Lower Trent Conservation

MURRAY MARSH NATURAL HABITAT AREA MANAGEMENT PLAN

"Local leaders in conservation…working with others towards healthy watersheds for now and future generations."

Approved by: Lower Trent Conservation Board of Directors
Date: September 11, 2014

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1. INTRODUCTION

Lower Trent Conservation (LTC) owns and manages over 1,500 hectares (3,750 acres) of natural open space. These forests, valleys, meadows and wetlands are part of a system of protected landscapes that depict the natural diversity of the region. They are special places in the watershed that are protected from development, where the natural world comes first. There are 17 properties, in total, that range in size from small parkettes to areas over 650 hectares.

LTC has classified its properties into two categories: Conservation Areas and Natural Habitat Areas (NHA). Conservation Areas provide venues for healthy and active lifestyles such as hiking, mountain biking, fishing, cross-country skiing, picnicking, canoeing, and other recreational activities. Natural Habitat Areas are, generally, large tracts of land with significant natural features managed to remain in their natural state. They are open to the public, but intended to be low use areas with no maintained trails or facilities. Long-term protection of such natural areas is required to ensure healthy watersheds, and for the enjoyment of present and future generations. LTC's Murray Marsh property is designated as a Natural Habitat Area.

2. GOALS AND OBJECTIVES

The purpose of the Murray Marsh NHA Management Plan is to address management concerns in a fashion that is consistent with LTC goals and objectives, while considering input from watershed residents and stakeholders.

2.1 GOALS

LTC's goals are to ensure that the management of the Murray Marsh NHA:

1. satisfies the requirements set out by the Conservation Lands Strategy,
2. protects natural features, habitat, and natural area linkages within Murray Marsh, and
3. contributes to a healthy watershed.

2.2 OBJECTIVES

The Plan is intended to address the following management objectives:

1. guide naturalization and wildlife habitat protection and enhancement,
2. identify maintenance and signage requirements,
3. identify the potential for educational/recreational activities,
4. identify ecological information needs, and
5. identify promoted uses, permitted uses, and prohibited uses of the property.

3. PLAN DEVELOPMENT PROCESS

The Murray Marsh NHA Management Plan was developed by LTC staff in consultation with the public and external agencies, and approved by the LTC Board of Directors. Input received throughout the consultation period was considered and incorporated, where possible, in the preparation of the final plan. The range of interests, values, and perspectives received was broad, therefore, not all concerns could be addressed. The following is a summary of the process followed.

January – March, 2014	• Staff reviewed background information, identified preliminary list of potential issues, and prepared background information for consultation
March 31 –April 2, 2014	• Staff notified public and agencies of development of management plan and upcoming public open house via website, news release, E-News, correspondence to registered hunters, nearby landowners, agencies, and interest groups. • Sent questionnaire to registered hunters (65 questionnaires mailed, 19 responses received)
April 10, 2014	• Reviewed work plan and preliminary list of potential issues with LTC Board of Directors
April 15, 2014	• Held Open House in Codrington (approximately 25 people attended)
April – May, 2014	• Staff developed preliminary recommendations
May 28/29, 2014	• Agency/interest group meetings held (Ministry of Natural Resources and Forestry (MNRF), Ontario Federation of Anglers and Hunters (OFAH), Nature Conservancy of Canada, Willow Beach Field Naturalists, Northumberland Land Trust)
Late May, 2014	• Staff revised preliminary recommendations based on feedback received
June 12, 2014	• Approval by LTC Board of Directors to consult on draft recommendations
June 23 – July 25, 2014	• Public consultation on draft recommendations • Public notified of public consultation via website, E-News, Facebook, direct correspondence to registered hunters, nearby landowners, agencies, interest groups, and open house attendees • 9 written comments received • 2 phone calls received • 2 in person meetings held (OFAH, Northumberland Land Trust)
August, 2014	• Staff revised draft recommendations and prepared draft Management Plan
September 11, 2014	• Board of Directors consideration of draft Management Plan

4. BACKGROUND

4.1 LOCATION

While the Murray Marsh Provincially Significant Wetland (PSW) is shared between the Municipality of Brighton and the City of Quinte West, the Murray Marsh NHA is located entirely in the northern portion of the Municipality of Brighton (Figure 1). Murray Marsh stretches for 10 km along Percy Reach on the Trent River south of Campbellford, and extends south for 8 km nearly reaching the hamlet of Wooler. Legally, the NHA property is identified as Concession 8, parts of Lot 23-30, and Concession 7, parts of Lot 26 and 27 (former Murray Township) Municipality of Brighton, Northumberland County (UTM 18T 279647E 4898084N NAD83). The main entrance point to the property is by way of Goodfellow Road, off of County Road 30 north of Codrington.

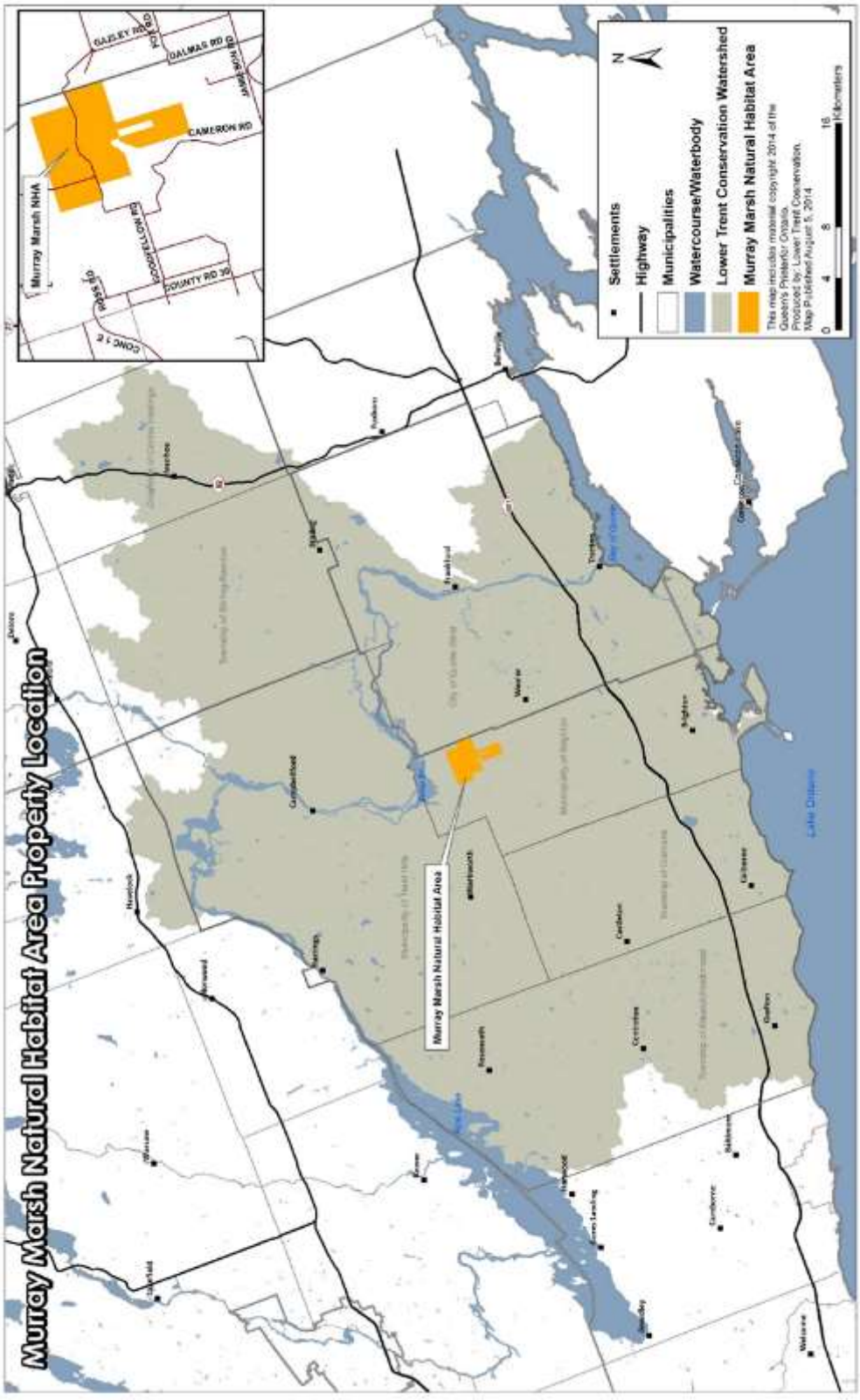

Figure 1: Murray Marsh Natural Habitat Area (NHA) property location.

4.2 LAND ACQUISITION

LTC acquired 667 hectares of the wetland, including the Puddephatt farm, during the late 1980's with financial assistance from the Nature Conservancy of Canada, Ontario Heritage Foundation, MNRF, and Wildlife Habitat Canada.

The Puddephatt property was owned by LTC; however, Charlie Puddephatt had a life lease on the property, which he managed until his death in 2010. LTC has since taken over the management of the former Puddephatt property. The requirement for LTC to manage these additional lands is one of the drivers behind the development of this Management Plan.

4.3 GENERAL DESCRIPTION

Murray Marsh is one of the largest remaining wetlands in southeastern Ontario. It is situated in the heart of the LTC watershed region. Wetlands are not all the same, Murray Marsh is actually comprised of three different types of wetlands – swamp, marsh, and fen. As swamp is the most abundant wetland type, the name "Murray Marsh" is a misnomer.

The Murray Marsh is bordered by drumlin fields to the east, sand and clay plains to the west, and an esker ridge to the south. Several small watercourses flow through the wetland before emptying into the Trent River. Its varied and scenic topography includes low-lying wetland areas, drumlin islands, sand ridges, and the Trent River. The many drumlins rising above the wetland offer spectacular views of the Trent River valley.

4.4 ADJACENT PROPERTIES/LAND USES

Through the combined ownership of property by LTC and the Province of Ontario, over half (approximately 56 percent) of the Murray Marsh is protected and accessible to the public, the remaining properties on the outer edges are in private ownership (Figure 2).

LTC has two agricultural lease agreements in the Murray Marsh NHA totaling 97.5 ha of land, which are primarily farmed for soy and corn. Similarly, LTC leases a small parcel of open field within the Murray Marsh NHA for apiculture (beekeeping). Refer to Figure 3 for the locations of leased agricultural and apiculture lands.

The Murray Marsh Heritage Resource Inventory (Dini 1991) provides a detailed report of the private properties surrounding Murray Marsh. Each property was scored from 1 (low acquisition priority) to 3 (high acquisition priority) based on features, biodiversity, critical habitat, unprotected habitat, and access for social use. These individual property scores could assist in assessing private properties for acquisition when funding and property are available.

