacustris</i> Willd.	Lake-bank Sedge	X	S5	X		X				X
110	<i>Carex laevivaginata</i> (Kükenth.) Mack.	Smooth-sheathed Sedge	X	S4	X						
111	<i>Carex lasiocarpa</i> Ehrh.	Slender Sedge	X	S5	X		X				
112	<i>Carex laxiflora</i> Lam.	Loose-flowered Sedge	X	S5	X						
113	<i>Carex lenticularis</i> Michx.	Lenticular Sedge		S5	X						
114	<i>Carex leptalea</i> Wahlenb. ssp. <i>leptalea</i>	Bristle-stalked Sedge	X	S5	X						
115	<i>Carex leptonevia</i> (Fern.) Fern.	Finely-nerved Sedge	X	S4	X						
116	<i>Carex limosa</i> L.	Mud Sedge	X	S5	X		X				
117	<i>Carex livida</i> (Wahlenb.) Willd.	Livid Sedge	X	S5	X						
118	<i>Carex lupulina</i> Muhlenb. ex Willd	Hop Sedge	X	S5	X						X
119	<i>Carex magellanica</i> Lam. ssp. <i>irrigua</i> (Wahlenb.) Hiit.	Stunted Sedge		S5	X						X
120	<i>Carex peckii</i> Howe	Peck's Sedge	X	S5	X						
121	<i>Carex pedunculata</i> Muhlenb. ex Willd.	Long-stalked Sedge	X	S5	X		X				X
122	<i>Carex plantaginea</i> Lam.	Plantain-leaved Sedge	X	S5	X						
123	<i>Carex platyphylla</i> J. Carey	Broad-leaved Sedge		S5	X						
124	<i>Carex prairea</i> Dewey	Prairie Sedge	X	S5	X						

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bocek	Other
125	<i>Carex projecta</i> Mack.	Necklace Sedge	X	S5	X						
126	<i>Carex pseudo-cyperus</i> L.	Cypress-like Sedge	X	S5	X						X
127	<i>Carex retrorsa</i> Schwein.	Retrorse Sedge	X	S5	X						
128	<i>Carex rosea</i> Schkuhr ex Willd.	Stellate Sedge	X	S5	X		X				X
129	<i>Carex scabrata</i> Schwein.	Rough Sedge	X	S5	O		X				X
130	<i>Carex spicata</i> Hudson	Spiked Sedge	X	SE5	X						
131	<i>Carex sterilis</i> Willd.	Sterile Sedge	X	S4	X						
132	<i>Carex stipata</i> Muhlenb. ex Willd.	Awl-fruited Sedge	X	S5	X	X					X
133	<i>Carex stricta</i> Lam.	Tussock Sedge	X	S5	X	X	X				X
134	<i>Carex tenera</i> Dewey	Straw Sedge	X	S5	X						
135	<i>Carex tenuiflora</i> Wahlenb.	Sparse-flowered Sedge	X	S5	X						
136	<i>Carex trisperma</i> Dewey var. <i>trisperma</i>	Three-seeded Sedge		S5	X						
137	<i>Carex tuckermanii</i> Dewey	Tuckerman's Sedge	X	S4	X						X
138	<i>Carex vaginata</i> Tausch	Sheathed Sedge	X	S5	X						
139	<i>Carex viridula</i> Michx. ssp. <i>viridula</i>	Greenish Sedge	X	S5	X						
140	<i>Carex vulpinoidea</i> Michx.	Fox Sedge	X	S5	X						X
141	<i>Carpinus caroliniana</i> Walt.	American Hornbeam	X	S5	X					X	X
142	<i>Celastrus scandens</i> L.	Climbing Bittersweet		S5	X						X
143	<i>Celtis occidentalis</i> L.	Hackberry	X	S4	X			X	X		
144	<i>Cephalanthus occidentalis</i> L.	Eastern Buttonbush	X	S5	X						X
145	<i>Cerastium fontanum</i> Baumg.	Larger Mouse-ear Chickweed	X	SE5	X						
146	<i>Ceratophyllum demersum</i> L.	Common Coontail	X	S5	O			X			
147	<i>Chamaedaphne calyculata</i> (L.) Moench	Leatherleaf	X	S5	X		X				X
148	<i>Chelone glabra</i> L.	Turtlehead	X	S5	X						X
149	<i>Chenopodium album</i> L.	White Goosefoot		SE5	O					X	
150	<i>Chrysanthemum leucanthemum</i> L.	Ox-eye Daisy	X	SE5	X	X			X	X	X
151	<i>Cichorium intybus</i> L.	Chicory		SE5	X					X	X
152	<i>Cicuta bulbifera</i> L.	Bulb-bearing Water-hemlock		S5	X	X			X	X	X
153	<i>Cicuta maculata</i> L.	Spotted Water-hemlock	X	S5	X		X	X	X	X	X
154	<i>Cinna latifolia</i> (Trevir. ex Goepf) Griseb. In Ledeb.	Broad-leaved Reed Grass		S5	X						
155	<i>Circaea alpina</i> L.	Smaller Enchanter's Nightshade		S5	X						X

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
156	<i>Circaea lutetiana</i> L. ssp. <i>canadensis</i> (L.) Aschers. & Magnusson.	Yellowish Enchanter's Nightshade		S5	X						X
157	<i>Cirsium arvense</i> (L.) Scop.	Canada Thistle		SE5	X	X			X	X	X
158	<i>Cirsium muticum</i> Michx.	Swamp Thistle	X	S5	X						
159	<i>Cirsium vulgare</i> (Savi) Ten.	Bull Thistle	X	SE5	O				X		X
160	<i>Cladium mariscoides</i> (Muhlenb.) Torr.	Water Bog-rush	X	S5	X		X				
161	<i>Clematis virginiana</i> L.	Virgin's-bower	X	S5	X	X	X	X	X	X	X
162	<i>Clintonia borealis</i> (Ait.) Raf.	Blue Bead-lily	X	S5	X		X				X
163	<i>Convolvulus arvensis</i> L.	Field Bindweed		SE5	O				X		X
164	<i>Coptis trifolia</i> (L.) Salisb.	Goldthread	X	S5	X		X				
165	<i>Corallorhiza striata</i> Lindley	Striped Coral-root		S4	X						
166	<i>Cornus alternifolia</i> L. f.	Alternate-leaved Dogwood		S5	X		X		X		X
167	<i>Cornus amomum</i> Miller ssp. <i>obliqua</i> (Raf.) J.S.Wilson	Silky Dogwood		S5	X					X	X
168	<i>Cornus canadensis</i> L.	Bunchberry		S5	X		X				X
169	<i>Cornus rugosa</i> Lam.	Round-leaved Dogwood		S5	O	X					
170	<i>Cornus stolonifera</i> Michx.	Red-osier Dogwood		S5	X	X	X	X	X	X	X
171	<i>Coronilla varia</i> L.	Variable Crown-vetch		SE5	O	X					
172	<i>Crataegus chrysoarpa</i> Ashe	Round-leaved Hawthorn	X	S5	O		X				
173	<i>Crataegus mollis</i> Scheele	Downy Hawthorn		S5	X						
174	<i>Crataegus punctata</i> Jacq.	Large-fruited Thorn	X	S5	X						
175	<i>Crataegus submollis</i> Sarg.	Emerson's Thorn		S4S5	X						
176	<i>Cryptotaenia canadensis</i> (L.) DC.	Hone wort	X	S5	X				X		
177	<i>Cuscuta gronovii</i> Willd. ex Schultz	Gronovius' Dodder		S5	X					X	X
178	<i>Cyperus esculentus</i> L.	Yellow Nut Grass	X	S5	X					X	X
179	<i>Cypripedium acaule</i> Ait.	Pink Lady's-slipper		S5	X		X				X
180	<i>Cypripedium arietinum</i> Ait. F.	Ram's-head Lady's-slipper	X	S3	X						
181	<i>Cypripedium calceolus</i> L.	Large Yellow Lady's-slipper	X	SRF	X						
182	<i>Cypripedium calceolus</i> var. <i>planipetalum</i>	Small Yellow Lady's-slipper	X	SH	X		X				X
183	<i>Cypripedium reginae</i> Walt.	Showy Lady's-slipper	X	S4	X	X					X
184	<i>Cystopteris bulbifera</i> (L.) Bernh.	Bulbet Bladder Fern	X	S5	X	X	X				

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bocek	Other
185	<i>Dactylis glomerata</i> L.	Orchard Grass		SE5	O				X		X
186	<i>Dalibarda repens</i> L.	Dewdrop		S4S5	O	X					
187	<i>Danthonia spicata</i> (L.) P. Beauv. Ex Roem. & Schult.	Poverty Oat Grass	X	S5	X						
188	<i>Daucus carota</i> L.	Wild Carrot		SE5	X	X	X	X	X	X	X
189	<i>Decodon verticillatus</i> (L.) Elliot	Swamp Loosestrife	X	S5	X						X
190	<i>Desmodium glutinosum</i> (Muhlenb. ex Willd.) Alph. Wood	Pointed-leaved Tick-trefoil		S4	X						
191	<i>Drosera rotundifolia</i> L.	Round-leaved Sundew	X	S5	X						
192	<i>Dryopteris carthusiana</i> (Vill.) H.P. Fuchs	Spinulose Wood Fern	X	S5	X	X	X		X		X
193	<i>Dryopteris clintoniana</i> (D.C. Eaton) Dowell	Clinton's Wood Fern	X	S4	X						
194	<i>Dryopteris cristata</i> (L.) A. Gray	Crested Wood Fern	X	S5	X	X	X		X		X
195	<i>Dryopteris intermedia</i> (Muhlenb. Ex Willd.) A. Gray	Evergreen Wood Fern	X	S5	X						X
196	<i>Dryopteris marginalis</i> (L.) A. Gray	Marginal Wood Fern	X	S5	X	X					X
197	<i>Echinocystis lobata</i> (Michx.) Torr. & A. Gray	Prickly Cucumber		S5	X	X	X	X	X	X	X
198	<i>Echium vulgare</i>	Blueweed	X	SE5	O						X
199	<i>Elatine minima</i> (Nutt.) Fischer & C.A. Mey.	Small Waterwort	X	S4	X						
200	<i>Eleocharis elliptica</i> Kunth	Elliptic Spike-rush	X	S5	X						
201	<i>Eleocharis obtusa</i> (Willd.) Schult.	Blunt Spike-rush	X	S5	O						
202	<i>Eleocharis rostellata</i> (Torr.) Torr.	Beaked Spike-rush	X	S3	X						
203	<i>Eleocharis smallii</i> Britton	Small's Spike-rush		S5	X						
204	<i>Elymus hystrix</i> L.	Bottle-brush Grass	X	S5	X						X
205	<i>Elymus repens</i> (L.) Gould	Quack Grass		SE5	X						
206	<i>Elymus trachycaulus</i> (Link) Gould ssp. <i>trachycaulus</i>	Slender Wheat Grass	X	S5	X						
207	<i>Elymus virginicus</i> L. var. <i>virginicus</i>	Virginia Wild Rye	X	S5	X	X			X	X	X
208	<i>Epilobium ciliatum</i> Raf. ssp. <i>glandulosum</i> (Lehm.) Hoch & Raven	Northern Willow-herb	X	SU	X					X	X
209	<i>Epilobium leptophyllum</i> Raf.	Narrow-leaved Willow-herb	X	S5	X						
210	<i>Epilobium strictum</i> Muhlenb. ex Spreng.	Soft Willow-herb	X	S5	X						
211	<i>Epipactis helleborine</i> (L.) Crantz	Helleborine	X	SE5	X	X		X	X	X	X
212	<i>Equisetum arvense</i> L.	Field Horsetail	X	S5	X	X					X
213	<i>Equisetum fluviatile</i> L.	Water Horsetail	X	S5	X						X
214	<i>Equisetum hyemale</i> L. ssp. <i>affine</i> (Engelm.) Calder & Roy	Scouring-rush	X	S5	X		X				X