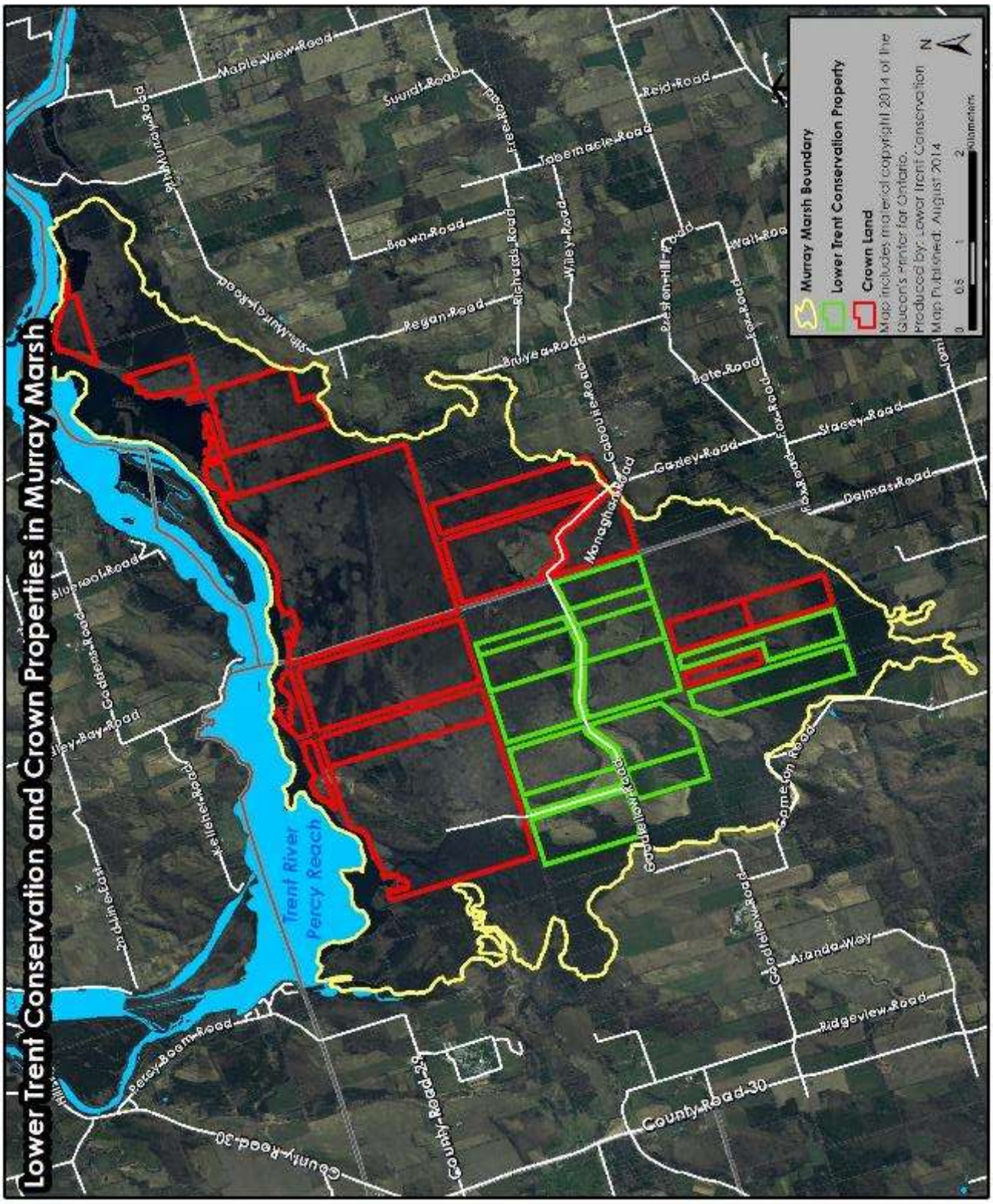

Figure 2: Murray Marsh property ownership.

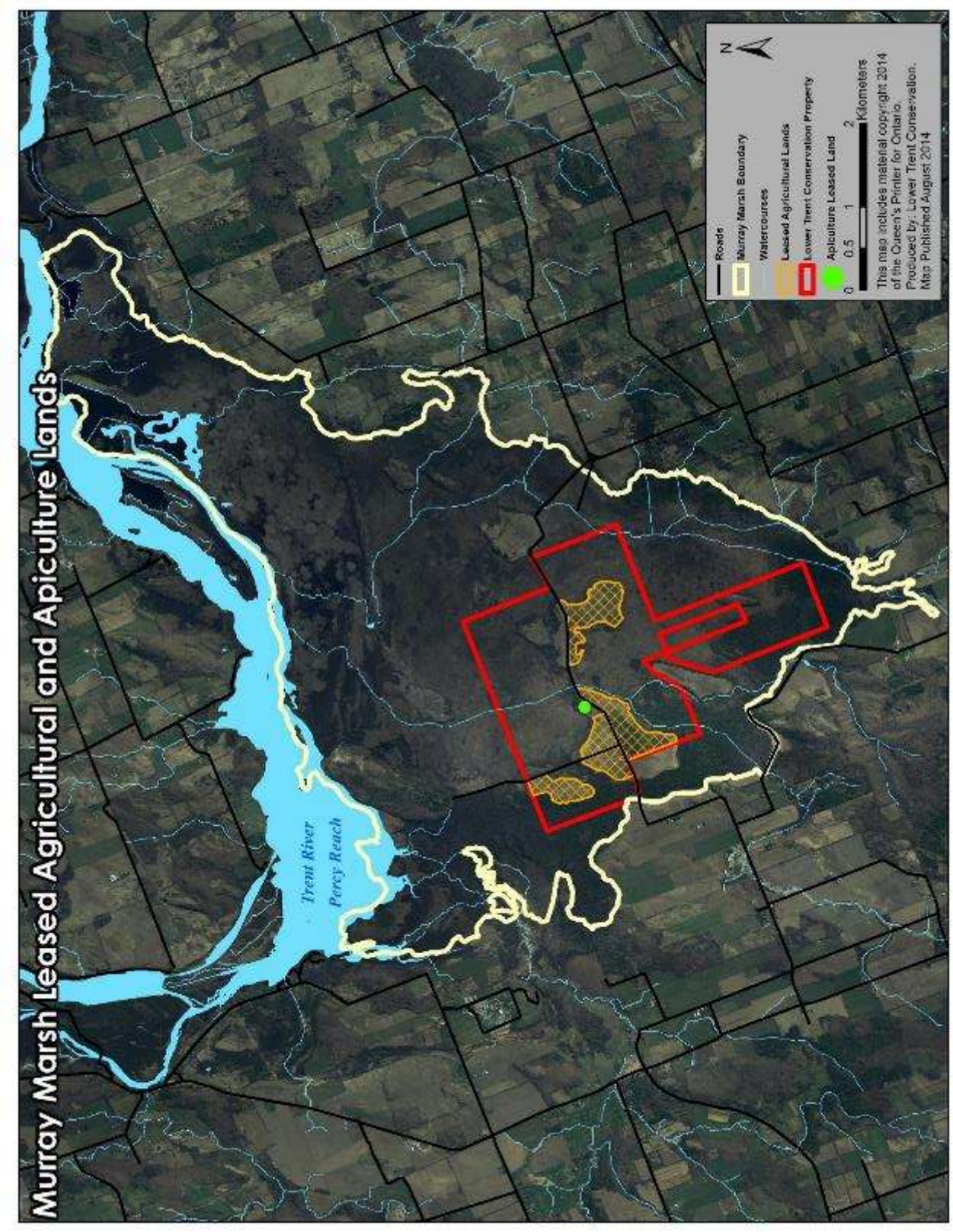

Figure 3: Leased Agricultural Lands within the Murray Marsh Natural Habitat Area.

4.5 HISTORY

The Murray Marsh wetland is entirely located within the former Murray Township (as per municipal boundaries up to 1852). Subsequently, Brighton Township was formed from the western half of Murray Township and eastern half of Cramahe Township. As a result, the wetland straddled the Brighton and Murray Township boundary. Following amalgamation of Murray Township, Sidney Township, the City of Trenton and the Village of Frankford, to form the City of Quinte West in 1998, the Murray Marsh is now shared between the Municipality of Brighton and City of Quinte West. The name Murray Marsh stems from the wetland's location in the former Murray Township.

Murray Township was named after James Murray (1721-1794), an army officer from Scotland, who was a colonial administrator and governor of Quebec. It is unlikely that he ever saw the wetland which bears his name. (Photo source: wikimedia.com).

First Nations people who lived in the Trent River valley would have used the wetland and its abundant resources. First Nations burial grounds have been found on Jett Island in the northwest area of the wetland.

In the 1800's, Europeans settled Austen Island, which should actually be spelled Austin for the family that lived there in the 1870's (D. Buchanan, personal communication), and Ames Island located in the Murray Marsh NHA. Some families moved to the area from Prince Edward County, like Elisha and James Ames, sons of James Ames who settled in the area in 1850, coming from Waupoos Island (D. Buchanan, personal communication). James Plumpton owned the lands known as Charlie Puddephatt's farm (Northumberland County Atlas Map 1878).

The Murray Marsh has been protected from development by several means. Much of the wetland is under public ownership, either as Crown Land or as a NHA owned by Lower Trent Conservation. In addition, the entire wetland is protected, given its classification as a Provincially Significant Wetland (PSW) and an Area of Natural and Scientific Interest (ANSI). Also, under the Conservation Authority's Development, Interference With Wetlands, and Alterations to Shorelines and Watercourses regulation, PSWs and adjacent lands are protected from development (see section 4.11 Wetland Protection).

4.6 CLIMATE

Murray Marsh is located within the Great Lakes-St. Lawrence Lowland and is characterized by a temperate humid climate, moderated by the Great Lakes. The area's climate is strongly influenced by the westerly winds, which bring dry, cold air in the winter and humid, warm air in the summer (Raynard, 1979). The average climate data from the Trenton Airport can be found in Table 1.

There is substantial evidence indicating that climate change is occurring. All the global climate models accepted by the Intergovernmental Panel on Climate Change predict warmer temperatures, and most predict more precipitation for southern Ontario. Over time, this change is expected to impact natural habitats and wildlife distribution.

Table 1: 2001-2013 Climate Data from Environment Canada at the Trenton Airport

	January-March	**April-June**	**July-September**	**October-December**	**Year**
Mean Temperature (^{o}C)	-0.36	12.4	19.2	3.4	7.9
Total Rain (mm)	87.2	227.5	241.2	233.0	788.9
Total Snow (cm)	93.6	5.3	0.0	35.7	134.6
Total Precipitation(mm)	172.2	233.5	247.8	257.7	915.4
Mean Snow Depth (cm)	6.3	0.0	0.0	2.0	2.1

4.7 PHYSIOGRAPHY

The physiography of southern Ontario has been heavily influenced by the Wisconsin glaciation. At its maxima, 21,000 years ago, the Laurentide ice sheet covered all of southern Ontario and extended into southern Ohio (Chapman, 1966). As the ice sheet began to retreat, the newly exposed landscape was littered with moraines, kames, eskers, and other glacial formations.