	Scientific Name	Common Name	S	Straks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
215	<i>Equisetum palustre</i> L.	Marsh Horsetail	X	S5	X						
216	<i>Equisetum variegatum</i> Schleich. Ex Fried., Weber & Mohr ssp. <i>variegatum</i>	Variiegated Horsetail	X	S5	X			X			X
217	<i>Eragrostis frankii</i> C.A. Mey. ex Steud.	Frank's Love Grass	X	S4	X						
218	<i>Eragrostis hypnoides</i> (Lam.) B.S.P.	Tall Love Grass		S4	X						
219	<i>Erigeron annuus</i> (L.) Pers.	Daisy Fleabane		S5	O	X		X			X
220	<i>Erigeron philadelphicus</i> L. ssp.?	Philadelphia Fleabane	X	S5	X		X	X			X
221	<i>Eriophorum vaginatum</i> L. ssp. <i>spissum</i> (Fern.) Hultén	Sheathed Cotton-grass	X	S5	X						
222	<i>Eriophorum viridi-carinatum</i> (Engelm.) Fern.	Thin-leaved Cotton-grass	X	S5	X		X				
223	<i>Erysimum cheiranthoides</i> L. ssp. <i>cheiranthoides</i>	Wormseed Mustard		SE5	O	X					X
224	<i>Eupatorium maculatum</i> L. ssp.?	Spotted Joe-Pye-weed		S5	X	X	X	X	X	X	X
225	<i>Eupatorium perfoliatum</i> L.	Boneset/Perfoliate Thoroughwort		S5	X	X	X		X		X
226	<i>Eupatorium rugosum</i> Houtt.	White Snakeroot		S5	X						
227	<i>Euthamia graminifolia</i> (L.) Nutt.	Flat-topped Bushy Goldenrod		S5	X					X	X
228	<i>Festuca subverticillata</i> (Pers.) Alexeev	Nodding Fescue		S4	X						
229	<i>Fragaria vesca</i> L. ssp. <i>americana</i> (Porter) Staudt	Woodland Strawberry	X	S5	X						
230	<i>Fragaria virginiana</i> Miller ssp. <i>glauca</i> (S. Watson) Staudt	Common Strawberry	X	S5	X	X					X
231	<i>Fraxinus americana</i> L.	White Ash		S5	O				X		
232	<i>Fraxinus nigra</i> Marshall	Black Ash	X	S5	X	X	X				X
233	<i>Fraxinus pennsylvanica</i> Marshall	Red Ash		S5	X	X	X	X	X	X	X
234	<i>Galearis spectabilis</i> (L.) Raf.	Showy Orchis		S4	X						
235	<i>Galium aparine</i> L.	Cleavers	X	S5	X		X				X
236	<i>Galium asprellum</i> Michx.	Rough Bedstraw	X	S5	X						
237	<i>Galium labradoricum</i> (Wiegand) Wiegand	Labrador Marsh Bedstraw	X	S5	X						
238	<i>Galium obtusum</i> Bigelow	Blunt-leaved Bedstraw	X	S4S5	X						
239	<i>Galium palustre</i> L.	Marsh Bedstraw	X	S5	X						
240	<i>Galium triflorum</i> Michx.	Sweet-scented Bedstraw	X	S5	X	X			X	X	X
241	<i>Gaultheria hispidula</i> (L.) Muhlenb. ex Bigelow	Creeping Snowberry	X	S5	X		X				
242	<i>Gaultheria procumbens</i> L.	Wintergreen		S5	X						X
243	<i>Gaylussacia baccata</i> (Wangenh.) K. Koch	Black Huckleberry	X	S4	O		X				
244	<i>Geranium robertianum</i> L.	Herb-robert		SE5	O	X					

	Scientific Name	Common Name	S	Straks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
245	<i>Geum aleppicum</i> Jacq.	Yellow Avens		S5	O			X		X	X
246	<i>Geum canadense</i> Jacq.	White Avens	X	S5	X						
247	<i>Geum laciniatum</i> Murray	Rough Avens		S4	X						
248	<i>Geum rivale</i> L.	Purple Avens	X	S5	X	X	X			X	X
249	<i>Glyceria canadensis</i> (Michx.) Trin.	Rattlesnake Grass		S4S5	O	X					
250	<i>Glyceria grandis</i> S. Watson	Tall Manna Grass	X	S4S5	X				X		
251	<i>Glyceria maxima</i> (Hartm.) F.O. Holmb.	Sweet Manna Grass	X	SE4	X			X	X		
252	<i>Glyceria striata</i> (Lam.) A. Hitchc.	Fowl Meadow Grass	X	S5	X		X	X	X	X	X
253	<i>Goodyera repens</i> var. <i>ophioides</i> Fern.	Dwarf Rattlesnake Plantain	X	S5	X						
254	<i>Gymnocarpium dryopteris</i> (L.) Newman	Oak Fern		S5	X	X	X				
255	<i>Helianthus tuberosus</i> L.	Jerusalem Artichoke		SE5	X						
256	<i>Hesperis matronalis</i> L.	Dame's Rocket		SE5	O				X		
257	<i>Hieracium aurantiacum</i> L.	Devil's Paintbrush		SE5	X	X					X
258	<i>Hieracium caespitosum</i> Dumort. ssp. <i>caespitosum</i>	Field Hawkweed	X	SE5	X						X
259	<i>Hieracium piloselloides</i> Vill.	Glaucos King Devil	X	SE5	X						
260	<i>Hydrophyllum canadense</i> L.	Canada Water-leaf	X	S4	X						
261	<i>Hydrophyllum virginianum</i> L.	Virginia Water-leaf	X	S5	X						
262	<i>Hypericum ascyron</i> L.	Great St. John's-wort	X	S4	X						
263	<i>Hypericum perforatum</i> L.	Common St. John's-wort		SE5	O						X
264	<i>Ilex verticillata</i> (L.) A. Gray	Winterberry	X	S5	X						
265	<i>Impatiens capensis</i> Meerb.	Spotted Touch-me-not		S5	X	X	X	X	X	X	X
266	<i>Impatiens glandulifera</i> Royle	Glandular Touch-me-not		SE4	O				X		
267	<i>Impatiens pallida</i> Nutt.	Pale Touch-me-not	X	S5	X						
268	<i>Inula helenium</i> L.	Elecampane	X	SE5	X		X				
269	<i>Iris versicolor</i>	Large Blue Flag	X	S5	X		X		X	X	X
270	<i>Juglans cinerea</i>	Butternut	X	S3	O						
271	<i>Juglans nigra</i>	Black Walnut		S4	X					X	X
272	<i>Lactuca biennis</i> (Moench) Fern.	Biennial Lettuce	X	S5	X						X
273	<i>Laportea canadensis</i> (L.) Weddell	Wood Nettle	X	S5	X	X		X	X	X	X
274	<i>Larix laricina</i> (Du Roi) K. Koch	Tamarack		S5	X	X	X				X

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
275	<i>Lathyrus palustris</i> L.	Marsh Vetchling	X	S5	X						
276	<i>Ledum groenlandicum</i> Oeder	Labrador-tea	X	S5	X		X				
277	<i>Leersia oryzoides</i> (L.) Sw.	Rice Cut Grass	X	S5	X	X					
278	<i>Lemna minor</i>	Lesser Duckweed	X	S5	X	X					
279	<i>Leonurus cardiaca</i> L. ssp. <i>cardiaca</i>	Common Motherwort		SE5	O						X
280	<i>Lilium michiganense</i> Farw.	Michigan Lily	X	S5	X				X		
281	<i>Lilium philadelphicum</i> L.	Wood Lily	X	S5	X	X		X	X		X
282	<i>Linaria vulgaris</i> Miller	Butter-and-eggs		SE5	O						X
283	<i>Linnaea borealis</i> L. ssp. <i>longifolia</i> (Torr.) Hultén	Twinflower		S5	X		X				
284	<i>Liparis loeselii</i> (L.) L.C. Rich.	Bog Twayblade	X	S4S5	X						
285	<i>Listera cordata</i> (L.) R. Br. ex Ait. f.	Heart-leaved Twayblade		S5?	X						
286	<i>Lobelia cardinalis</i> L.	Cardinal-flower		S5	X	X	X		X	X	X
287	<i>Lobelia kalmii</i> L.	Kalm's Lobelia	X	S5	O						X
288	<i>Lolium perenne</i> L.	English Rye Grass	X	SE4	X						
289	<i>Lonicera dioica</i> L.	Glaucous Honeysuckle		S5	X						X
290	<i>Lonicera oblongifolia</i> (Goldie) Hook.	Swamp Fly Honeysuckle	X	S4S5	X						
291	<i>Lonicera tatarica</i> L.	Tartarian Honeysuckle	X	SE5	O	X					X
292	<i>Lotus corniculatus</i> L.	Bird's-foot Trefoil	X	SE5	X			X			X
293	<i>Ludwigia palustris</i> (L.) Elliot	Marsh Purslane		S5	X						
294	<i>Lycopus americanus</i> Muhlenb. ex Bartram	Cut-leaved Water-horehound	X	S5	X					X	X
295	<i>Lycopus uniflorus</i> Michx.	Northern Water-horehound	X	S5	X						X
296	<i>Lysimachia ciliata</i> L.	Fringed Loosestrife	X	S5	X					X	X
297	<i>Lysimachia terrestris</i> (L.) B.S.P.	Swamp Loosestrife	X	S5	X		X	X			
298	<i>Lysimachia thyrsoflora</i> L.	Tufted Loosestrife	X	S5	X						
299	<i>Lythrum salicaria</i> L.	Purple Loosestrife		SE5	X				X		X
300	<i>Maianthemum canadense</i> Desf.	Wild-lily-of-the-valley	X	S5	X		X				X
301	<i>Maianthemum racemosum</i> ssp. <i>racemosum</i>	False Solomon's-Seal	X	S5	X	X	X	X	X	X	X
302	<i>Maianthemum stellatum</i> (L.) Link	Starflower False Solomon's-seal	X	S5	X	X					
303	<i>Maianthemum trifolium</i> (L.) Sloboda	Three-leaf Solomon's-seal	X	S5	X		X				X
304	<i>Malaxis monophyllos</i> ssp. <i>brachypoda</i>	White Adder's Mouth	X	S4	X						

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
305	<i>Malus pumila</i> Miller	Common Crabapple		SE5	X				X		X
306	<i>Matteuccia struthiopteris</i> (L.) Tod. Var. <i>pensylvanica</i> (Willd.) C.V. Morton	Ostrich Fern	X	S5	X	X		X	X	X	X
307	<i>Medeola virginiana</i> L.	Indian Cucumber Root		S5	X		X				
308	<i>Melilotus alba</i> Medik.	White Sweet-clover		SE5	X						
309	<i>Melilotus officinalis</i> (L.) Pall.	Yellow Sweet-clover		SE5	X						
310	<i>Menispermum canadense</i> L.	Moonseed	X	S4	X			X	X	X	X
311	<i>Mentha arvensis</i> L. ssp. <i>borealis</i> (Michx.) R.L. Taylor & Macbryde	American Wild Mint	X	S5	X					X	X
312	<i>Mentha spicata</i> L.	Spear Mint		SE4	X						
313	<i>Menyanthes trifoliata</i> L.	Three-leaved Buckbean		S5	X		X				
314	<i>Milium effusum</i> L.	Wood Millet	X	S4S5	X						
315	<i>Mimulus ringens</i> L.	Square-stemmed Monkey-flower		S5	X	X	X	X	X	X	X
316	<i>Mitchella repens</i> L.	Creeping Partridge-berry	X	S5	X						X
317	<i>Mitella diphylla</i> L.	Two-leaved Bishop's Cap	X	S5	X						
318	<i>Mitella nuda</i> L.	Naked Mitrewort		S5	X						
319	<i>Monarda didyma</i> L.	Oswego-tea		S3	X						
320	<i>Moneses uniflora</i> (L.) A. Gray	One-flowered Wintergreen	X	S5	X						
321	<i>Monotropa uniflora</i> L.	Indian-pipe		S5	X						X
322	<i>Muhlenbergia glomerata</i> (Willd.) Trin.	Glomerate Satin Grass	X	S5	X						
323	<i>Myosotis laxa</i> Lehm.	Smaller Forget-me-not	X	S5	X	X			X		
324	<i>Myrica gale</i> L.	Sweet Gale	X	S5	X		X				X
325	<i>Nasturtium microphyllum</i> (Boenn.) Reichb.	Small-leaved Water-cress		SE5	X	X	X				
326	<i>Oenothera biennis</i> L.	Common Evening-Primrose		S5	X						
327	<i>Onoclea sensibilis</i> L.	Sensitive Fern	X	S5	X	X	X		X	X	X
328	<i>Orthilia secunda</i> (L.) House	One-sided Shinleaf	X	S5	X						
329	<i>Oryzopsis asperifolia</i> Michx.	White-grained Mountain-rice	X	S5	X						
330	<i>Osmorhiza claytonii</i> (Michx.) C.B. Clarke	Woolly Sweet-cicely		S5	X						
331	<i>Osmunda cinnamomea</i> L.	Cinnamon Fern	X	S5	X		X				X
332	<i>Osmunda regalis</i> L. var. <i>spectabilis</i> (Willd.) A. Gray	Royal Fern		S5	X	X	X		X	X	X
333	<i>Ostrya virginiana</i> (P. Mill.) K. Koch	Eastern Hop-hornbeam		S5	X				X		X
334	<i>Oxalis acetosella</i> L. ssp. <i>montana</i> (Raf.) Hultén	True Wood-sorrel	X	S5	X						X