Murray Marsh is found in an area where the Peterborough drumlin field and the Iroquois plain physiographic regions overlap. The drumlins within the Murray Marsh are part of the Peterborough Drumlin Field and were uncovered during the retreat of the last ice sheet, over 10,000 years ago. Today, some 27 drumlins can be found within Murray Marsh (Thompson-Pender et al. 1982). Elevation varies from 50 to 85 m within and surrounding the Murray Marsh, with Potts Island being the highest point of land at 168 m above sea level (all of the islands within Murray Marsh can be found in Figure 4) (Raynard 1979).

The wetland is located within the Trent Embayment (Figure 5), which was a large bay on Lake Iroquois containing many islands (Chapman and Putnam 1984). Lake Iroquois shaped the basin of Murray Marsh along with other landforms such as remnant beaches, sand bars, and former shorelines along drumlins (Raynard, 1979).

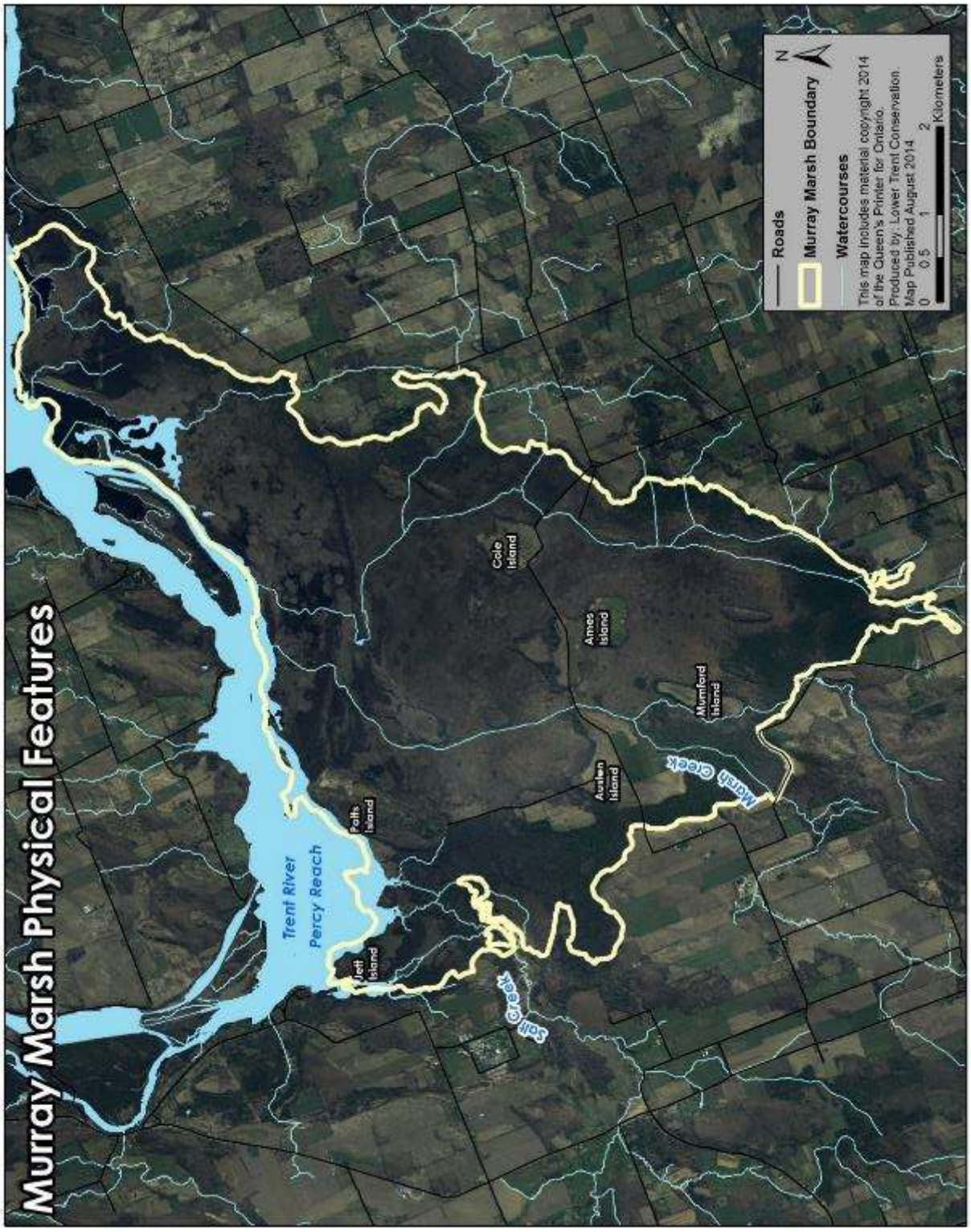

Figure 4: Murray Marsh physical features map illustrating islands and watercourses.

Figure 5: Map of ancient Lake Iroquois showing extent of shoreline in green. The Trent Embayment was located on the present day Trent River. This area would have contained the Murray Marsh.

4.8 SOILS

The Canada Land Inventory classifies the islands in the wetland as Class 1, indicating no significant limitations in use for crops. Class 1 identifies the best agricultural lands with ideal climate and soil to allow a farmer to grow a range of crops.

Soils within the Murray Marsh NHA consist of four types (Figure 6). The dominant soil type within the NHA is Muck, associated with the swamp communities. The other three soil types, Wooler, Pontypool and Bondhead, are located on the upland areas within the Murray Marsh NHA (Biophysical Inventory, 1982). These are the areas where agriculture occurs.

Muck

Muck is an organic soil that typically forms in areas that are wet for the entire year (shallow lakes, rivers, or ponds). It is a very dark, soft soil with poor drainage and is comprised primarily of decayed plant material (i.e., grasses, sedges, leaf litter). The majority of the Murray Marsh NHA is an undrained depression, which has allowed for the development of this rich organic soil (Biophysical Inventory, 1982).

Wooler

The majority of Austen Island and an unnamed island north of Austen Island are comprised of the Wooler soil type. Wooler soil consists of alternating layers of silt loam and fine sand that is well drained; however, it has a high erosion rate (Biophysical Inventory 1982).

Pontypool Series

The eastern tip of Austen Island is comprised of Pontypool Sand. Pontypool Series soils are calcareous medium and fine grained sand with rapid drainage. The high sand content also makes these areas more susceptible to erosion by both wind and water, especially where vegetation has been cleared (Biophysical Inventory 1982).

Bondhead

Ames Island is comprised fully of Bondhead soils. Soils in the Bondhead Series are deep, well drained loams with some stones throughout the soil profile. As a result, these soils are generally farmed (Biophysical Inventory, 1982).

The Bondhead Loam is a calcareous loam or sandy loam tills derived from the grayish limestone of the Trenton formation. Trenton limestone typically has high concentrations of calcium with much lower concentrations of magnesium. As a result, certain crops grown in these soils may suffer from magnesium deficiencies (Hoffman and Acton, 1974).

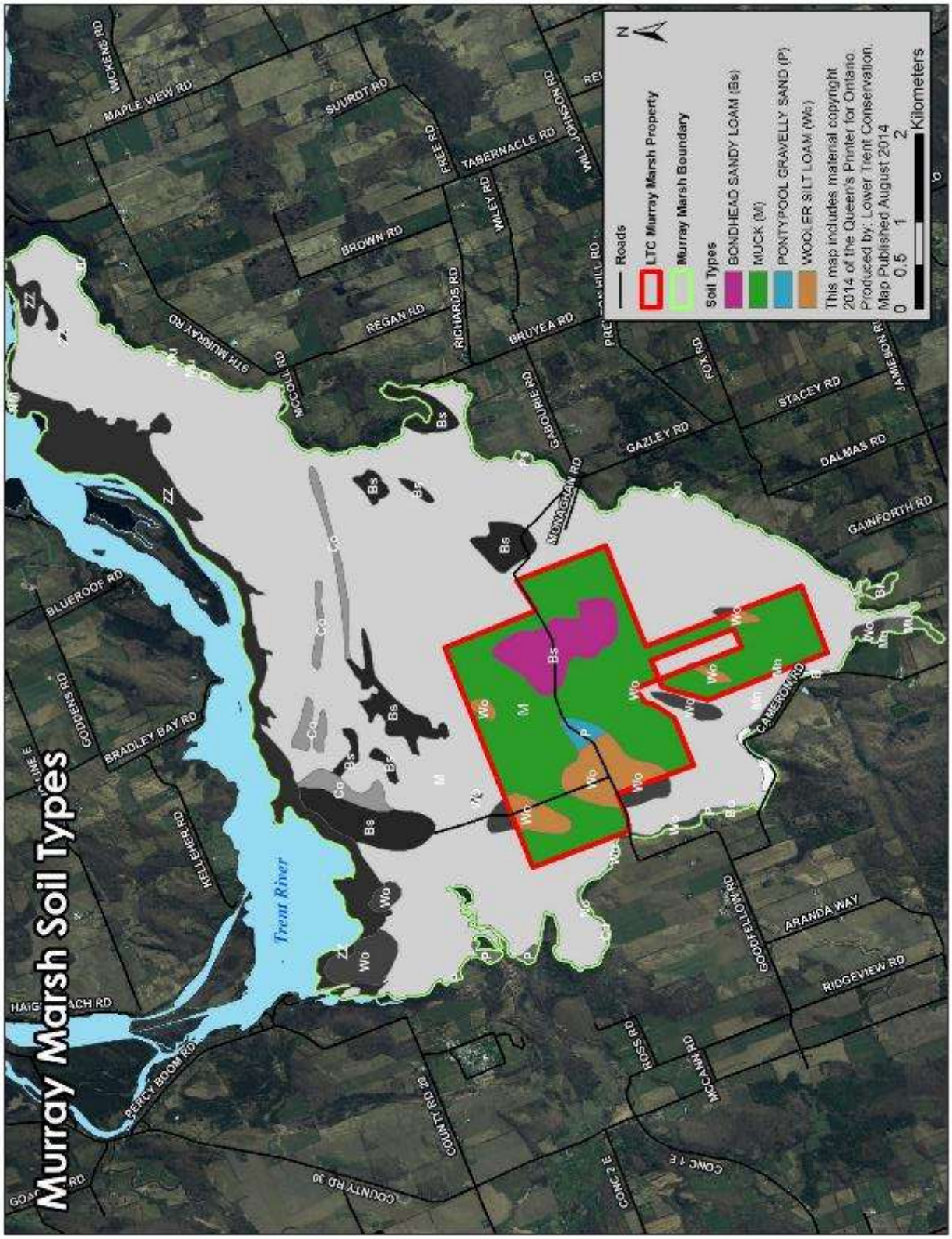

Figure 6: Soils of Murray Marsh

4.9 VEGETATION

As noted above, three types of wetland have been identified in the Murray Marsh PSW: marsh, swamp and fen. Swamp is the most predominant (Mosquin et al. 1985). According to a wetland evaluation study completed in 1985, wetland vegetation in the Murray Marsh NHA consists solely of swamp communities dominated by black ash, red maple, larch, white cedar, alder, and willow species (Mosquin et al. 1985). Dogwood species are also common. The marsh communities occur further to the north along the river.

Upland vegetation on Ames Island and Austen Island consists of croplands and old fields regenerating to woodland.

4.10 WATER RESOURCES

General Description

Marsh and Salt Creeks, as well as many other smaller intermittent streams, drain into Murray Marsh before flowing into the Trent River (Figure 4).

Flood Prevention

Murray Marsh is the only major flood water storage for the Trent River system south of Campbellford. It also serves as a filtration system for nutrients, improving the water quality in the Trent River.

4.11 WETLAND PROTECTION

Due to its size (approx. 3,760 hectares), diverse habitat, rich biodiversity, and hydrological importance as a flood storage area, the Murray Marsh is designated as a Provincially Significant Wetland (PSW) and a Provincially Significant Life Science Area of Natural and Scientific Interest (ANSI).

Wetlands are designated "Provincially Significant" by MNRF based on an evaluation which considers biological, social, hydrological, and special features. Section 2.1.4 of the Provincial Policy Statement (PPS) (2014) states that "Development and site alteration shall not be permitted in significant wetlands in Ecoregions 5E, 6E and 7E."

Wetlands are lands submerged or saturated by water -- either permanently or temporarily. They form when water becomes trapped, either through poor drainage, periodic flooding or by coastal barriers such as sandbars. Wetlands include marshes, swamps, fens, seasonally flooded forest, sloughs – any land area that can keep water long enough to let wetland plants and soils develop.

Wetlands serve many functions and provide people with numerous benefits such as: improving water quality by capturing silt and filtering out organic materials, pollutants and excess nutrients; acting as sponge-like reservoirs to help control and reduce flooding through water storage and retention; regulating stream flows; protecting shoreline areas from erosion; providing products for food (wild rice, fish, waterfowl); providing opportunities for recreation including hunting, fishing, birdwatching, canoeing, kayaking; as well as providing habitat for diverse wildlife including fish spawning and nursery habitat.

ANSI's are also identified and designated by MNRF. Life Science ANSI's, like the Murray Marsh, include areas that contain many natural landscapes, communities, plants, and animals that have values related to natural heritage protection, scientific study, or education. Section 2.1.5 of the PPS (2014) states that "Development and site alteration shall not be permitted in significant areas of natural and scientific interest, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions."

The PPS (2014) also states that d*evelopment* and *site alteration* shall not be permitted on *adjacent lands* to PSWs and ANSIs unless the *ecological function* of the *adjacent lands* has been evaluated and it has been demonstrated that there will be no *negative impacts* on the natural features or on their *ecological functions*.

The ANSI and PSW boundaries are similar (as shown in Figure 7).

Wetlands are also protected by Conservation Authority regulations. All wetlands and adjacent lands within the Lower Trent watershed region, regardless of their provincial significance status and ownership, are protected under the Conservation Authority's Regulation *163/06 Development, Interference with Wetlands, & Alterations to Shorelines & Watercourses Regulation* established under the *Conservation Authorities Act*. Under *Ontario Regulation 163/06,* written permission must be obtained from Lower Trent Conservation before initiating certain types of work within regulated areas. Activities that need approval include:

- Construction, reconstruction, or placing of a building/structure of any kind.
- Any change to a building/structure that would alter the use, size, or number of dwelling units.
- Site grading.
- Temporary or permanent placing or removal of any material originating on the site or elsewhere.
- Straightening, changing, diverting or interfering in any way with a watercourse, shoreline or wetland.

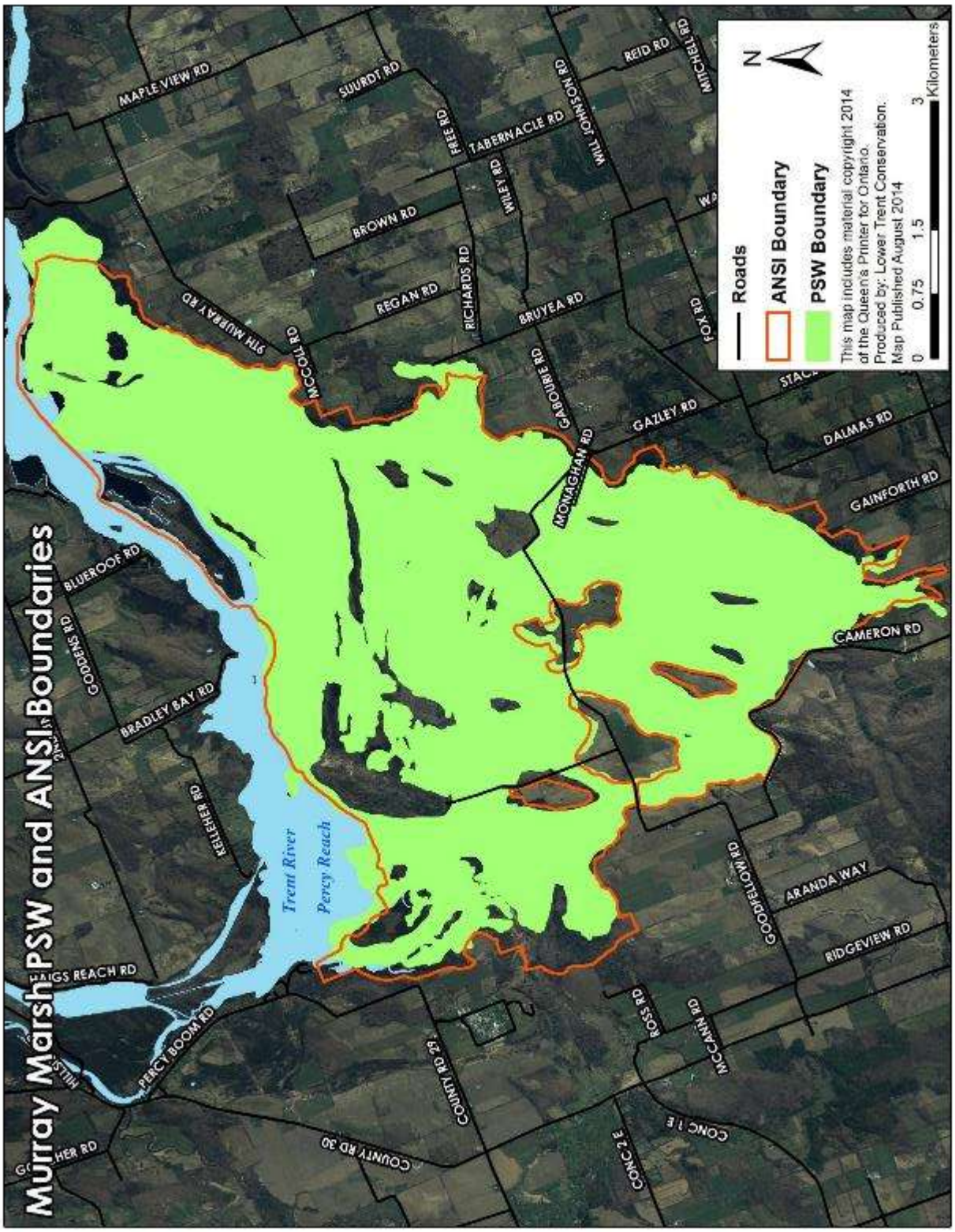

Figure 7: Provincially Significant Life Science Area of Natural and Scientific Interest (ANSI) and Provincially Significant Wetland (PSW) boundaries within the Murray Marsh.

4.12 WILDLIFE & WILDLIFE HABITAT

Birds

In the summer of 1982, an inventory of the fauna within the entire Murray Marsh was completed, including upland areas (Thompson-Pender et al, 1982).

Murray Marsh hosts diverse habitats that serve the needs of a variety of birds including songbirds, waterfowl, and marsh birds. A total of 102 species of birds were observed during the inventory, this number does not include migratory birds. Sixty migratory species were listed as common migrant birds of the Lower Trent Region and would be expected to be present in Murray Marsh during migration periods. Refer to Appendix A for the complete list of species found during the inventory.

Mammals

The mammals documented in the 1982 inventory were either sighted or evidence of them was identified such as tracks, scats or dens. Twenty-four mammals were documented to inhabit the Murray Marsh, refer to Appendix A for a list of identified mammal species. Trapping records (incomplete) for 1990 to 2014 list raccoon, fisher, beaver, and river otter as the prey items trapped in the Murray Marsh NHA.

Reptiles and Amphibians

Due to the diverse habitat present in the Murray Marsh, reptiles and amphibians were found to be abundant during the 1982 field inventory. Sixteen species of reptiles and amphibians were identified, refer to Appendix A for a comprehensive list of species.

In 2014, funding from the Habitat Stewardship Program coordinated by Environment Canada was obtained to survey NHA lands for Western Chorus Frog. Amphibian surveys did not confirm presence of chorus frog; however, wood frog, spring peeper, green frog, northern leopard frog, and American toad were observed.

4.13 SPECIES AT RISK

Murray Marsh provides essential habitat to many of Ontario's "Species at Risk" - a total of eight bird species, six reptiles, one amphibian, two fish species, and two plants were documented to be found in Murray Marsh (see Table 2 which lists these species and their ranking). An additional species not previously recorded by MNRF, the Yellow Rail, was observed in the Murray Marsh NHA during 2014 spring amphibian surveys. By preserving the habitat of Murray Marsh NHA, and establishing corridors with surrounding properties, LTC is aiding in the survival of these species at risk.

Table 2: "Species at Risk" status information (as determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Committee on the Status of Species At Risk in Ontario (COSSARO)) for species recorded in the Murray Marsh wetland (not necessarily in the Murray Marsh Natural Habitat Area).
Data source: Ministry of Natural Resources and Forestry and Ontario Breeding Bird Atlas, 2014.