	Scientific Name	Common Name	S	Straks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
335	<i>Panax quinquefolius L.</i>	Ginseng		S2	X						
336	<i>Panicum acuminatum var. lindheimeri ADD.</i>	Panic Grass	X	S4	X						
337	<i>Panicum miliaceum L.</i>	Proso Millet		SE4	X						
338	<i>Parnassia glauca Raf.</i>	Amer. Grass-of-parnassus	X	S5	X		X				
339	<i>Parthenocissus inserta (A. Kern.) Fritsch</i>	Inserted Virginia-creeper			X					X	X
340	<i>Parthenocissus quinquefolia (L.) Planchon ex DC.</i>	Five-leaved Virginia-creeper	X	S4?	X				X		
341	<i>Pastinaca sativa L.</i>	Wild Parsnip		SE5	O						X
342	<i>Phalaris arundinacea L.</i>	Reed Canary Grass		S5	X	X	X	X	X		X
343	<i>Phleum pratense L.</i>	Timothy		SE5	X						X
344	<i>Phragmites australis (Cav.) Trin ex Steud.</i>	Common Reed		S5	X		X			X	X
345	<i>Phryma leptostachya L.</i>	Lopseed	X	S4S5	X						
346	<i>Picea glauca (Moench) Voss</i>	White Spruce	X	S5	X	X	X				X
347	<i>Picea mariana (Miller) B.S.P.</i>	Black Spruce		S5	X	X	X				X
348	<i>Pilea pumila (L.) Gray</i>	Canada Clearweed	X	S5	X						
349	<i>Pinus strobus L.</i>	Eastern White Pine		S5	X	X					X
350	<i>Plantago major L.</i>	Common Plantain		SE5	X			X	X	X	X
351	<i>Plantago rugelii Decne.</i>	Rugel's Plantain		S5	X						X
352	<i>Platanthera aquilonis Sheviak</i>	Northern Green Orchid	X	S5	X						X
353	<i>Platanthera dilatata (Pursh) Lindl. ex Beck</i>	Tall White Northern Orchid	X	S5	X		X				
354	<i>Platanthera leucophaea (Nutt.) Lindl.</i>	Prairie Fringed Orchid	X	S2	X						
355	<i>Platanthera obtusata (Banks ex Pursh) Lindl.</i>	One-leaf Rein Orchid	X	S5	X		X				
356	<i>Platanthera orbiculata (Pursh) Lindl.</i>	Round-Leaved Orchid		S4S5	X						
357	<i>Platanthera psycodes (L.) Lindl.</i>	Small Purple Fringed Orchid	X	S5	X						
358	<i>Poa compressa L.</i>	Canada Blue Grass	X	SE5	X				X		X
359	<i>Poa palustris L.</i>	Fowl Meadow Grass	X	S5	X						
360	<i>Poa pratensis L. ssp. pratensis</i>	Kentucky Bluegrass	X	S5	X						X
361	<i>Podophyllum peltatum L.</i>	May-apple	X	S5	X			X			
362	<i>Pogonia ophioglossoides (L.) Ker-Gawl.</i>	Rose Pogonia	X	S4S5	X						
363	<i>Polygala pauciflora Willd.</i>	Gay Wings		S5	X						X
364	<i>Polygonum amphibium L.</i>	Water Smartweed		S5	X						X

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bocek	Other
365	<i>Polygonum lapathifolium</i> L.	Dock-leaf Smartweed		S5	X						
366	<i>Polystichum acrostichoides</i> (Michx.) Schott	Christmas Fern	X	S5	X						
367	<i>Populus balsamifera</i> L.	Balsam Poplar	X	S5	X	X	X				X
368	<i>Populus grandidentata</i> Michx.	Large-toothed Aspen		S5	O		X		X	X	X
369	<i>Populus tremuloides</i> Michx.	Trembling Aspen	X	S5	X	X			X	X	X
370	<i>Potentilla norvegica</i> L ssp ?	Rough Cinquefoil		S5	X						
371	<i>Potentilla palustris</i> (L.) Scop.	Marsh Cinquefoil	X	S5	X						
372	<i>Potentilla recta</i> L.	Rough-fruited Cinquefoil		SE5	O						X
373	<i>Prenanthes alba</i> L.	White Rattlesnake-root	X	S5	X		X				
374	<i>Proserpinaca palustris</i> L.	Field Mermaid-weed		S4	X						
375	<i>Prunella vulgaris</i> L. ssp. <i>Lanceolata</i>	Common Heal-all	X	SE5	X			X	X	X	X
376	<i>Prunus nigra</i> Aiton	Canada Plum	X	S4	X						
377	<i>Prunus serotina</i> Ehrh.	Black Cherry	X	S5	O	X	X				X
378	<i>Prunus virginiana</i> L. ssp. <i>virginiana</i>	Choke Cherry	X	S5	O	X					X
379	<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>latiusculum</i> (Desv.) L. Underw. Ex A. Heller	Eastern Bracken-fern		S5	X		X				X
380	<i>Pyrola asarifolia</i> Michx.	Pink Pyrola	X	S5	X						X
381	<i>Quercus alba</i> L.	White Oak		S5	O						
382	<i>Quercus macrocarpa</i> Michx.	Bur Oak	X	S5	X					X	X
383	<i>Quercus rubra</i> L.	Red Oak	X	S5	O		X				
384	<i>Ranunculus abortivus</i> L.	Kidney-leaf Buttercup	X	S5	X						
385	<i>Ranunculus acris</i> L.	Tall Buttercup		SE5	X	X					
386	<i>Ranunculus flabellaris</i> Raf.	Yellow Water-crowfoot	X	S4?	X						
387	<i>Ranunculus hispidus</i> Michx. var. <i>caricetorum</i> (Greene) T. Duncan	Swamp Buttercup	X	S5	X				X		
388	<i>Ranunculus recurvatus</i> Poir. var. <i>recurvatus</i>	Hooked Buttercup	X	S5	X						
389	<i>Ranunculus repens</i> L.	Creeping Buttercup	X	SE5	O				X		
390	<i>Rhamnus alnifolia</i> L'Hér.	Alder-leaved Buckthorn		S5	X		X				
391	<i>Rhamnus frangula</i> L.	Glossy Buckthorn		SE5	O	X		X	X	X	X
392	<i>Rhus radicans</i> L. ssp. <i>negundo</i> (Greene) McNeill	(Climbing) Poison-ivy	X	S5	X	X		X		X	X
393	<i>Rhus rydbergii</i> Small ex Rydb.	Western Poison-ivy		S5	O				X	X	X

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bocek	Other
394	<i>Rhus typhina</i> L.	Staghorn Sumac	X	S5	X						
395	<i>Rhus vernix</i> L.	Poison Sumac		S4	O		X				
396	<i>Rhynchospora alba</i> (L.) M. Vahl	White Beaked-rush	X	S5	X		X				
397	<i>Rhynchospora capillacea</i> Torr.	Capillary Beaked-rush	X	S4?	X		X				
398	<i>Ribes americanum</i> Miller	Wild Black Current	X	S5	X						
399	<i>Ribes cynosbati</i> L.	Prickly Gooseberry	X	S5	X			X	X		
400	<i>Ribes hirtellum</i> Michx.	Smooth Gooseberry	X	S5	X	X					
401	<i>Ribes hudsonianum</i> Richardson	Hudson Bay Current	X	S5	X						
402	<i>Ribes lacustre</i> (Pers.) Poir.	Swamp Black Current	X	S5	X	X					
403	<i>Ribes triste</i> Pall.	Wild Red Current	X	S5	X						
404	<i>Rosa carolina</i> L.	Swamp Rose		S4	X						
405	<i>Rosa palustris</i> Marshall	Marsh Rose	X	S5	X					X	X
406	<i>Rubus idaeus</i> L. ssp. <i>melanolasius</i> (Dieck) Focke	Wild Red Raspberry	X	S5	X	X	X		X		X
407	<i>Rubus pubescens</i> Raf.	Dwarf Raspberry	X	S5	X	X	X				
408	<i>Rudbeckia hirta</i> L.	Black-eyed Susan		S5	X						
409	<i>Rumex crispus</i> L.	Curled Dock		SE5	O					X	
410	<i>Rumex obtusifolius</i> L.	Bitter Dock		SE5	X				X		
411	<i>Rumex orbiculatus</i> Gray.	Water Dock		S4S5	X						
412	<i>Rumex verticillatus</i> L.	Swamp Dock		S4	X						X
413	<i>Sagittaria latifolia</i> Willd.	Broad-leaved Arrowhead	X	S5	X	X			X		
414	<i>Salix alba</i> L.	White Willow	X	SE4	X						
415	<i>Salix amygdaloides</i> Anderss.	Peachleaf Willow	X	S5	X					X	X
416	<i>Salix bebbiana</i> Sarg.	Bebb Willow	X	S5	X						X
417	<i>Salix candida</i> Fluegge ex Willd	Hoary Willow	X	S5	X		X				
418	<i>Salix discolor</i> Muhl.	Pussy Willow	X	S5	X			X		X	X
419	<i>Salix exigua</i> Nutt.	Sandbar Willow	X	S5	X						
420	<i>Salix fragilis</i> L.	Crack Willow	X	SE5	X			X	X		
421	<i>Salix lucida</i> Muhl.	Shining Willow	X	S5	X				X		
422	<i>Salix nigra</i> Marsh.	Black Willow	X	S4?	X						
423	<i>Salix pedicellaris</i> Pursh	Bog Willow	X	S5	X						
424	<i>Salix petiolaris</i> Sm.	Meadow Willow	X	S5	X	X		X		X	X

	Scientific Name	Common Name	S	Straks	History	Site 1	Site 2	Site 3	Site 4	Bocek	Other
425	<i>Salix x rubens</i> Schrank (pro sp.)	alba x fragilis	X	SE4	O					X	X
426	<i>Sambucus canadensis</i> L.	Common Elderberry		S5	X	X					X
427	<i>Sambucus racemosa</i> L. ssp. <i>Pubens</i> (Michx.) House	Red-berried Elderberry	X	S5	X	X			X		
428	<i>Samolus valerandi</i> L. ssp. <i>parviflorus</i> (Raf.) Hultén	Brookweed		S4	X						
429	<i>Sanguinaria canadensis</i> L.	Bloodroot	X	S5	X	X					
430	<i>Sanicula marilandica</i> L.	Black Snakeroot		S5	X						
431	<i>Sanicula odorata</i> (Raf.) Pryer & Phillippe	Clustered Snakeroot	X	S5	X						
432	<i>Sarracenia purpurea</i> L.	Pitcher-plant	X	S5	X		X				X
433	<i>Scirpus acutus</i> Muhlenb. ex Bigelow	Hard-stemmed Bulrush		S5	X						
434	<i>Scirpus atrovirens</i> Willd.	Dark-green Bulrush	X	S5	O	X			X		X
435	<i>Scirpus cyperinus</i> (L.) Kunth	Wool-grass		S5	X						
436	<i>Scirpus hudsonianus</i> (Michx.) Fern.	Hudson Bay Bulrush	X	S5	X		X				
437	<i>Scirpus microcarpus</i> C. Presl	Small-fruited Bulrush	X	S5	O	X					
438	<i>Scirpus validus</i> L.	American Great Bulrush		S5	O	X					X
439	<i>Scutellaria galericulata</i> L.	Hooded Skullcap	X	S5	X						X
440	<i>Scutellaria lateriflora</i> L.	Mad-dog Skullcap	X	S5	X					X	X
441	<i>Senecio aureus</i> L.	Golden Groundsel	X	S5	X		X				
442	<i>Shepherdia canadensis</i> (L.) Nutt.	Canada Soapberry	X	S5	X						
443	<i>Silene latifolia</i> Poir.	Bladder Champion		SE5	O						X
444	<i>Silene vulgaris</i> (Moench) Garcke	Catchfly		SE5	O	X					
445	<i>Sisymbrium altissimum</i> L.	Tall Tumble-mustard		SE5	O	X					
446	<i>Sisyrinchium montanum</i>	Common Blue-eyed Grass	X	S5	O						X
447	<i>Sisyrinchium mucronatum</i>	Slender Blue-eyed Grass		S4S5	O						X
448	<i>Sium suave</i> Walter	Hemlock Water-parsnip	X	S5	X					X	X
449	<i>Smilax herbacea</i> L.	Smooth Herbaceous Greenbrier	X	S4	X						
450	<i>Smilax hispida</i> Muhl. ex Torr.	Hispid Greenbrier	X	S4	X					X	
451	<i>Solanum dulcamara</i> L.	Bitter Nightshade		SE5	X	X	X	X	X	X	X
452	<i>Solidago canadensis</i> L.	Canada Goldenrod	X	S5	X	X			X	X	X
453	<i>Solidago gigantea</i> Aiton	Giant Goldenrod	X	S5	X						X