Species	COSEWIC	COSSARO
Birds		
Bald Eagle	Not At Risk	Special Concern
Least Bittern	Threatened	Threatened
Chimney Swift	Threatened	Threatened
Red-headed Woodpecker	Threatened	Special Concern
Barn Swallow	Threatened	Threatened
Golden-winged Warbler	Threatened	Special Concern
Canada Warbler	Threatened	Special Concern
Bobolink	Threatened	Threatened
Eastern Meadowlark	Threatened	Threatened
Black Tern	Not at Risk	Special Concern
Reptiles		
Northern Map Turtle	Special Concern	Special Concern
Eastern Musk Turtle	Special Concern	Threatened
Blanding's Turtle	Threatened	Threatened
Snapping Turtle	Special Concern	Special Concern
Milksnake	Special Concern	Special Concern
Eastern Ribbonsnake	Special Concern	Special Concern
Amphibians		
Western Chorus Frog	Threatened (Great Lakes / St. Lawrence - Canadian Shield population)	Not At Risk
Fish		
Lake Sturgeon	Threatened	Endangered
Channel Darter	Threatened	Threatened
Plants		
American Ginseng	Endangered	Endangered
Ogden's Pondweed	N/A	Endangered

5. MANAGEMENT ISSUES & CONSIDERATIONS

Through development of this Management Plan, a number of items were identified that required consideration. These include:

1. Recreational/Traditional uses
    - Hunting and trapping
    - ATVs, snowmobiles
2. Agricultural practices
    - Best Management Practices
    - Beekeeping
3. Biodiversity
    - Biological surveys
    - Species at Risk
    - Rare and sensitive species
    - Invasive species
4. Future land acquisitions
5. Garbage dumping
6. Illegal tree cutting
7. Vandalism
8. Trespass onto adjacent private land

Images 1 – 9 highlight some of the conditions, activities, and issues within the Murray Marsh NHA, considered during development of this plan. These are discussed further in the recommendation section below.

Image 1: Deer stand on the edge of a field on Austen Island.

Image 2: Snowmobile tracks in wetland area.

Image 3: Dog Strangling Vine, an invasive plant, found growing along field edges on Ames Island in the Murray Marsh NHA.

Image 4: Agricultural spraying near edge of wetland.

Image 5: To discourage bears, bee hives in the Murray Marsh NHA are placed behind electric wire fencing powered by a solar panel.

Image 6: View of swamp habitat from the southern edge of Austen Island in the Murray Marsh NHA. This is the dominant type of habitat in the Murray Marsh.

Image 7: Sandhill cranes are an example of wildlife using this wetland.

Image 8: Edge of agricultural field (on the left) encroaching into wetland (on the right).

Image 9: Evidence of garbage dumping in Murray Marsh on Austen Island.

6. RECOMMENDATIONS

6.1 GENERAL USAGE

The LTC Conservation Lands Strategy (2012) identifies NHAs as low use areas meant to provide for the long-term protection of natural areas and ensure healthy watersheds for the enjoyment of present and future generations. They are to remain in a natural state and, while they are open to the public, they are generally not promoted for public use. While Murray Marsh NHA is not actively promoted as a public use area, the public is more aware of its existence because of the size and significance of this large tract of wetland/woodland.

LTC's Conservation Areas Regulation (R.R.O. 1990, Regulation 116) established under the *Conservation Authorities Act,* sets out "prohibited activities and activities requiring permits." The Authority does not issue permits for all activities listed in the regulation and has established a list of permitted and prohibited "uses" for NHAs that support the long-term preservation of the natural values of the property. Those that apply specifically to Murray Marsh NHA are listed below.

Permitted Uses

Permitted uses are those activities that are seen to have minimal negative impact. Some of these activities require a permit (or written permission), as per the Conservation Areas Regulation. Permitted uses include:

- Wildlife viewing and nature appreciation
- Nature photography
- Education and research (may require written permission)
- Traditional management activities:
    - Hunting (requires a permit)
    - Trapping (requires written permission)
    - Agriculture (requires written permission)

Prohibited Uses

The Conservation Areas Regulation enables LTC to issue permits for a number of activities. LTC has determined that some of these activities have the potential to disturb or alter the natural heritage features and functions of its Conservation Lands, and prohibits these activities on all LTC lands, including Murray Marsh NHA. These prohibited uses include, but are not limited to:

- motorized vehicles (e.g., snowmobiles, ATVs)
- open fires
- overnight camping
- dogs off leash

RECOMMENDATIONS

1. *Maintain Murray Marsh NHA in its natural state with minimal trails/facilities.*
2. *Install a kiosk to identify the property and incorporate linkage to LTC website, property map, interpretive information and permitted/prohibited uses.*
3. *Install property boundary signage in key locations, as required (e.g., to address trespassing issues, along access roads/trails).*
4. *Minimize promotion of the Murray Marsh NHA as a public use area, recognizing that some promotion is beneficial as a means of increasing education and awareness about the value of wetlands and other natural heritage features.*

6.2 NATURAL HABITAT PROTECTION AND ENHANCEMENT

The Murray Marsh NHA is part of a PSW and an ANSI with a diversity of ecological communities, species, and linkages to nearby natural areas. Since habitat loss and fragmentation are some of the leading threats to Ontario's biodiversity, establishing healthy, interconnected natural areas is essential to its conservation. There are numerous protected wetlands and forests in the vicinity of the Murray Marsh NHA, however, these forests are isolated from one another and fragmented by roads and agricultural lands. Protection of natural habitats and their interconnectedness has long been recognized as important to the viability of wildlife populations. Large interconnected natural areas are needed by many species to carry out their life cycles including foraging for food, finding shelter, reproducing, and dispersal. Linkages between habitats also allow for species to move and migrate across the landscape. Equally

important are vegetated buffers that protect sensitive habitats, like wetlands, from development and agricultural land uses. Given the potential impacts of climate change, it is even more critical to protect and enhance habitats and ecosystems.

There is little information about wildlife communities, and plant and animals species, including species at risk, for the Murray Marsh NHA. Flora and fauna inventories of the entire wetland are over 30 years old. Information about invasive species is also lacking. Additionally, in general, the value of wetlands and other natural habitats is not recognized.

RECOMMENDATIONS

1. *Adopt a "leave it alone" philosophy.*
2. *Complete vegetation community mapping using Ecological Land Classification system to assess types of habitats present.*
3. *Develop a database to record plant and wildlife species presence. Incorporate annual trapping records, hunting records, as well as information from databases for neighbouring crown land.*
4. *Monitor vegetation and wildlife to detect changes in species diversity and abundance (specifically "Species at Risk").*
5. *Implement habitat improvement to protect species at risk, where appropriate and feasible. (e.g., Install barn swallow nesting structures, nest boxes, chimney swift artificial nesting sites, establish pollinator habitat, etc.)*
6. *Monitor for, and remove/manage, invasive species, where feasible.*
7. *Consider the cost/benefits of acquisition of lands surrounding the Murray Marsh NHA when opportunities arise in order to promote connectivity of wetlands, forests, and other natural habitats.*
8. *Communicate with local landowners and reinforce the importance of the conservation of these sensitive natural features.*
9. *Promote wetland awareness through information, and potentially wetland viewing opportunities.*
10. *Collaborate with the MNRF on land management approaches for the NHA and on neighbouring Crown Land, including biophysical inventories and habitat assessments.*

6.3 TRADITIONAL MANAGEMENT ACTIVITIES

TRAPPING

Trapping has been a permitted use in the Murray Marsh NHA since LTC acquired the land, as it was seen as a traditional use of the land and as an acceptable conservation activity.

Currently, one individual has permission from LTC for trapping on the property. The trapper submits an annual report of the animals harvested. There has been a general decline in the reported number of animals trapped annually by the current trapper. No additional requests for trapping on the property have been received in recent years and, as such, there is no pressure from local landowners to continue or expand the activity.

There are no data regarding the status of populations of fur bearing animals, specifically for the Murray Marsh NHA, and no evidence that trapping is either beneficial or harmful to the viability of wildlife populations or water management.

There is a minimal increase to our liability, for both the trapper and other users of the property.

LTC does not currently charge a fee for this activity.

RECOMMENDATIONS

1. *Permit the individual that currently traps in the Murray Marsh NHA to continue the practice.*
2. *Use of the property for trapping will not be promoted.*
3. *Additional trapping permissions may be considered should trapping be required for future wildlife or water management. The MNRF list of trappers will be utilized if additional trapping permissions are required.*
4. *Require any trappers using the Murray Marsh NHA to submit annual records of the numbers and species of animals harvested, including a map of trapping sites. These records will be utilized, along with other data collected by LTC and users of Murray Marsh, to improve our knowledge of the Murray Marsh NHA and help direct future management decisions for the property.*
5. *Require trappers using the Murray Marsh NHA to sign a hold harmless agreement and provide proof of insurance coverage.*

<u>BEEKEEPING (APICULTURE)</u>

LTC currently leases a small parcel of land in the Murray Marsh NHA for beekeeping. Beekeeping is permitted in a non-sensitive area (open field). The area is fenced with electrical wire powered by a solar panel to discourage bears from entering. Beekeeping is a type of agriculture and, as such, fits with other permitted uses on the property. Since bees are important pollinators, the activity provides an overall benefit to the natural environment, especially since bee populations are declining. The area is low use, therefore, the likelihood of bee stings is minimal. The area is signed warning the public about the presence of bee hives.

RECOMMENDATIONS

1. *Allow the existing beekeeping operation to continue and review the Lease Agreement regularly.*
2. *Permit additional beekeeping operations, through a Lease Agreement, on a case by case basis, considering the impact on the natural environment, aesthetics, and health and safety issues.*
3. *Require "Warning" signs be installed at any beekeeping sites.*
4. *Require proof of insurance through a lease agreement.*
5. *Charge a small fee for lease of lands for beekeeping operations.*
6. *Plant/seed suitable native wildflowers to provide foraging opportunities for pollinators, where feasible.*
7. *Prohibit use of neonicotinoid pesticides on leased agricultural lands.*

AGRICULTURE

LTC currently leases 97.5 ha of land under two lease agreements. Agriculture is a traditional use of the property. The land rented includes Class 1 Agricultural Land. Protection of Class 1, 2 and 3 agricultural land is a priority for the Province. Leasing these lands is also a revenue generator for LTC. The revenues assist with offsetting other costs associated with its Conservation Lands program (including taxes, insurance, maintenance, and staffing).

Some agricultural practices can have a negative impact on the environment and, as such, LTC should establish restrictions on permitted agricultural use. Concerns with pesticide use and its impacts on water and wildlife should be considered. Chemicals in certain types of pesticides have been identified as harmful to bee populations, which are declining significantly. Grasslands provide habitat for some bird species that are at risk – very little of this type of habitat is currently available in the NHA due to use of the land for agriculture.