	Scientific Name	Common Name	S	Straks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
454	<i>Solidago juncea</i> Aiton	Early Goldenrod	X	S5	X						X
455	<i>Solidago rugosa</i> Aiton ssp. <i>rugosa</i>	Rough Goldenrod	X	S5	X						X
456	<i>Solidago uliginosa</i> Nutt.	Marsh Goldenrod	X	S5	X		X				
457	<i>Sonchus arvensis</i> L. ssp. <i>uliginosus</i> (M.Bieb.) Nyman	Perennial Sow-thistle	X	SE5	X	X			X	X	X
458	<i>Sparganium eurycarpum</i> Engelm. Ex A. Gray	Broad-fruited Bur-reed	X	S5	X	X		X	X		X
459	<i>Sphenopholis intermedia</i> (Rydb.) Rydb.	Slender Wedge Grass	X	S4S5	X						
460	<i>Spiraea alba</i> Du Roi	Narrow-leaved Meadow-sweet	X	S5	X	X			X	X	X
461	<i>Spiranthes romanzoffiana</i> Cham.	Hooded Ladies'-Tresses		S5	X						
462	<i>Staphylea trifolia</i> L.	American Bladder-nut	X	S4	X						
463	<i>Stellaria longifolia</i> Muhlenb. ex Willd.	Long-leaved Chickweed	X	S5	X						
464	<i>Streptopus lanceolatus</i> Michx.	Rose Twisted-Stalk	X	S5	X						X
465	<i>Symplocarpus foetidus</i> (L.) Salisb. ex Nutt.	Skunk Cabbage	X	S5	X						X
466	<i>Tanacetum vulgare</i> L.	Common Tansy	X	SE5	X						
467	<i>Taraxacum officinale</i> G. Weber	Common Dandelion	X	SE5	X	X	X	X	X	X	X
468	<i>Teucrium canadense</i> L. ssp. <i>canadense</i>	Wood Germander		S5?	X						
469	<i>Thalictrum dioicum</i> L.	Early Meadow-rue		S5	X	X	X		X		X
470	<i>Thalictrum pubescens</i> Pursh	Tall Meadow-rue	X	S5	X		X	X	X	X	X
471	<i>Thelypteris palustris</i> Schott var. <i>pubescens</i> (Lawson) Fern.	Marsh Fern	X	S5	X		X				X
472	<i>Thuja occidentalis</i> L.	Eastern White Cedar		S5	X	X	X				X
473	<i>Tiarella cordifolia</i> L.	False Mitrewort	X	S5	X		X				
474	<i>Tilia americana</i> L.	American Basswood	X	S5	X	X	X	X	X	X	X
475	<i>Tragopogon dubius</i> Scop.	Doubtful Goat's-beard		SE5	O						X
476	<i>Triadenum fraseri</i> (Spach) Gleason	Fraser's St. John's-wort	X	S5	X						X
477	<i>Trientalis borealis</i> Raf. ssp. <i>borealis</i>	Star-flower		S5	X	X	X		X		X
478	<i>Trifolium campestre</i> Schreb.	Large Hop Clover	X	SE5	O						X
479	<i>Trifolium pratense</i> L.	Red Clover	X	SE5	O			X	X		X
480	<i>Trifolium repens</i> L.	White Clover		SE5	O			X	X		X
481	<i>Triglochin maritimum</i> L.	Seaside Arrow-grass	X	S5	X		X				
482	<i>Triglochin palustre</i> L.	Marsh Arrow-grass		S5	X						
483	<i>Trillium cernuum</i> L.	Nodding Trillium		S5	X						
484	<i>Tsuga canadensis</i> (L.) Carriere	Eastern Hemlock		S5	X	X	X		X		X

	Scientific Name	Common Name	S	Franks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
485	<i>Tussilago farfara</i> L.	Coltsfoot	X	SE5	O	X					X
486	<i>Typha angustifolia</i> L.	Narrow-leaved Cattail		SE5	X						
487	<i>Typha latifolia</i> L.	Broad-leaved Cattail		S5	X	X	X	X			X
488	<i>Typha X glauca</i> Godron	Glaucous Cattail		SE5	O						X
489	<i>Ulmus americana</i> L.	American Elm	X	S5	X					X	X
490	<i>Ulmus rubra</i> Muhl.	Slippery Elm	X	S5	X						
491	<i>Ulmus thomasi</i> Sarg.	Rock Elm	X	S4?	X						
492	<i>Urtica dioica</i> ssp. <i>Gracilis</i> (Ait.) Seland	Stinging Nettle	X	S5	X			X	X	X	X
493	<i>Utricularia cornuta</i> Michx.	Horned Bladderwort		S5	X		X				
494	<i>Utricularia intermedia</i> hayne	Flat-leaved Bladderwort	X	S5	X						
495	<i>Utricularia minor</i> L.	Lesser Bladderwort		S5	X						
496	<i>Utricularia vulgaris</i> L.	Greater Bladderwort		S5	X						
497	<i>Uvularia grandiflora</i>	Large-Flowered Bellwort	X	S5	X						X
498	<i>Vaccinium macrocarpon</i> Aiton	Large Cranberry	X	S4S5	X		X				
499	<i>Vaccinium myrtilloides</i> Michx.	Velvet-leaf Blueberry	X	S5	X		X				
500	<i>Vaccinium oxycoccos</i>	Small Cranberry	X	S5	X		X				
501	<i>Valeriana sitchensis</i> Bong.ssp. <i>uliginosa</i> (Torr.& A. Gray) F.Mey.	Swamp Valerian	X	S2	X		X				
502	<i>Vallisneria americana</i> Michx.	Water-celery	X	S5	X						
503	<i>Verbascum blattaria</i> L.	Moth Mullein		SE5	O					X	
504	<i>Verbena hastata</i> L.	Blue Vervain		S5	X			X		X	X
505	<i>Verbena urticifolia</i> L.	White Vervain		S5	X					X	X
506	<i>Veronica anagallis-aquatica</i> L.	Water Speedwell		SE5	X						
507	<i>Viburnum acerifolium</i> L.	Maple-leaved Viburnum		S5	O	X	X				X
508	<i>Viburnum lentago</i> L.	Nannyberry	X	S5	X	X		X	X		X
509	<i>Viburnum opulus</i> L.	Guelder Rose		SE4	X	X					
510	<i>Viburnum trilobum</i> Marshall	High Bush Cranberry	X	S5	X	X			X		X
511	<i>Vicia cracca</i> L.	Tufted Vetch		SE5	X				X		X
512	<i>Viola blanda</i> Willd.	Sweet White Violet	X	S4S5	X						X
513	<i>Viola canadensis</i> L.	Canada Violet	X	S5	O	X					
514	<i>Viola conspersa</i> Reichb.	American Dog Violet	X	S5	X						X
515	<i>Viola cucullata</i> Aiton	Marsh Blue Violet	X	S5	X	X	X	X	X		X
516	<i>Viola macloskeyi</i> F.E. Lloyd ssp. <i>pallens</i> (Banks ex DC.) M. Baker	Macloskey's Violet	X	S5	X		X				

	Scientific Name	Common Name	S	SRanks	History	Site 1	Site 2	Site 3	Site 4	Bochek	Other
517	<i>Viola nephrophylla</i> Greene	Northern Bog Violet	X	S4	X						
518	<i>Viola pubescens</i> Aiton	Downy Yellow Violet	X	S5	X			X			
519	<i>Viola renifolia</i> A. Gray	Kidney-leaved Violet	X	S5	X						
520	<i>Viola sagittata</i> Aiton var. ?	Arrow-leaved Violet	X	S4	X						
521	<i>Viola selkirkii</i> Pursh ex Goldie	Selkirk's Violet		S5	X						
522	<i>Viola septentrionalis</i> Greene	Northern Blue Violet	X		X						
523	<i>Vitis riparia</i> Michx.	Riverbank Grape	X	S5	X	X	X	X	X	X	X
524	<i>Wolffia columbiana</i>	Columbia Wolffia	X	S4S5	X						X
525	<i>Xanthium strumarium</i> L.	Tumor-curing Cocklebur		S5	X						
526	<i>Zanthoxylum americanum</i> Miller	American Prickly-ash		S5	X			X	X	X	X
527	<i>Zigadenus elegans</i> Pursh.	White Camas		S4	X						

The NHIC assigns subnational ranks (SRANKS) for species and vegetation communities in Ontario (NHIC website). These SRANKS parallel the global ranks (GRANKS), and range from S1 (extremely rare in Ontario, generally 5 or fewer locations) to S5 (demonstrably secure in Ontario). Non-native species are not ranked.

- S1** **Extremely rare** in Ontario; usually 5 or fewer occurrences in the province, or very few remaining hectares.
- S2** **Very rare** in Ontario; usually between 5 and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.
- S3** **Rare to uncommon** in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.
- S4** **Common** and apparently secure in Ontario; usually with more than 100 occurrences in the province.
- S5** **Secure**—Common, widespread, and abundant in the nation or state/province.
- SE** **Exotic**; not believed to be a native component of Ontario's flora.

Appendix B: Terrestrial Invertebrates

Checklist for Dragonflies of Minesing Wetlands

	Scientific Name	Common Name	S ranks	History	Site 1	Site 2	Site 3	Site 4	Other
1	<i>Calopteryx aequabile</i>	River Jewelwing	S5	X	X		X	X	X
2	<i>Calopteryx maculata</i>	Ebony Jewelwing	S5	X	X		X	X	X
3	<i>Hetaerina americana</i>	American Rubyspot	S4	X			X	X	
4	<i>Lestes congener</i>	Spotted Spreadwing	S5	X				X	
5	<i>Lestes disjunctus disjunctus</i> <i>Lestes disjunctus australis</i>	Common Spreadwing Common Spreadwing	S5 S5						X
6	<i>Lestes dryas</i>	Emerald Spreadwing	S5	X					
7	<i>Amphiagrion saucium</i>	Eastern Red Damsel	S3	X					
8	<i>Argia fumipennis violacea</i>	Variable Dancer	S5	X			X	X	X
9	<i>Argia moesta</i>	Powdered Dancer	S5	X					X
10	<i>Argia tibialis</i>	Blue-tipped Dancer	S3	X				X	
11	<i>Chromagrion conditum</i>	Aurora Damsel	S5		X				
12	<i>Coenagrion resolutum</i>	Taiga Bluet	S5	X				X	
13	<i>Enallagma antennatum</i>	Rainbow Bluet	S4	X					
14	<i>Enallagma carunculatum</i>	Tule Bluet	S5	X					
15	<i>Enallagma ebrium</i>	Marsh Bluet	S5	X	X	X			X
16	<i>Enallagma exsulans</i>	Stream Bluet	S5	X			X	X	X
17	<i>Enallagma hageni</i>	Hagen's Bluet	S5	X					X
18	<i>Ischnura posita posita</i>	Fragile Forktail	S4					X	
19	<i>Ischnura verticalis</i>	Eastern Forktail	S5	X	X	X	X	X	X
20	<i>Aeshna canadensis</i>	Canadian Darner	S5	X					X
21	<i>Aeshna umbrosa umbrosa</i>	Shadow Darner	S5	X					X
22	<i>Anax junius</i>	Common Green Darner	S5	X	X	X	X	X	X
23	<i>Basiaeschna janata</i>	Springtime Darner	S5	X					
24	<i>Boyeria vinosa</i>	Fawn Darner	S5				X	X	X
25	<i>Gomphus adelphus</i>	Moustached Clubtail	S3						X
26	<i>Gomphus descriptus</i>	Harpoon Clubtail	S3	X					
27	<i>Gomphus lividus</i>	Ashy Clubtail	S4	X					
28	<i>Hagenius brevistylus</i>	Dragonhunter	S5	X					
29	<i>Stylurus scudderii</i>	Zebra Clubtail	S3					X	
30	<i>Stylurus spiniceps</i>	Arrow Clubtail	S1	X					
31	<i>Cordulegaster diastatops</i>	Delta-spotted Spiketail	S3						X
32	<i>Epiheca cynosura</i>	Common Baskettail	S5						X
33	<i>Epiheca spinigera</i>	Spiny Baskettail	S5	X					
34	<i>Erythemis simplicicollis</i>	Eastern Pondhawk	S5				X	X	X
35	<i>Leucorrhinia intacta</i>	Dot-tailed Whiteface	S5	X	X	X	X		X
36	<i>Libellula incesta</i>	Slaty Skimmer	S4					X	
37	<i>Ladona (Libellula) julia</i>	Chalk-fronted Skimmer	S5	X					X
38	<i>Libellula luctuosa</i>	Widow Skimmer	S5	X	X	X	X	X	X
39	<i>Libellula lydia</i>	Common Whitetail	S5	X	X	X	X	X	X
40	<i>Libellula pulchella</i>	Twelve-spotted Skimmer	S5	X	X		X	X	X
41	<i>Libellula quadrimaculata</i>	Four-spotted Skimmer	S5	X					X
42	<i>Pachydiplax longipennis</i>	Blue Dasher	S5				X		
43	<i>Sympetrum internum</i>	Cherry-faced Meadowhawk	S5	X	X				X
44	<i>Sympetrum obtrusum</i>	White-faced Meadowhawk	S5	X	X	X	X	X	X

45	<i>Sympetrum rubicundulum</i>	Ruby Meadowhawk	S5	X					
46	<i>Sympetrum vicinum</i>	Yellow-legged Meadowhawk	S5	X					X

From Checklist of Odonata Of Simcoe County by R.L. Bowles April 1992 revised August 2006
History records from Walker, MNR, and R. L. Bowles

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- SE** **Exotic**; not believed to be a native component of Ontario's flora.