RECOMMENDATIONS

1. *Consider the cost/benefits of leasing agricultural land vs expanding grassland bird habitat prior to renewing any leases. This may mean a reduction in the amount of leased land or reduced rental fees to reflect restrictions on cropping.*
2. *Require Best Management Practices be followed on agricultural lands (e.g., stream/wetland buffers, sound nutrient management practices, use of cover crops, timing of harvesting for nesting birds; type of herbicides/pesticides) by incorporating them in future agricultural land lease agreements.*
3. *Prohibit spreading of biosolids in the Murray Marsh NHA through lease agreements.*
4. *Require proof of insurance through lease agreements.*
5. *Ensure land is being leased at market value by reviewing rates prior to renewing / establishing leases.*

HUNTING

Hunting has been a traditional use of the Murray Marsh and has been a permitted use in the Murray Marsh NHA since LTC acquired the land.

Hunting is the activity that occurs on the property that garnered the most attention during development of the Management Plan, with people expressing both pro-hunting and anti-hunting views. As such, the Management Plan will not address all concerns.

The following is a summary of comments and concerns expressed:

- hunting is a traditional cultural heritage activity on the property
- hunting provides recreational, social, and economic value
- fees collected for hunting permits result in revenue generation for LTC's Conservation Lands program that helps to offset costs
- hunters using the property are made aware of LTC and some of the services/value it provides

- hunting can contribute to sustainable wildlife management in the Wildlife Management Unit
- hunting can result in ecological impacts (Note: that there are no wildlife game population data specifically for the Murray Marsh NHA demonstrating positive or negative impacts. Data are available from MNRF for the broader Wildlife Management Unit 71, where Murray Marsh is located).
- hunting results in increased potential for accidents for hunters, staff, and other users and increased liability for LTC
- hunting has the potential to result in conflict with neighbouring landowners and land uses and potential damage to agricultural crops
- ensuring that all hunters on LTC lands have been issued a permit is difficult to police
- hunting is seen by some individuals to be an inappropriate use of Conservation Lands
- off-leash dogs and ATVs are often used for hunting and LTC does not permit these activities on its properties

Under the Conservation Areas Regulation (R.R.O. 1990, Regulation 116), hunting is not allowed except under a permit issued by LTC. LTC currently issues annual permits to hunt on certain LTC lands in the NHA (approximately 467 ha). Approximately 30 permits are issued annually. There is no restriction on game species and an annual report on harvests is not currently required.

Since there is staff time and use of resources associated with administering permits, an administration fee is charged. The current (2013) fee for hunting on LTC property is $20. This is an administration fee to cover the cost of a permit, maps, and information. Fees charged by other Conservation Authorities for hunting range from $25 - $70 annually.

LTC recently took over management of the former Puddephatt lands that it purchased in 1989 (following the death of the previous owner, who was granted a life lease of the property). The previous owner permitted a select group of individuals to hunt on the lands he managed. LTC made a temporary decision to grandfather this activity until a Management Plan for the property was completed. While some individuals have indicated that the former Puddephatt property should be reserved for those permitted to hunt there traditionally, others feel that it should be open to the public.

To address concerns with safety and over-hunting, limitations on hunting need to be considered. There is no information available through the MNRF or OFAH to indicate a safety related upper limit for hunter density. However, based on site visits from staff and discussions with OFAH and MNRF staff, there have been no reports of overcrowding. A couple respondents to a questionnaire distributed by LTC indicated overhunting/overcrowding at certain times, however, it does not appear to be a widespread concern with the hunters at Murray Marsh NHA.

Other jurisdictions have had success with issuing hunting permissions for individual tracts of land rather than providing access to all for an entire block of land. This helps to control

numbers in any given area and encourages self-policing as each hunter is aware of who else has permission to hunt in a given area.

RECOMMENDATIONS

1. *Allow hunting on the Murray Marsh NHA through issuance of permits.*
2. *Permits will be valid for a period of one year (April 1 – March 31). Permits will be issued starting on March 15th (or the next working day) of each calendar year.*
3. *Divide the property into two hunting zones (see map below).*
4. *Limit the number of permits issued for each hunting zone - a maximum of 15 permits will be issued for zone A and 30 permits for zone B.*
5. *Hunters may purchase permits for both zones (fees would apply for each zone).*
6. *Monitor the number of hunting permits issued and any problems reported and review annually.*
7. *Any change to the hunting zones and number of permits will be approved by the Board of Directors.*
8. *Review the administration fee annually in conjunction with LTC fee schedule review.*
9. *Exclude leased agricultural lands from hunting permissions. Should a hunter obtain permission for hunting on LTC leased lands, a copy of the written permission from the lessee must be provided to LTC. All other LTC rules and restrictions apply.*
10. *Permanent deer stands will not be permitted on LTC lands.*
11. *Require each registered hunter to provide LTC with proof of insurance (OFAH membership), a copy of his/her valid hunting outdoors card, and sign a hold harmless agreement.*
12. *Require each registered hunter to complete an annual survey regarding hunting experience and game harvested. New permits will not be issued to applicants that fail to submit a completed survey for the preceding year.*

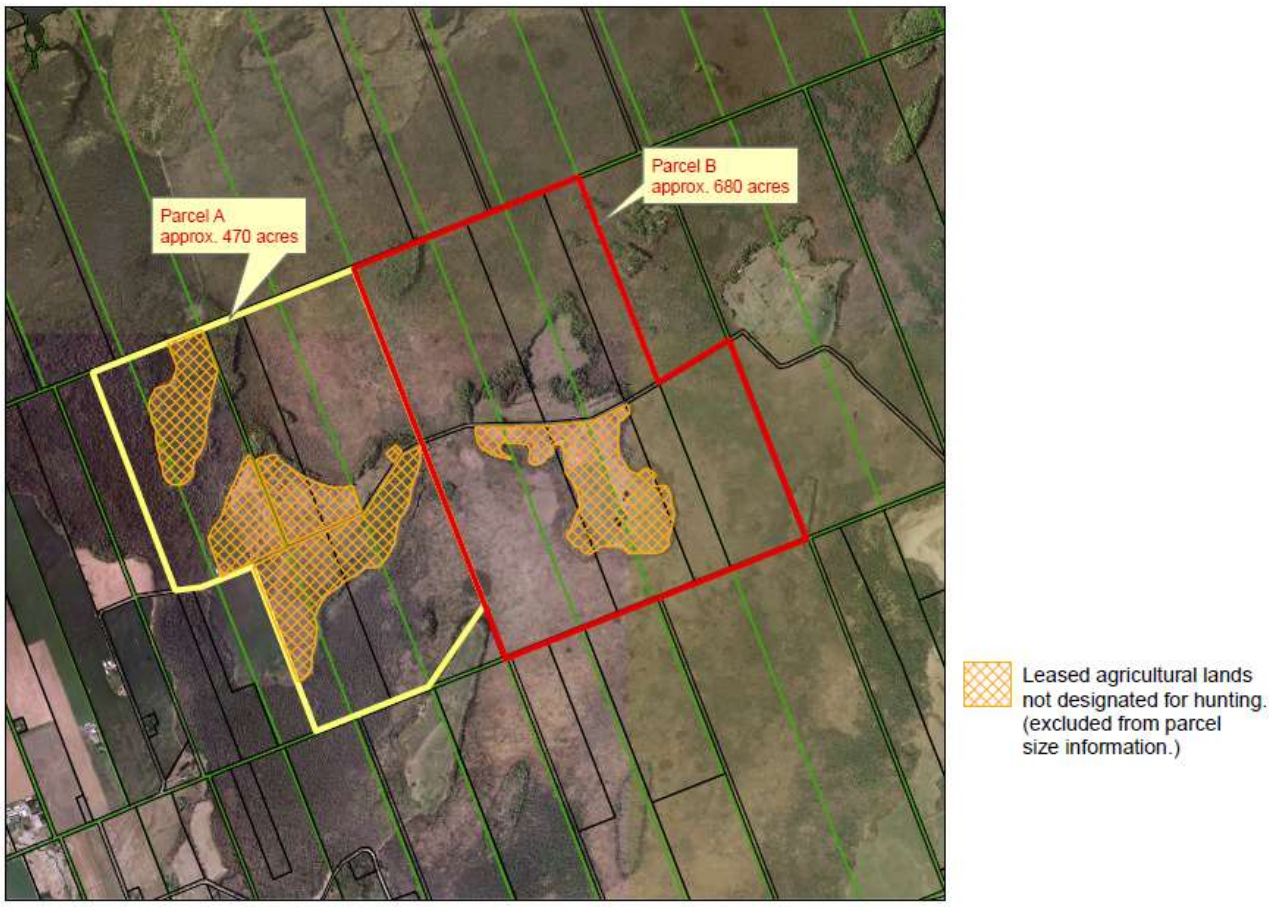

Figure 8: Hunting zones and leased agricultural lands.

6.4 GENERAL ISSUES

Illegal activity, common to many remote areas, occurs in the Murray Marsh NHA, including illegal ATV/snowmobile usage, vandalism, garbage dumping, and tree cutting. There have not been many reports of these types of issues, but they do occur and are likely to occur in the future.

RECOMMENDATIONS

1. *Post rules for the property in a kiosk.*
2. *Increase general surveillance of the property.*

7. REFERENCES

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APPENDIX A: SPECIES LIST FROM THE MURRAY MARSH BIOPHYSICAL INVENTORY 1982

APPENDIX B

Murray Marsh-Master Tree/Shrub List and Symbols

Black Alder	Alb	Ilex verticillata
Gray Alder	Alg	Alnus rugosa
Common Apple	Apc	Malus sylvestris
Domestic Apple	Apd	Pyrus malus
Black Ash	Ab	Fraxinus nigra
Prickly Ash	Pa	Zanthoxylum americanum
American Ash	Amt	Sorbus americanum
Red Ash	Ar	Fraxinus pennsylvanica
White Ash	Aw	Fraxinus americanum
Balsam Fir	Bf	Abies balsalmea
Basswood	Bd	Tilia americana
American Beech	Be	Fagus grandifolia
Blue Beech	Bed	Carpinus caroliniana
White Birch	Bw	Betula grandifolia
Yellow Birch	By	Betula papyrifera
Common Blackberry	Bc	Rubus allegheniensis
Glossy Buckthorn	Bg	Rhamnus frangula
Common Buckthorn		Rhamnus cathartica
Butternut	Butt	Juglans cinerea
Buttonbush	Butb	Cephalanthus occidentalis
Red Cedar	Cer	Juniperus virginiana
White Cedar	Cew	Tuja occidentalis
Black Cherry	Cb	Prunus serotina
Choke Cherry	Cc	Prunus virginiana
Red Cherry	Cr	Prunus pennsylvanica
Virginia Creeper	Cv	Parthenocissus vitacea
Black Currant	Cbl	Ribes americanum
Alternate Dogwood	Dal	Cornus alternifolia
Flowering Dogwood	Df	Cornus florida
Red-osier Dogwood	Dro	Cornus stolonifera
Common Elder	Ec	Sambucus canadensis
Red-berried Elderberry	Erb	Sambucus pubens
White Elm	Ew	Ulmus americana
Red Elm	Erd	Ulmus rubra
Rock Elm	Erk	Ulmus thomasii
Prickly Gooseberry	Gp	Ribes cynosbati
Smooth Gooseberry	Gs	Ribes hirtellum
Hawthorn	Hwt	Crataegus sp.
Beaked Hazelnut	Hbk	Corylus cornuta
Eastern Hemlock	He	Tsuga canadensis
Ground Hemlock	Heg	Taxus canadensis
Bitternut Hickory	Bh	Carya ovata
Shagbark Hickory	Bs	Carya cordiformis
Hobblebush	Hb	Viburnum alnifolium
Northern Bush Honeysuckle	Hnb	Diervilla sessifolia
Tartarian Honeysuckle	Ht	Lonicera tatarica
Ironwood	I	Ostrya virginiana
Juneberry	J	Amelanchier arborea
Common Juniper	Jc	Juniperus communis
Tamarack	L	Larix laricina
Labrador Tea		Ledum groenlandicum