Checklist of Butterflies of Minesing Wetlands

	Scientific Name	Common Name	S RANKS	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
1	<i>Papilio polyxenes</i>	Black Swallowtail	S5	X		X		X		X
2	<i>Papilio cresphontes</i>	Giant Swallowtail	S2	O				X		
3	<i>Papilio canadensis</i>	Canadian Tiger Swallowtail	S5	X		X		X		X
4	<i>Pieris oleracea</i>	Mustard White	S4	X		X	X	X		X
5	<i>Pieris rapae</i>	Cabbage White	SE	X	X	X	X	X	X	X
6	<i>Colias philodice</i>	Clouded Sulphur	S5		X			X		X
7	<i>Colias eurytheme</i>	Orange Sulphur	S5	X				X		X
8	<i>Feniseca tarquinius</i>	Harvester	S4	O						X
9	<i>Everes comyntas</i>	Eastern Tailed Blue	S5	O				X		X
10	<i>Celastrina ladon</i>	Spring Azure	S5	X	X	X	X	X		X
11	<i>Celastrina neglecta</i>	Summer Azure	S5	X			X	X	X	X
12	<i>Glaucopsyche lygdamus</i>	Silvery Blue	S5	O		X				X
13	<i>Speyeria cybele</i>	Great Spangled Fritillary	S5	X						X
14	<i>Phyciodes cocyta</i>	Northern Crescent	S5	X		X				X
15	<i>Polygonia interrogationis</i>	Question Mark	S5	X	X	X	X	X		X
16	<i>Polygonia comma</i>	Eastern Comma	S5	X			X	X		X
17	<i>Nymphalis vau-album</i>	Compton Tortoiseshell	S5	X						X
18	<i>Nymphalis antiopa</i>	Mourning Cloak	S5	X		X	X	X		X
19	<i>Nymphalis milberti</i>	Milbert's Tortoiseshell	S5	O				X		X
20	<i>Vanessa virginiensis</i>	American Lady	S5	X						X
21	<i>Vanessa cardui</i>	Painted Lady	SZB	X				X		
22	<i>Vanessa atalanta</i>	Red Admiral	SZB	X			X	X		X
23	<i>Limenitis arthemis astyanax</i>	Red-spotted Purple	S5							
	<i>Limenitis arthemis arthemis</i>	White Admiral	S5	X	X	X	X			X X
24	<i>Limenitis archippus</i>	Viceroy	S5	X		X				X
25	<i>Asterocampa celtis</i>	Hackberry Emperor	S2	X				*		
26	<i>Enodia anthedon</i>	Northern Pearly-Eye	S4	X						X
27	<i>Satyrodes eurydice</i>	Eyed Brown	S5	X	X	X	X	X	X	X
28	<i>Megisto cymela</i>	Little Wood-Satyr	S5	O		X				X
29	<i>Coenonympha tullia</i>	Common Ringlet	S5	X	X	X	X			X
30	<i>Cercyonis pegala</i>	Common Wood-Nymph	S5	X					X	
31	<i>Danaus plexippus</i>	Monarch	S4	X	X	X	X	X	X	X
32	<i>Epargyreus clarus</i>	Silver-spotted Skipper	S4	X		X				X
33	<i>Thorybes pylades</i>	Northern Cloudywing	S5	X		X				X
34	<i>Erynnis juvenalis</i>	Juvenal's Duskywing	S5	O		X				X
35	<i>Erynnis lucilius</i>	Columbine Duskywing	S4	O		X				X
36	<i>Carterocephalus palaemon</i>	Arctic Skipper	S5	X		X				X
37	<i>Ancyloxypha numitor</i>	Least Skipper	S5	X		X		X		X
38	<i>Thymelicus lineola</i>	European Skipper	SE	X	X	X	X	X	X	X
39	<i>Pompeius verna</i>	Little Glassywing	S3S4	O						X
40	<i>Poanes hobomok</i>	Hobomok Skipper female form pocahontas	S5	O		X		X		X
41	<i>Euphyes vestris</i>	Dun Skipper	S5	X						X

Giant Swallowtail
Hackberry Emperor

August 17, 2005 on Nottawasaga River down river from the Willow (no photos)
* searches for this species during survey were unsuccessful

From Checklist of Butterflies of Simcoe County by R. L. Bowles revised August 2006

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Appendix C: Benthic Invertebrates

Checklist of Benthic Invertebrates of Minesing Wetlands December 2006

	Species	Common Names	Status	Nottawasaga River ^a	Willow Creek ^b	Black Creek ^c
1	Acarina	Water Mites				
	<i>Hygrobates sp.</i>					X
2	<i>Lebertia sp.</i>					X
3	Amphipoda	Scuds				
4	<i>Crangonyx pseudogracilis</i>					X
5	<i>Gammarus sp.</i>			X		X
6	<i>Gammarus fasciatus</i>					X
	<i>Garmmarus lacustris</i>					X
7	<i>Gammarus pseudolimnaeus</i>				X	
8	<i>Hyalella azteca</i>				X	X
9	Coleoptera	Beetles				
10	Dropidae:					
11	<i>Helichus sp.</i>					
12	Elmidae:					
13	<i>Dubiraphia sp.</i>					X
14	<i>Dubiraphia bivittata</i>				X	X
	<i>Dubiraphia quadrinotata</i>				X	
15	<i>Macronychus glabratus</i>					X
16	<i>Optioservus sp.</i>			X	X	
17	<i>Optioservus fastiditus</i>					
18	<i>Stenelmis sp.</i>					X
19	Dytiscidae:					
20	<i>Agabus sp.</i>					X
	Gyrinidae:					
	<i>Gyrinus sp.</i>				X	X
	Halplidae:					
	<i>Peltodytes sp.</i>				X	
21	Hydrophilidae:					
	<i>Berosus sp.</i>					X
22	<i>Crenetis sp.</i>					X
	<i>Enochrus sp.</i>					X
23	<i>Hydrobius sp.</i>					X
	<i>Tropisternus sp.</i>					X
24	Decapoda	Crayfish				
	<i>Cambarus robustus</i>					X
	<i>Orconectes propinquus</i>					X
	<i>Orconectes rusticus</i>					X
25	<i>Orconectes virilis</i>					X
26	Diptera	True Flies				
27	Ceratopogonidae	Biting Midges		X	X	X
28	Chironomidae:	Midges				
	<i>Ablabesmyia annulata</i>					X
	<i>Brillia sp.</i>					X
29	<i>Brundiniella sp.</i>	Midges (cont.)				X
	<i>Chemovskiiia</i>			X		
	<i>Chironomus sp.</i>			X	X	

30	<i>Cladotanytarsus sp.</i>				X		X
31	<i>Clinotanypus sp.</i>						X
	<i>Corynoneura sp.</i>						X
32	<i>Cricotopus sp.</i>				X		X
	<i>Cricotopus bicinctus</i>				X		
	<i>Cryptochironomus sp.</i>				X		X
	<i>Cryptotendipes sp.</i>				X		
	<i>Cyphomella sp.</i>				X		
33	<i>Diamesa sp.</i>						X
	<i>Hydrobaenus</i>				X		
35	<i>Macropelopia sp.</i>						X
36	<i>Microspectra sp.</i>				X		X
	<i>Microtendipes sp.</i>						X
	<i>Monodiamesa sp.</i>				X		
37	<i>Nanocladius sp.</i>				X		
	<i>Natarsia sp.</i>						X
	<i>Nilotanypus sp.</i>						X
	<i>Odontomesa sp.</i>				X		X
	<i>Pagastia sp.</i>						X
	<i>Parachaetocladius sp.</i>						X
	<i>Parakiefferiella sp.</i>				X		X
	<i>Paralauterborniella sp.</i>				X		X
	<i>Parametrioctenemus sp.</i>				X		X
	<i>Paratanytarsus sp.</i>				X		X
	<i>Paratendipes sp.</i>				X		X
	<i>Phaenopsectra sp.</i>				X		X
	<i>Polypedilum sp.</i>				X		X
	<i>Potthastia sp.</i>				X		
	<i>Procladius sp.</i>				X		X
	<i>Prodiamesa sp.</i>						X
	<i>Rheocricotopus sp.</i>				X		
	<i>Rheotanytarsus sp.</i>						X
	<i>Saetheria sp.</i>				X		X
	<i>Stictochironomus sp.</i>				X		
	<i>Tanytarsus sp.</i>				X		X
	<i>Thienemannimyelia group</i>				X		X
	<i>Tribelos sp.</i>				X		
	<i>Trissopelopia sp.</i>						X
	<i>Tvetenia sp.</i>						X
	<i>Zavrelia sp.</i>				X		
	Dixidae:	Meniscus Midges					
	<i>Dixa sp.</i>						X
	<i>Dixella sp.</i>						X
	Empididae:	Dance Flies					
	<i>Chelifera sp.</i>						X
	<i>Hemerodromia sp.</i>						X
	Ptychopteridae:	Phantom Crane Flies					
	<i>Bittacomorpha sp.</i>						
	<i>Ptychoptera sp.</i>						X
	Psychodidae	Mothflies/Sandflies					X

	Simuliidae:	Black Flies				X	
	<i>Simulium</i> sp.						X
	Tabanidae:	Horseflies					
	<i>Chrysops</i> sp.						X
	Tipulidae:	Crane Flies					X
	<i>Dicranota</i> sp.						X
	<i>Hexatoma</i> sp.						X
	<i>Limnophila</i> sp.						X
	<i>Limona</i> sp.						X
	<i>Monophilus</i> sp.						X
	<i>Ormosia</i> sp.						X
	<i>Pseudolimnophila</i> sp.						X
	<i>Tipula</i> sp.						X
	Ephemeroptera	Mayflies					
	Ameletidae:						
	<i>Ameletus</i> sp.						X
	Baetidae:						
	<i>Acentrella</i> sp.				X		
	<i>Baetis</i> sp.						X
	Baetiscidae:						
	<i>Baetisca</i> sp.				X		
	Caenidae:						
	<i>Caenis</i> sp.						X
	Ephemerellidae:				X		
	<i>Hexagenia</i> sp.				X		X
	<i>Stenonema vicarium</i>					X	
	<i>Stenonema</i> sp.						X
	Leptophlebiidae:						
	<i>Leptophlebia</i> sp.						X
	Oligoneuriidae						
	<i>Isonychia</i>					X	
	Hemiptera	True Bugs					
	Corixidae:	Water Boatmen			X		
	<i>Hesperocorixa</i>					X	
	<i>Sigara</i> sp.						X
	<i>Palmacorixa</i>					X	
	Gerridae:	Water Striders					
	<i>Gerris</i> sp.						X
	Notonectidae:	Backswimmers					
	<i>Notonecta</i> sp.						X
	Nepidae:	Water Scorpions					
	<i>Ranatra</i> sp.					X	
	Veliidae	Broad-shouldered Water Striders					
	Hirudinea	Leeches					X
	Glossiphonidae:						
	<i>Glossiphonia complanata</i>						X
	<i>Helobdella stagnalis</i>						X
	Piscicolidae:						
	<i>Piscicola</i> sp.						X