Lilac	Li	Syringa sp.
Leatherleaf		Chamaedaphne calyculata
Locust (Black)	Lb	Robinia pseudoacacia
Mountain Maple	Mnt	Acer spicatum
Manitoba Maple	Mm	Acer negundo
Red Maple	Mr	Acer rubrum
Silver Maple	Ms	Acer saccharinum
Sugar Maple	Mn	Acer saccharum
Nannyberry	N	Viburnum lentago
Bur Oak	Ob	Quercus macrocarpa
Red Oak	Or	Quercus rubra
White Oak	Ow	Quercus alba
Jack Pine	Pj	Pinus banksiana
Red Pine	Pr	Pinus resinosa
Scots Pine	Ps	Pinus sylvestris
White Pine	Pw	Pinus strobus
Canada Plum	Pl	Prunus nigra
Balsam Poplar	Bp	Populus balsalmifera
Cottonwood	C	Populus deltoides
Largetooth Aspen	Lta	Populus grandidentata
Trembling Aspen	Ta	Populus tremuloides
Black Raspberry	Rb	Rubus occidentalis
Purple-flowering Raspberry	Rpf	Rubus odoratus
Red Raspberry	Rr	Rubus idaeus
Norway Spruce	Sn	Picea abies
White Spruce	Sw	Picea glauca
Staghorn Sumac	Ss	Rhus typhina
Sweet Gale	Sg	Myrica gale
Maple-leaved Viburnum	Mlv	Viburnum acerifolium
Bebb Willow	Wb	Salix bebbiana
Black Willow	Wbl	Salix nigra
Crack Willow	Wc	Salix fragilis
Peach-leaved Willow	Wp	Salix amygdaloides
Pussy Willow	Wpu	Salix discolor
Sand-bar Willow	Wsb	Salix exigua
Shining Willow	Wsh	Salix lucida
Weeping Willow	Wwp	Salix babylonica
White Willow	Wwh	Salix alba

Nomenclature follows Soper and Heimburger (1982) and Little (1980).

APPENDIX D

Murray Marsh - Master Plant Species List

Compositae	
Devil's Paintbrush	Hieracium aurantiacum
King Devil	Hieracium pratense
Common Burdock	Arctium minus
Common Tansy	Tanacetum vulgare
Canada Thistle	Cirsium arvense
Bull Thistle	Cirsium vulgare
Yellow Goatsbeard	Tragopogon dubius
Smaller Pussytoes	Antennaria neodioica
Yarrow	Achillea millefolium
Nodding Thistle	Carduus nutans
Blue-stem Goldenrod	Solidago caesia
Daisy Fleabane	Erigeron annuus
Spiny Clotbur	Xanthium strumarium
Tall Rattlesnake Root	Prenanthes altissima
Black-eyed Susan	Rudbeckia hirta
Boneset	Eupatorium perfoliatum
Tall Goldenrod	Solidago altissima
Lance-leaved Goldenrod	Solidago graminifolia
Chicory	Cichorium intybus
Mayweed	Anthemis cotula
Elecampane	Inula helenium
Pearly Everlasting	Anaphalis margaritacea
Flat-topped White Aster	Aster umbellatus
Horseweed	Erigeron canadensis
Climbing Hempweed	Mikania scandens
Prairie Dock	Silphium terebinthinaceum
Beggar-tick	Bidens vulgata
Spiny-leaved Sow Thistle	Sonchus asper
New England Aster	Aster novae-angliae
Oxeye Daisy	Chrysanthemum leucanthemum
Common Dandelion	Taraxacum officinale
Silverrod	Solidago bicolor
Wavy-leaved Aster	Aster undulatus
Water Marigold	Megalodonta beckii
Joe-Pye-Weed	Eupatorium maculatum
Bur-Marigold	Bidens cernua
Rosaceae	
Rough-fruited Cinquefoil	Potentilla recta
Silvery Cinquefoil	Potentilla argentea
Common Cinquefoil	Potentilla simplex
Dwarf Cinquefoil	Potentilla canadensis
Marsh Cinquefoil	Potentilla palustris
Common Strawberry	Fragaria virginiana
Silverweed	Potentilla anserina
Virginia Rose	Rosa virginiana
Rugosa Rose	Rosa rugosa
Dwarf Raspberry	Rubus pubescens

Wood Strawberry	Fragaria vesca
Agrimony	Agrimonia gryposepala
Strawberry-raspberry	Rosaeifolii illecebrosus
Ranunculaceae	
Common Buttercup	Ranunculus acris
Marsh Marigold	Caltha palustris
Wood Anemone	Anemone quinquefolia
Creeping Buttercup	Ranunculus repens
Wild Columbine	Aquilegia canadensis
Round-lobed Hepatica	Hepatica americana
Sharp-lobed Hepatica	Hepatica acutiloba
White Baneberry	Actaea pachypoda
Canada Anemone	Anemone canadensis
Early Meadow Rue	Thalictrum dioicum
Tall Meadow Rue	Thalictrum polygamum
Thimbleweed	Anemone riparia
Virgin's Bower	Clematis virginiana
Plataginaceae	
Common Plantain	Plantago major
Water Plantain	Alisma plantago-aquatica
Narrow-leaved Plantain	Hosta japonica
Leguminosae	
Slender Bush Clover	Lespedeza virginica
White Clover	Trifolium repens
Yellow Sweet Clover	Melilotus officinalis
Wild Indigo	Baptisia tinctoria
Birdsfoot-trefoil	Lotus corniculatus
Wood Vetch	Vicia caroliniana
American Vetch	Vicia americana
Linear-leaved Vetchling	Lathyrus palustris var lincarifolius
Beach Pea	Lathyrus japonicus
Pointed-leaved Tick Trefoil	Desmodium glutinosum
Hog-peanut	Amphicarpa bracteata
Showy Tick Trefoil	Desmodium canadense
Red Clover	Trifolium pratense
Black Medick	Medicago lupulina
Hop Clover	Trifolium agrarium
White Sweet Clover	Melilotus alba
Caryophyllaceae	
Mouse-ear Chickweed	Cerastium vulgatum
Evening Lychnis	Lychnis alba
Bladder Campion	Silene cucubalus
Deptford Pink	Dianthus armeria
Thyme-leaved Sandwort	Arenaria serpyllifolia
Scrophulariaceae	
Common Mullein	Verbascum blattaria
Corn Speedwell	Veronica arvensis
Butter-and-Eggs	Linaria vulgaris

Swamp Lousewort	Pedicularis palustris
Water Speedwell	Veronica comosa
Square-stemmed Monkey Flower	Mimulus ringens
Turtlehead	Chelone glabra
Asclepiadaceae	
Common Milkweed	Asclepias syriaca
Swamp Milkweed	Asclepias incarnata
Butterfly Weed	Asclepias tuberosa
Vitaceae	
Wild Summer-grape	Vitis aestivalis
Riverbank Grape	Vitis riparia
Virginia Creeper	Parthenocissus inserta
Boraginaceae	
Hoary Puccoon	Lithospermum canescens
Viper's Bugloss	Echium vulgare
True Forget-me-not	Myosotis scorpioides
Hounds-tongue	Cynoglossum officinale
Oxalidaceae	
Yellow Wood Sorrel	Oxalis europaea
Guttiferae	
Kalm's St. Johnswort	Hypericum kalmianum
Marsh St. Johnswort	Hypericum virginicum
Common St. Johnswort	Hypericum perforatum
Umbelliferae	
Queen Anne's Lace	Daucus carota
Sweet Cicely	Osmorhiza claytoni
Black Snakeroot	Sanicula marilandica
Water Hemlock	Cicuta maculata
Purple Angelica	Angelica atropurpurea
Water-parsnip	Sium suave
Cruciferae	
Poor-man's Pepper	Lepidium virginicum
Field Peppergrass	Lepidium campestre
Shepherd's-purse	Capsella bursa-pastoris
Tall Wormseed Mustard	Erysimum hieraciifolium
True Watercress	Nasturtium officinale
Charlock	Brassica kaber
Winter Cress	Barbarea vulgaris
Field Mustard	Brassica rapa
Labiatae	
Peppermint	Mentha piperita
Wild Bergamot	Monarda fistulosa
Water Horehound	Lycopus americanus
Marsh or Common Skullcap	Scutellaria epilobilifolia
Ground Ivy	Glechoma hederacea
Wild Mint	Mentha arvensis
Mad-dog Skullcap	Scutellaria lateriflora

Hyssop Skullcap	Scutellaria integrifolia
Heal-all	Prunella vulgaris
Catnip	Nepeta cataria
Motherwort	Leonurus cardiaca
Woundwort	Stachys palustris
Iridaceae	
Blue-flag Iris	Iris versicolor
Pointed Blue-eyed Grass	Sisyrinchium
Gramineae	
Quack Grass	Agropyron repens
Canada Brome Grass	Bromus pubescens
Nodding Wood-grass	Sorghastrum rutans
Redtop	Agrostis gigantea
Eastern Manna Grass	Glyceria septentrionalis
Meadow Grass	Glyceria striata
Slender Wheat Grass	Agropyron trachycaulum
Timothy	Phleum pratense
Bearing Sprouts Grass	Aulenbergia sobolifera
Panic Grass	Panicum polyanthes
Western Fescue Grass	Festuca occidentalis
Rice-Cutgrass	Leersia oryzoides
Short-awn Foxtail	Alopecurus aequalis
Giant Reed	Phragmites communis
Alfalfa	Medicago sativa
Wild Rice	Zizania aquatica
Philadelphia Witch Grass	Panicum philadelphicum
Bluejoint	Calamagrostis canadensis
Reed Canary Grass	Phalaris arundinacea
Linaceae	
Flat-seeded False Flax	Camelina parodii
Wild Flax	Linum perenne
Anacardiaceae	
Poison Ivy	Rhus radicans
Balsaminaceae	
Pale Touch-me-not	Impatiens pallida
Spotted Touch-me-not	Impatiens capensis
Equisetaceae	
Water Horsetail	Equisetum fluviatile
Field Horsetail	Equisetum arvense
Wood Horsetail	Equisetum sylvaticum
Typhaceae	
Common Cattail	Typha latifolia
Narrow-leaved Cattail	Typha angustifolia
Cyperaceae	
False Sedge	Carex pseudo-cyperus
Rough Sedge	Carex scabrata
Sedge of Lake-margins	Carex lacustris