	Isopoda	Sow Bugs					
	<i>Asellus sp.</i>						X
	<i>Asellus racovitzai</i>						X
	<i>Lirceus sp.</i>						X
	Megaloptera	Alderflies					
	Sialidae:						
	<i>Sialis sp.</i>						X
	Lepidoptera	Aquatic Moths					
	Pyrilidae:						
	<i>Petrophila sp.</i>						X
	Odonata	Dragonflies and Damselflies					
	Anisoptera	Dragonflies					
	Aeshnidae:						
	<i>Boyeria sp.</i>					X	X
	Cordulegasteridae:						
	<i>Cordulegaster sp.</i>						X
	<i>Dromogomphus</i>				X		
	<i>Stylurus</i>				X		
	Zygoptera	Damselflies					
	<i>Calopteryx maculata</i>					X	
	<i>Calopteryx sp.</i>						X
	<i>Enallagma sp.</i>						X
	Plecoptera	Stoneflies					
	Capniidae:						
	<i>Chloroperlidae</i>						X
	Leuctridae						X
	Nemuridae:						X
	<i>Amphinemura sp.</i>						X
	Perlidae:						
	<i>Paragnetina sp.</i>						X
	Perlodidae:						X
	<i>Isoperla sp.</i>				X		
	Mollusca	Clams and Mussels					
	Sphaeriidae:				X		X
	<i>Pisidium casertanum</i>				X		
	<i>Pisidium sp.</i>						X
	<i>Sphaerium striatinum</i>						X
	Unionidae:				X		
	Gastropoda	Snails and Limpets					
	<i>Amnicola limosa</i>						X
	<i>Ferrissia parallela</i>						X
	Lymnaeidae:				X		
	<i>Physa sp.</i>						X
	Physidae:						
	<i>Physella</i>					X	
	Oligochaeta	Aquatic Worms					
	Lumbricidae:						X
	<i>Lubricus rubellus</i>						X
	Sparganophilidae:						
	<i>Sparganophilus eiseni</i>						X

	Tubificidae:				X		X
	<i>Limnodrilus hoffmeisteri</i>				X		X
	<i>Potamothrix moldaviensis</i>				X		
	Trichoptera	Caddisflies					
	Brachycentridae:						
	<i>Brachycentrus</i>					X	
	Hydropsychidae:						
	<i>Cheumatopsyche sp.</i>					X	X
	<i>Diplectrona sp.</i>						X
	<i>Hydropsyche betteni</i>						X
	<i>Hydropsyche sparna</i>					X	
	<i>Oxyethira sp.</i>						X
	Lepidostomitidae:						
	<i>Lepidostoma sp.</i>						X
	Leptoceridae:						
	<i>Mysyacides sp.</i>						X
	<i>Oecetis sp.</i>						X
	Lemnephilidae:						X
	<i>Hydataphylax sp.</i>						X
	<i>Limnephilus sp.</i>						X
	<i>Pycnopsyche sp.</i>					X	X
	Philopotamidae:						
	<i>Dolophilodes sp.</i>						X
	Phryganeidae:						
	<i>Agrypnia sp.</i>						X
	<i>Ptilostomis sp.</i>						X
	Polycentropodidae:						
	<i>Neureclipsis sp.</i>						X
	<i>Polycentropus sp.</i>						X
	Psychomyiidae:						
	<i>Lype sp.</i>						X
	Rhyacophilidae:						
	<i>Rhyacophila sp.</i>						X

- a Samples from Nottawasaga River approximately 1.5 km upstream of Minesing Wetlands (2005-2006)
- b Small, qualitative sample from Willow Creek at George Johnston Road (2000)
- c Samples from Black Creek at George Johnston Road and tributary west of Vespra Valley Road (2003-2005)

Appendix D: Fish

Checklist of Fish of Minesing Wetlands December 2006

	Species	Common Names	Status	Nottawasaga River	Mad River and Drains	Willow Creek and Drains	Black Creek/Keast Creek
1	<i>Ichthyomyzon fossor</i>	Northern Brook Lamprey	S3			X	X
2	<i>Petromyzon marinus</i>	Sea Lamprey		X	X		
3	<i>Acipenser fulvescens</i>	Lake Sturgeon		X			
4	<i>Amia calva</i>	Bowfin		X			
5	<i>Oncorhynchus kisutch</i>	Coho Salmon		X	X		
6	<i>Oncorhynchus tshawytscha</i>	Chinook Salmon		X	X		
7	<i>Oncorhynchus mykiss</i>	Rainbow Trout		X	X		
8	<i>Salmo trutta</i>	Brown Trout				X	
9	<i>Salvelinus fontinalis</i>	Brook Trout					X
10	<i>Esox lucius</i>	Northern Pike		X	X	X	
11	<i>Umbra limi</i>	Central Mudminnow			X	X	X
12	<i>Catostomus catostomus</i>	Longnose Sucker		X			
13	<i>Catostomus commersoni</i>	White Sucker		X	X	X	X
14	<i>Moxostoma sp.</i>	Redhorse (unknown species)		X			
15	<i>Moxostoma macrolepidotum</i>	Shorthead Redhorse		X			
16	<i>Moxostoma spp.</i>	Redhorse (unknown species)		X		X	
17	<i>Phoxinus eos</i>	Northern Redbelly Dace				X	
18	<i>Cyprinus carpio</i>	Common Carp		X		X	
19	<i>Hybognathus hankinsoni</i>	Brassy Minnow					X
20	<i>Notemigonus crysoleucas</i>	Golden Shiner		X		X	
21	<i>Rhinichthys atratulus</i>	Blacknose Dace				X	X
22	<i>Rhinichthys cataractae</i>	Longnose Dace			X	X	X
23	<i>Semotilus atromaculatus</i>	Creek Chub			X	X	X
24	<i>Ictalurus nebulosus</i>	Brown Bullhead		X		X	
25	<i>Ictalurus punctatus</i>	Channel Catfish		X			
26	<i>Lota lota</i>	Burbot		X	X		
27	<i>Culaea inconstans</i>	Brook Stickleback				X	X
28	<i>Percopsis omiscomaycus</i>	Trout-perch		X			
29	<i>Ambloplites rupestris</i>	Rock Bass		X			
30	<i>Lepomis gibbosus</i>	Pumpkinseed		X	X		
31	<i>Micropterus dolomieu</i>	Smallmouth Bass		X		X	
32	<i>Micropterus salmoides</i>	Largemouth Bass		X		X	X
33	<i>Pomoxis nigromaculatus</i>	Black Crappie		X			
34	<i>Perca flavescens</i>	Yellow Perch		X			
35	<i>Stizostedion vitreum vitreum</i>	Walleye		X		X	
36	<i>Etheostoma nigrum</i>	Johnny Darter				X	
37	<i>Cottus spp.</i>	Mottled/Slimy Sculpin			X	X	X

Appendix E: Reptiles and Amphibians

Checklist of the AMPHIBIANS and REPTILES of Minesing Wetlands
Compiled August 1993 (revised 2005) by Robert L. Bowles.

Species	Common Names	S ranks	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
AMPHIBIA	amphibians, salamanders & newts								
ANURA	(frogs & toads)								
<i>Bufo americanus</i>	American Toad	S5	X	X		X	X	X	X
<i>Hyla versicolor</i>	Tetraploid Gray Treefrog	S5	X	X		X	X		X
<i>Pseudacris triseriata</i>	Western Chorus Frog	S4	X						
<i>Pseudacris c. crucifer</i>	Northern Spring Peeper	S5	X	X	X	X	X		X
<i>Rana sylvatica</i>	Wood Frog	S5	X	X	X		X	X	X
<i>Rana pipiens</i>	Northern Leopard Frog	S5	X	X	X	X	X	X	X
* <i>Rana palustris</i>	Pickerel Frog	S4	X						
<i>Rana clamitans melanota</i>	Green Frog	S5	X	X		X	X	X	X
* <i>Rana septentrionalis</i>	Mink Frog	S5	X				X		
<i>Rana catesbeiana</i>	American Bullfrog	S4	X	X			X		
REPTILIA	(reptiles)								
TESTUDINES	(turtles)								
<i>Chelydra serpentina serpentina</i>	Common Snapping Turtle	S5	X	X	X	X	X		X
<i>Chrysemys picta marginata</i>	Midland Painted Turtle	S5	X	X	X	X	X		X
* <i>Graptemys geographica</i>	Northern Map Turtle	S3	O						
<i>Emydoidea blandingii</i>	Blanding's Turtle	S3	X						X
* <i>Glyptemys insculpta</i>	Wood Turtle	S2	X						
* <i>Clemmys guttata</i>	Spotted Turtle	S3	X						
SQUAMATA	(lizards and snakes)								
SERPENTES	(snakes)								
<i>Thamnophis s. sirtalis</i>	Eastern Gartersnake	S5	X	X	X	X	X		X
<i>Lampropeltis triangulum</i>	Milksnake	S3	X						*

Note: Record all details of the observations of species marked thus *, e.g. date, location, number of individuals, etc.

* expected to report observations for this species but found none

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- S5** **Secure**—Common, widespread, and abundant in the nation or state/province.
- SE** **Exotic**; not believed to be a native component of Ontario's flora.

Appendix F: Birds

Checklists of Birds of Mining Wetlands May, 1999 revised August 2006

	Species	Common Names	Sim	Status	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
1	<i>Chen caerulescens</i>	Snow Goose	OM	24B,SZN	X						X
2	<i>Branta bernicla</i>	Brant	OM	SZN,SRB	X						
3	<i>Branta canadensis</i>	Canada Goose	SR*	S5B,ZN	X	X	X	X	X	X	X
4	<i>Cygnus buccinator</i>	Trumpeter Swan	SR*	S2S3		X		X	X		X
5	<i>Cygnus columbianus</i>	Tundra Swan	M	S3B,SZN	X	X			X		X
6	<i>Aix sponsa</i>	Wood Duck	SR*	S5B, SZN	X	X	X	X	X	X	X
7	<i>Anas strepera</i>	Gadwall	OSR*	S4B,SZN	X						
8	<i>Anas americana</i>	American Wigeon	OSR*	S4B,SZN	X	X		X	X		X
9	<i>Anas rubripes</i>	American Black Duck	SR*	S5B, SZN	X	X			X		X
10	<i>Anas platyrhynchos</i>	Mallard	SR*	S5B,SZN	X	X	X	X	X	X	X
11	<i>Anas discors</i>	Blue-winged Teal	SR*	S5B,SZN	X	X		X	X		X
12	<i>Anas clypeata</i>	Northern Shoveler	OSR*	S4B,SZN	X				X		X
13	<i>Anas acuta</i>	Northern Pintail	OSR*	S5B,SZN	X	X		X	X	X	X
14	<i>Anas crecca</i>	Green-winged Teal	SR*	S4B,SZN	X	X		X	X		X
15	<i>Aythya valisineria</i>	Canvasback	OSR*	S1B,SZN	X						
16	<i>Aythya americana</i>	Redhead	OSR*	S2B,SZN	X						X
17	<i>Aythya collaris</i>	Ring-necked Duck	OSR*	S5B,SZN	X	X			X		X
18	<i>Aythya marila</i>	Greater Scaup	M	S2B,SZN	X				X		X
19	<i>Aythya affinis</i>	Lesser Scaup	OSR*	S4B, SZN	X				X	X	X
20	<i>Bucephala albeola</i>	Bufflehead	M	S3B,SZN	X	X		X	X		X
21	<i>Bucephala clangula</i>	Common Goldeneye	M	S5B,SZN	X			X	X		X
22	<i>Lophodytes cucullatus</i>	Hooded Merganser	SR*	S5B,SZN	X			X	X		X
23	<i>Mergus merganser</i>	Common Merganser	OSR*	S5B, SZN	X	X		X	X	X	X
24	<i>Mergus serrator</i>	Red-breasted Merganser	M	S4B,SZN	X						
25	<i>Oxyura jamaicensis</i>	Ruddy Duck	OM	S2B, SZN	X						X
26	<i>Phasianus colchicus</i>	Ring-necked Pheasant	YR*	SE	X						
27	<i>Bonasa umbellus</i>	Ruffed Grouse	YR*	S5	X	X	X	X	X	X	X
28	<i>Meleagris gallopavo</i>	Wild Turkey	YR*	S4	X			X	X	X	X
29	<i>Gavia immer</i>	Common Loon	SR*	S4B,SZN	X						X
30	<i>Podilymbus podiceps</i>	Pied-billed Grebe	SR*	S4B,SZN	X						X
31	<i>Podiceps auritus</i>	Horned Grebe	M	S1B,SZN	X				X		X
32	<i>Phalacrocorax auritus</i>	Double-crested Cormorant	SR*	S4B,SZN	O			X	X		X
33	<i>Botaurus lentiginosus</i>	American Bittern	SR*	S4B,SZN	X			X	X		X
34	<i>Ixobrychus exilis</i>	Least Bittern	SR*	S3B,SZN	X						X
35	<i>Ardea herodias</i>	Great Blue Heron	SR*	S5B,SZN	X	X		X	X	X	X
36	<i>Casmerodius albus</i>	Great Egret	SR*	S2B,SZN	X			X	X		X
37	<i>Bubulcus ibis</i>	Cattle Egret	VR	SZB,SZN	X						
38	<i>Butorides virescens</i>	Green Heron	SR*	S4B,SZN	X			X	X		X
39	<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	SR*	S3B,SZN	X			X			X
40	<i>Cathartes aura</i>	Turkey Vulture	SR*	S4B,SZN	X			X	X		X
41	<i>Pandion haliaetus</i>	Osprey	SR*	S4B, SZN	X			X	X		X
42	<i>Haliaeetus leucocephalus</i>	Bald Eagle	OM	S4B,SZN	X						X
43	<i>Circus cyaneus</i>	Northern Harrier	SR*	S4B,SZN	X	X					X
44	<i>Accipiter striatus</i>	Sharp-shinned Hawk	SR*	S5B, SZN	X						X
	SPECIES	Common Names	Sim	Status	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
45	<i>Accipiter cooperii</i>	Cooper's Hawk	SR*	S4B, SZN	X						

46	<i>Accipiter gentilis</i>	Northern Goshawk	SR*	S4	X			X			X
47	<i>Buteo lineatus</i>	Red-shouldered Hawk	SR*	S4B,SZN	X						X
48	<i>Buteo platypterus</i>	Broad-winged Hawk	SR*	S5B,SZN	X				X		X
49	<i>Buteo jamaicensis</i>	Red-tailed Hawk	YR*	S5B,SZN	X			X	X	X	X
50	<i>Buteo lagopus</i>	Rough-legged Hawk	WR	S1B,SZN	X				X		X
51	<i>Falco sparverius</i>	American Kestrel	SR*	S5B, SZN	X	X			X		X
52	<i>Falco columbarius</i>	Merlin	M	S4B,SZN	X			X			X
53	<i>Rallus limicola</i>	Virginia Rail	SR*	S4B,SZN	X			X	X		X
54	<i>Porzana carolina</i>	Sora	SR*	S4B, SZN	X			X	X		X
55	<i>Gallinula chloropus</i>	Common Moorhen	SR*	S4B,SZN	X				X		X
56	<i>Fulica americana</i>	American Coot	SR*	S4B,SZN	X						X
57	<i>Grus canadensis</i>	Sandhill Crane	M?	S4B, SZN	X			X	X		X
58	<i>Pluvialis squatarola</i>	Black-bellied Plover	M	SZN	0				X		
59	<i>Charadrius semipalmatus</i>	Semipalmated Plover	M	S4B,SZN	0				X		
60	<i>Charadrius vociferus</i>	Killdeer	SR*	S5B,SZN	X			X	X		X
61	<i>Tringa melanoleuca</i>	Greater Yellowlegs	M	S4B, SZN	X			X	X		X
62	<i>Tringa flavipes</i>	Lesser Yellowlegs	M	S4B, SZN	X			X	X		X
63	<i>Tringa solitaria</i>	Solitary Sandpiper	M	S4B, SZN	X			X	X		X
64	<i>Actitis macularia</i>	Spotted Sandpiper	SR*	S5B,SZN	X	X		X	X		X
65	<i>Bartramia longicauda</i>	Upland Sandpiper	SR*	S4B,SZN	X						
66	<i>Calidris pusilla</i>	Semipalmated Sandpiper	M	S3S4B,SZN							X
67	<i>Calidris minutilla</i>	Least Sandpiper	M	S4B,SZN	O			X	X		
68	<i>Calidris bairdii</i>	Baird's Sandpiper	OM	SZN	X						X
69	<i>Calidris melanotos</i>	Pectoral Sandpiper	M	SHB,SZN	O			X			X
70	<i>Calidris alpina</i>	Dunlin	M	S3B,SZN	O			X			X
71	<i>Gallinago gallinago</i>	Wilson's Snipe	SR*	S5B,SZN	X			X	X		X
72	<i>Scolopax minor</i>	American Woodcock	SR*	SAN	X				X		X
73	<i>Larus philadelphia</i>	Bonaparte's Gull	M	S4B,SZN	X						
74	<i>Larus delawarensis</i>	Ring-billed Gull	SR*	S5B,SZN	X	X	X	X	X	X	X
75	<i>Larus argentatus</i>	Herring Gull	SR*	S5B,SZN	X			X	X	X	X
76	<i>Sterna caspia</i>	Caspian Tern	SR*	S3B, SZN	X				X		X
77	<i>Sterna hirundo</i>	Common Tern	SR*	S4B, SZN	X						
79	<i>Chlidonias niger</i>	Black Tern	SR*	S3B,SZN	X						
80	<i>Columba livia</i>	Rock Pigeon	YR*	SE	X				X		X
81	<i>Zenaidura macroura</i>	Mourning Dove	YR*	S5B, SZN	X	X	X	X	X	X	X
82	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	SR*	S4B,SZN	X			X	X		X
83	<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	SR*	S4B,SZN	X				X		
84	<i>Otus asio</i>	Eastern Screech-Owl	YR*	S5	X						X
85	<i>Bubo virginianus</i>	Great Horned Owl	YR*	S5	X			X	X		X
86	<i>Nyctea scandiaca</i>	Snowy Owl	WR	SZB?,SZN	X				X		X
87	<i>Surnia ulula</i>	Northern Hawk Owl	OWR	S4	X						
88	<i>Strix varia</i>	Barred Owl	YR*	S4S5	X						
89	<i>Strix nebulosa</i>	Great Gray Owl	OWR	S3S4	X						X
90	<i>Asio flammeus</i>	Short-eared Owl	OM*	S3S4B,SZN	X						
	SPECIES	Common Names	Sim	Status	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
91	<i>Aegolius funereus</i>	Boreal Owl	OWR	S4	X						
92	<i>Aegolius acadicus</i>	Northern Saw-whet Owl	YR*	S4B,SZN	X						X
93	<i>Chordeiles minor</i>	Common Nighthawk	SR*	S4B,SZN	X			X			X
94	<i>Caprimulgus vociferus</i>	Whip-poor-will	SR*	S4B,SZN	X						

95	<i>Chaetura pelagica</i>	Chimney Swift	SR*	S5B,SZN	X			X			
96	<i>Archilochus colubris</i>	Ruby-throated Hummingbird	SR*	S5B,SZN	X			X	X	X	X
97	<i>Ceryle alcyon</i>	Belted Kingfisher	SR*	S5B,SZN	X			X	X	X	X
98	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	SR*	S3B, SZN	X			X	X		X
99	<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	O	S4	X						X
100	<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	SR*	S5B, SZN	X	X		X	X		X
101	<i>Picoides pubescens</i>	Downy Woodpecker	YR*	S5	X		X	X	X	X	X
102	<i>Picoides villosus</i>	Hairy Woodpecker	YR*	S5	X			X	X	X	X
103	<i>Picoides tridactylus</i>	Am. Three-toed Woodpecker	VR	S4	X						
104	<i>Picoides arcticus</i>	Black-backed Woodpecker	VR	S4	X						
105	<i>Colaptes auratus</i>	Northern Flicker	SR*	S5B,SZN	X		X	X	X		X
106	<i>Dryocopus pileatus</i>	Pileated Woodpecker	SR*	S4,S5	X		X		X	X	X
107	<i>Contopus cooperi</i>	Olive-sided Flycatcher	M*	S5B,SZN	X						X
108	<i>Contopus virens</i>	Eastern Wood-Pewee	SR*	S5B,SZN	X			X	X (N)		X
109	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	M	S5B,SZN	X						X
110	<i>Empidonax alnorum</i>	Alder Flycatcher	SR*	S5B,SZN	X	X					X
111	<i>Empidonax traillii</i>	Willow Flycatcher	SR*	S5B,SZN	X		X				X
112	<i>Empidonax minimus</i>	Least Flycatcher	SR*	S5B,SZN	X			X	X		X
113	<i>Sayornis phoebe</i>	Eastern Phoebe	SR*	S5B, SZN	X	X		X	X		X
114	<i>Myiarchus crinitus</i>	Great Crested Flycatcher	SR*	S5B,SZN	X			X	X (N)	X	X
115	<i>Tyrannus tyrannus</i>	Eastern Kingbird	SR*	S5B, SZN	X	X	X	X	X		X
116	<i>Lanius ludovicianus</i>	Loggerhead Shrike	VR*	S2B,SZN	X						
117	<i>Lanius excubitor</i>	Northern Shrike	WR	S2S3B,SZN	X						X
118	<i>Vireo flavifrons</i>	Yellow-throated Vireo	OSR*	S4B,SZN	X			X	X		X
119	<i>Vireo solitarius</i>	Blue-headed Vireo	OSR*	S5B,SZN	X				X		X
120	<i>Vireo gilvus</i>	Warbling Vireo	SR*	S5B,SZN	X			X	X		X
121	<i>Vireo philadelphicus</i>	Philadelphia Vireo	OSR*	S5B,SZN	X				X		
122	<i>Vireo olivaceus</i>	Red-eyed Vireo	SR*	S5B, SZN	X			X	X	X	X
123	<i>Perisoreus canadensis</i>	Gray Jay	VR	S5	X						
124	<i>Cyanocitta cristata</i>	Blue Jay	YR*	S5	X	X	X	X	X	X	X
125	<i>Corvus brachyrhynchos</i>	American Crow	YR*	S5B,SZN	X	X	X	X	X	X	X
126	<i>Corvus corax</i>	Common Raven	YR*	S5	O			X			X
127	<i>Eremophila alpestris</i>	Horned Lark	SR*	S5B,SZN	X						X
128	<i>Progne subis</i>	Purple Martin	SR*	S5B, SZN	X						X
129	<i>Tachycineta bicolor</i>	Tree Swallow	SR*	S5B, SZN	X	X	X	X	X	X	X
130	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	SR*	S5B, SZN	X			X	X		XX
131	<i>Riparia riparia</i>	Bank Swallow	SR*	S5B, SZN	X			X			X
132	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	SR*	S5B, SZN	X						X
133	<i>Hirundo rustica</i>	Barn Swallow	SR*	S5B,SZN	X	X		X	X	X	
134	<i>Poecile atricapillus</i>	Black-capped Chickadee	YR*	S5	X	X	X	X	X	X	X
	SPECIES	Common Names	Sim	Status	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
135	<i>Poecile hudsonicus</i>	Boreal Chickadee	VR	S5	X						
136	<i>Sitta canadensis</i>	Red-breasted Nuthatch	YR*	S5B, SZN	X		X				X
137	<i>Sitta carolinensis</i>	White-breasted Nuthatch	YR*	S5	X		X	X	X	X	X
138	<i>Certhia americana</i>	Brown Creeper	YR*	S5B,SZN	X	X			X		X
139	<i>Troglodytes aedon</i>	House Wren	SR*	S5B, SZN	X			X	X	X	X
140	<i>Troglodytes troglodytes</i>	Winter Wren	SR*	S5B, SZN	X		X				X
141	<i>Cistothorus palustris</i>	Marsh Wren	SR*	S5B,SZN	X				X	X	X

142	<i>Regulus satrapa</i>	Golden-crowned Kinglet	OYR*	S5B, SZN	X						X
143	<i>Regulus calendula</i>	Ruby-crowned Kinglet	OYR*	S5B, SZN	X			X			X
144	<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher	OSR*	S4B, SZN	X				X		X
145	<i>Sialia sialis</i>	Eastern Bluebird	SR*	S4S5B, SZN	X						X
146	<i>Catharus fuscescens</i>	Veery	SR*	S4B,SZN	X		X	X	X	X	X
147	<i>Catharus minimus</i>	Gray-cheeked Thrush	M	S3S4B,SZN	X						
148	<i>Catharus ustulatus</i>	Swainson's Thrush	OSR*	S5B,SZN	X						X
149	<i>Catharus guttatus</i>	Hermit Thrush	SR*	S5B,SZN	X			X	X		X
150	<i>Hylocichla mustelina</i>	Wood Thrush	SR*	S5B,SZN	X	X		X	X		X
151	<i>Turdus migratorius</i>	American Robin	SR*	S5B, SZN	X	X	X	X	X (N)	x	X
152	<i>Dumetella carolinensis</i>	Gray Catbird	SR*	S5B,SZN	X	X	X	X	X	X	X
153	<i>Toxostoma rufum</i>	Brown Thrasher	SR*	S5B ,SZN	X				X		X
154	<i>Sturnus vulgaris</i>	European Starling	YR*	SE	X	X	X	X	X	X	X
155	<i>Anthus rubescens</i>	American Pipit	M	S4B,SZN	X						
156	<i>Bombycilla cedrorum</i>	Cedar Waxwing	YR*	S5B,SZN	X	X	X	X	X	X	X
157	<i>Vermivora pinus</i>	Blue-winged Warbler	SR*	S4B, SZN	X						
158	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	SR*	S4B, SZN	X						X
159	<i>Vermivora peregrina</i>	Tennessee Warbler	M	S5B , SZN	X				X		X
160	<i>Vermivora celata</i>	Orange-crowned Warbler	OM	S4B?, SZN	X						
161	<i>Vermivora ruficapilla</i>	Nashville Warbler	SR*	S5B, SZN	X		X		X		X
162	<i>Parula americana</i>	Northern Parula	M	S4B, SZN	X						
163	<i>Dendroica petechia</i>	Yellow Warbler	SR*	S5B,SZN	X	X	X	X	X	X	X
164	<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler	SR*	S5B,SZN	X	X		X	X		X
165	<i>Dendroica magnolia</i>	Magnolia Warbler	SR*	S5N,SZN	X						X
166	<i>Dendroica tigrina</i>	Cape May Warbler	M	S5B, SZN	X						
167	<i>Dendroica caerulescens</i>	Black-throated Blue Warbler	SR*	S5B,SZN	X				X		X
168	<i>Dendroica coronata</i>	Yellow-rumped Warbler	SR*	S5B,SZN	X		X	X	X		X
169	<i>Dendroica virens</i>	Black-throated Green Warbler	SR*	S5B, SZN	X		X		X		X
170	<i>Dendroica fusca</i>	Blackburnian Warbler	SR*	S5B,SZN	X						X
171	<i>Dendroica pinus</i>	Pine Warbler	SR*	S5B,SZN	X			X	X		X
172	<i>Dendroica discolor</i>	Prairie Warbler	SR*	S3S4B,SZN	X						
173	<i>Dendroica p. palmarum</i>	Western Palm Warbler	M	S5NB,SZN	X			X	X		X
174	<i>Dendroica castanea</i>	Bay-breasted Warbler	M	S5B,SZN	X						X
175	<i>Dendroica striata</i>	Blackpoll Warbler	M	S4B,SZN	X						X
176	<i>Dendroica cerulea</i>	Cerulean Warbler	SR*	S3B,SZN	X						X
177	<i>Mniotilta varia</i>	Black-and-White Warbler	SR*	S5B, SZN	X			X	X		X
178	<i>Setophaga ruticilla</i>	American Redstart	SR*	S5B, SZN	X	X		X	X		X
179	<i>Protonotaria citrea</i>	Prothonotary Warbler	VR*	S1S2B, SZN	X						
	SPECIES	Common Names	Sim	Status	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
180	<i>Seiurus aurocapillus</i>	Ovenbird	SR*	S5B, SZN	X		X		X		X
181	<i>Seiurus noveboracensis</i>	Northern Waterthrush	SR*	S5B, SZN	X			X			X
182	<i>Oporornis agilis</i>	Connecticut Warbler	RM	S4B, SZN	X						
183	<i>Oporornis philadelphia</i>	Mourning Warbler	SR*	S5B, SZN	X		X		X		X
184	<i>Geothlypis trichas</i>	Common Yellowthroat	SR*	S5B, SZN	X		X	X	X	X	X
185	<i>Wilsonia pusilla</i>	Wilson's Warbler	M	S5B, SZN	X						X
186	<i>Wilsonia canadensis</i>	Canada Warbler	SR*	S5B, SZN	X						X
187	<i>Piranga olivacea</i>	Scarlet Tanager	SR*	S5B, SZN	X				X		X
188	<i>Pipilo erythrophthalmus</i>	Eastern Towhee	SR*	S4B, SZN	X			X	X		X
189	<i>Spizella arborea</i>	American Tree Sparrow	WR	S5B, SZN	X	X			X		X

190	<i>Spizella passerina</i>	Chipping Sparrow	SR*	S5B, SZN	X			X	X		X
191	<i>Spizella pusilla</i>	Field Sparrow	SR*	S5B, SZN	X						
192	<i>Poocetes gramineus</i>	Vesper Sparrow	SR*	S4B, SZN	X						X
193	<i>Passerculus sandwichensis</i>	Savannah Sparrow	SR*	S5B, SZN	X	X		X			X
194	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	SR*	S4B, SZN	X						
195	<i>Ammodramus henslowii</i>	Henslow's Sparrow	VR*	S1B, SZN	X						
196	<i>Passerella iliaca</i>	Fox Sparrow	M	S4B, SZN	X						
197	<i>Melospiza melodia</i>	Song Sparrow	SR*	S5B, SZN	X	X	X	X	X	X	X
198	<i>Melospiza lincolni</i>	Lincoln's Sparrow	OSR*	S5B, SZN	X						X
199	<i>Melospiza georgiana</i>	Swamp Sparrow	SR*	S5B, SZN	X	X	X				X
200	<i>Zonotrichia albicollis</i>	White-throated Sparrow	SR*	S5B, SZN	X	X	X	X			X
201	<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	M	S4B, SZN	X			X	X		X
202	<i>Junco hyemalis</i>	Dark-eyed Junco	OYR*	S5B, SZN	X				X		X
203	<i>Calcarius lapponicus</i>	Lapland Longspur	M	S4B, SZN	X						X
204	<i>Plectrophenax nivalis</i>	Snow Bunting	WR	SZB?, SZN	X	X			X		X
205	<i>Cardinalis cardinalis</i>	Northern Cardinal	YR*	S5	X						X
206	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	SR*	S5B, SZN	X	X		X	X		X
207	<i>Passerina cyanea</i>	Indigo Bunting	SR*	S5B, SZN	X		X	X	X		X
208	<i>Spiza americana</i>	Dickcissel	VR	SZB, SZN	X						
209	<i>Dolichonyx oryzivorus</i>	Bobolink	SR*	S4B, SZN	X						X
210	<i>Agelaius phoeniceus</i>	Red-winged Blackbird	SR*	S5B, SZN	X	X	X	X	X	X	X
211	<i>Sturnella magna</i>	Eastern Meadowlark	SR*	S5B, SZN	X	X			X		X
212	<i>Sturnella neglecta</i>	Western Meadowlark	OSR*	S4B, SZN	X						
213	<i>Euphagus carolinus</i>	Rusty Blackbird	M*	S5B, SZN	X			X			X
214	<i>Quiscalus quiscula</i>	Common Grackle	SR*	S5B, SZN	X	X		X	X	X	X
215	<i>Molothrus ater</i>	Brown-headed Cowbird	SR*	S5B, SZN	X	X		X	X		X
216	<i>Icterus galbula</i>	Baltimore Oriole	SR*	S5B, SZN	X			X	X	X	X
217	<i>Pinicola enucleator</i>	Pine Grosbeak	OWR	S3S4B, SZN	X						
218	<i>Carpodacus purpureus</i>	Purple Finch	YR*	S5B, SZN	X						X
219	<i>Loxia curvirostra</i>	Red Crossbill	OYR	S5B, SZN	X						
220	<i>Loxia leucoptera</i>	White-winged Crossbill	OYR	S5B, SZN	X						
221	<i>Carduelis flammea</i>	Common Redpoll	WR	S4B, SZN	X						
222	<i>Carduelis hornemanni</i>	Hoary Redpoll	OWR	SZB?, SZN	X						
223	<i>Carduelis pinus</i>	Pine Siskin	OYR*	S5B, SZN	X						
224	<i>Carduelis tristis</i>	American Goldfinch	YR*	S5B, SZN	X	X	X	X	X	X	X
225	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	WR*	S5B, SZN	X						
	SPECIES	Common Names	Sim	Status	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
226	<i>Passer domesticus</i>	House Sparrow	YR*	SE	X			X	X		X

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EX=Extinct O= Occasional M= Migrant
YR=Year Resident VR= Very Rare
WR= Winter Resident SR = Summer Resident
* = Nesting

The NHIC assigns subnational ranks (SRANKS) for species and vegetation communities in Ontario (NHIC website). These SRANKS parallel the global ranks (GRANKS), and range from S1 (extremely rare in Ontario, generally 5 or fewer locations) to S5 (demonstrably secure in Ontario). Non-native species are not ranked.

S1 **Extremely rare** in Ontario; usually 5 or fewer occurrences in the province, or very few remaining hectares.

- S2** **Very rare** in Ontario; usually between 5 and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.
- S3** **Rare to uncommon** in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.
- S4** **Common** and apparently secure in Ontario; usually with more than 100 occurrences in the province.
- S5** **Secure**—Common, widespread, and abundant in the nation or state/province.
- SE** **Exotic**; not believed to be a native component of Ontario's flora.
- SZB** **Breeding migrants/vagrants.**
- SZN** **Non-breeding migrants/vagrants.**

Appendix G: Mammals

Checklist of Mammals of Minesing Wetlands

	MAMMALIA	MAMMALS	S ranks	History	Site 1	Site 2	Site 3	Site 4	Bozcek	Other
1	<i>Didelphis virginiana</i>	Virginia Opossum	S4	X						
2	<i>Sorex cinereus</i>	Common (Masked) Shrew	S5	X						
3	<i>Sorex palustris</i>	Water Shrew	S5	X				X		
4	<i>Condylura cristata</i>	Star-nosed Mole	S5	X						X
5	<i>Myotis lucifugus</i>	Little Brown Bat	S5	X	X					X
6	<i>Eptesicus fuscus</i>	Big Brown Bat	S5							X
7	<i>Lepus americanus</i>	Snowshoe Hare	S5	X	X	X		X		X
8	<i>Lepus europaeus</i>	European Hare	SE	X						
9	<i>Tamias striatus</i>	Eastern Chipmunk	S5	X	X		X	X	X	X
10	<i>Marmota monax</i>	Woodchuck	S5	X	X	X		X	X	X
11	<i>Sciurus carolinensis</i>	Gray Squirrel	S5	X	X				X	X
12	<i>Tamiasciurus hudsonicus</i>	Red Squirrel	S5	X			X	X	X	X
13	<i>Glaucomys volans</i>	Southern Flying Squirrel	S3	X						*
14	<i>Castor canadensis</i>	Beaver	S5	X	X	X	X	X	X	X
15	<i>Peromyscus leucopus</i>	White-footed Mouse	S5	X						X
16	<i>Peromyscus maniculatus</i>	Deer Mouse	S5	X						X
17	<i>Microtus pennsylvanicus</i>	Meadow Vole	S5	X					X	X
18	<i>Ondatra zibethicus</i>	Muskrat	S5	X	X	X	X	X	X	X
19	<i>Zapus hudsonius</i>	Meadow Jumping Mouse	S5	X						
20	<i>Erethizon dorsatum</i>	Porcupine	S5	X	X		X	X		X
21	<i>Canis latrans / lycaon</i>	Eastern Coyote/Brush Wolf	S5	X	X	X	X	X	X	X
22	<i>Vulpes vulpes</i>	Red Fox	S5	X				X		X
23	<i>Ursus americanus</i>	Black Bear	S5	X						
24	<i>Procyon lotor</i>	Raccoon	S5	X	X	X	X	X	X	X
25	<i>Martes pennanti</i>	Fisher	S5	X						X
26	<i>Mustela erminea</i>	Ermine (Short tailed Weasel)	S5	X						
27	<i>Mustela frenata</i>	Long-tailed Weasel	S4	X						
28	<i>Mustela vison</i>	Mink	S5	X			X			X
29	<i>Mephitis mephitis</i>	Striped Skunk	S5	X	X					X
30	<i>Lutra canadensis</i>	River Otter	S5	X						X
31	<i>Lynx canadensis</i>	Canada Lynx	S5	X						
32	<i>Odocoileus virginianus</i>	White-tailed Deer	S5	X	X	X	X	X	X	X
33	<i>Alces alces</i>	Moose	S5	X			X scat			X

Record all details of the observation of species not recorded, e.g. date, location, number of individuals, etc. and send information to Bob Bowles, 374 Grenville Avenue, Orillia, Ontario. L3V 7P7.

* - should consider nest boxes for this species

Appendix H: Rare Species (Confidential Document)

Available upon request and Ministry of Natural Resources approval