Porcupine-like Sedge	Carex hystricina
	Scirpus sylvaticus
Dark Green Bulrush	Scirpus atrovirens
Crowded Sedge	Carex stipata
Projecting Sedge	Carex projecta
Like-a-Fox's-Tail Sedge	Carex vulpinoidea
Golden Sedge	Carex aurea
Yellowish Sedge	Carex flava
Beaked Sedge	Carex rostrata
Sedge with Wide-spreading Parts	Carex squarrosa
Sallow Sedge	Carex lurida
Three-square	Scirpus americanus
Sparganiaceae	
Green-fruited Bur-reed	Sparganium chlorocarpum
Many-peduncled Bur-reed	Sparganium multipedunculatum
Broad-fruited Bur-reed	Sparganium eurycarpum
American Bur-reed	Sparganium americanum
Araceae	
Wild Calla	Calla palustris
Jack-in-the-Pulpit	Arisaema atrorubens
Alismaceae	
Duck-potato	Sagittaria latifolia var obtusa
Stiff Wapato	Sagittaria rigida
Grass-leaved Arrowhead	Sagittaria graminea
Lentibulariaceae	
Horned Bladderwort	Utricularia cornuta
Humped Bladderwort	Utricularia gibba
Caprifoliaceae	
Elderberry	Sambucus canadensis
Twinflower	Linnaea borealis
Polypodiaceae	
Oak Fern	Dryopteris disjuncta
Bracken Fern	Pteridium aquilinum
Ostrich Fern	Pteretis pennsylvanica
Sensitive Fern	Onoclea sensibilis
Spinulose Wood-fern	Dryopteris spinulosa
Maidenhair Fern	Adiantum pedatum
Cinnamon Fern	Osmunda cinnamomea
Goldie's Fern	Dryopteris goldiana
Lady Fern	Athyrium filix-femina
Marsh Fern	Dryopteris thelypteris
Marginal Shield-fern	Dryopteris marginalis
Bulblet Fern	Cystopteris bulbifera
Christmas Fern	Polystichum acrostichoides
Liliaceae	
False Spikenard	Smilacina racemosa
Starry False Solomon's Seal	Smilacina stellata

Canada Mayflower	Maianthemum canadense
Large-flowered Trillium	Trillium grandiflorum
Purple Trillium	Trillium erectum
Perfoliate Bellwort	Uvularia perfoliata
Smooth Solomon's Seal	Polygonatum biflorum
Hairy Solomon's Seal	Polygonatum pubescens
Bluebead Lily	Clintonia borealis
Wild Leek	Allium tricoccum
Yellow Water Lily	Nuphar variegatum
Rose Twisted-stalk	Streptopus roseus
Day Lily	Hemerocallis fulva
Najadaceae	
Bushy Pondweed	Najas flexilis
Large-leaf Pondweed	Potamogeton amplifolius
Leafy Pondweed	Potamogeton epihydrus
Orchidaceae	
Showy Lady's Slipper	Cypripedium reginae
Yellow Lady's Slipper	Cypripedium calceolus
Small Yellow Lady's Slipper	Cypripedium calceolus var parviflorum
Helleborine	Epipactis helleborine
Bog Twayblade	Liparis loeselii
Primulaceae	
Moneywort	Lysimachia nummularia
Tufted Loosestrife	Lysimachia thyrsiflora
Fringed Loosestrife	Lysimachia ciliata
Swamp Loosestrife	Lysimachia terrestris
Purple Loosestrife	Lythrum salicaria
Starflower	Trientalis borealis
Violaceae	
Common Blue Violet	Viola papilionacea
Downy Yellow Violet	Viola pubescens
White Dog's Tooth Violet	Erythronium albidum
Birdfoot Violet	Viola pedata
Marsh Blue Violet	Viola cucullata
Malvaceae	
Velvetleaf	Abutilon theophrasti
Common Mallow	Malva neglecta
Aizoaceae	
Carpetweed	Mollugo verticillata
Berberidaceae	
May-apple	Podophyllum peltatum
Blue Cohosh	Caulophyllum thalictroides
Rubiaceae	
Rough Bedstraw	Galium asprellum
Three-flowered Bedstraw	Galium triflorum
Northern Bedstraw	Galium boreale

Wild Licorice	Galium circaezans
Partridgeberry	Mitchella repens
Cleavers	Galium aparine
Papaveraceae	
Dutchman's Breeches	Dicentra cucullaria
Bloodroot	Sanguinaria canadensis
Cornaceae	
Bunchberry	Cornus canadensis
Solanaceae	
Bittersweet Nightshade	Solanum dulcamara
Enchanter's Nightshade	Circaea quadrisulcata
Common Nightshade	Solanum americanum
Polygonaceae	
Curly Dock	Rumex crispus
Swamp Smartweed	Polygonum coccineum
Lady's Thumb	Polygonum persicaria
Saxifragaceae	
Grass-of-Parnassus	Parnassia glauca
Miterwort	Mitella diphylla
Araliaceae	
Wild Sarsaparilla	Smilax glauca
Ginseng	Panax quinquefolium
Dwarf Ginseng	Panax trifolius
Urticaceae	
Stinging Nettle	Urtica dioica
Wood Nettle	Laportea canadensis
Clearweed	Pilea pumila
Ophioglossaceae	
Rattlesnake Fern	Botrychium virginianum
Pontederiaceae	
Pickerelweed	Pontederia cordata
Nymphaeaceae	
White Water Lily	Nymphaea odorata
Cucurbitaceae	
Wild Cucumber	Echinocystis lobata
Juncaceae	
Soft Rush	Juncus effusus
Wood Rush	Luzula multiflora
Margined Rush	Juncus marginatus
Pyrolaceae	
Round-leaved American Wintergreen	Pyrola rotundifolia

Indian Pipe	Monotropa uniflora
Apocynaceae	
Spreading Dogbane	Apocynum androsaemifolium
Halcragidaceae	
Diverse-leaved Water Milfoil	Myriophyllum heterophyllum
Ceratophyllaceae	
Coontail	Ceratophyllum demersum
Lemnaceae	
Lentille D'eau Duckweed	Lemna minor
Star Duckweed	Lemna trisulca
Convolvulaceae	
Field Bindweed	Convolvulus arvensis
Dodder	Cuscuta gronovii
Verbenaceae	
Blue Vervain	Verbena hastata
Onagraceae	
Evening Primrose	Oenothera biennis
Hairy Willow-herb	Epilobium hirsutum
Campanulaceae	
Marsh Bellflower	Campanula aliginosa
Harebell	Campanula rotundifolia
Indian Tobacco	Lobelia inflata
Phrymaceae	
Lopseed	Phryma leptostachya
Geraniaceae	
Herb Robert	Geranium robertianum
Hydrocharitaceae	
Tape Grass	Vallisneria americana

APPENDIX 3

MASTER LIST OF BIRDS SIGHTED IN MURRAY MARSH, JUNE-AUG. 1982

Common Loon	Gavia immer
Pied-Billed Grebe	Podilymbus podiceps
Great Blue Heron	Ardea herodias
Green Heron	Butorides striatus
Least Bittern	Ixobrychus exilis
American Bittern	Botaurus lentiginosus
Mallard	Anas platyrhynchos
American Black Duck	Anas rubripes
Common Pintail	Anas acuta
Blue-winged Teal	Anas discors
Wood Duck	Aix sponsa
Turkey Vulture	Cathartes aura
Northern Goshawk	Accipiter gentilis
Red-tiled Hawk	Buteo jamaicensis
Broad-winged Hawk	Buteo platypterus
Northern Harrier	Circus cyaneus
Osprey	Pandion haliaetus
Merlin	Falco columbarius
American Kestrel	Falco sparverius
Ruffed Grouse	Bonasa umbellus
King Rail	Rallus elegans
Virinia Rail	Rallus limicola
Sora	Porzana carolina
Common Gallinule	Gallinula chloropus
American Coot	Fulica americana
Killdeer	Charadrius vociferus
Spotted Sandpiper	Actitis macularia
American Woodcock	Philohela minor
Common Snipe	Capella gallinago
Ring-billed Gull	Larus delawarensis
Common Tern	Sterna hirunda
Caspian Tern	Hydroprogne caspia
Black Tern	Chlidonias niger
Rock Dove	Columba livia
Morning Dove	Zenaida macroura
Black-billed Cuckoo	Coccyzus erythropthalmus
Great Horned Owl	Bubo virginianus
Ruby Throated Hummingbird	Archilochus colubris
Belted Kingfisher	Megaceryle alcyon
Common Flicker	Colaptes auratus
Pileated Woodpecker	Dryocopus pileatus
Yellow-bellied Sapsucker	Sphyrapicus varius
Hairy Woodpecker	Picoides villosus
Downy Woodpecker	Picoides pubescens
Eastern Kingbird	Tyrannus tyrannus
Great Crested Flycatcher	Myiarchus crinitus
Eastern Phoebe	Sayornis phoebe
Willow Flycatcher	Empidonax traillii
Least Flycatcher	Empidonax minimus
Eastern Pewee	Contopus virens

APPENDIX E CONT'D

Tree Swallow	Iridoprocne bicolor
Bank Swallow	Riparia riparia
Rough-winged Swallow	Stelgidopteryx ruficollis
Barn Swallow	Riparia riparia
Purple Martin	Progne subis
Blue Jay	Cyanocitta cristata
American Crow	Corvus brachyrhynchos
Black-capped Chickadee	Parus atricapillus
White-breasted Nuthatch	Sitta carolinensis
Brown Creeper	Certhia familiaris
House Wren	Troglodytes aedon
Marsh Wren	Cistothorus palustris
Northern Mockingbird	Mimus polyglottas
Gray Catbird	Dumetella carolinensis
Brown Thrasher	Toxostoma rufum
American Robin	Turdus migratorius
Wood Thrush	Hylocichla mustelina
Veery	Catharus fuscescens
Cedar Waxwing	Bombycilla cedrorum
European Starling	Sturnus vulgaris
Red-eyed Vireo	Vireo olivaceus
Warbling Vireo	Vireo gilvus
Black and White Warbler	Mniotilta varia
Yellow Warbler	Dendroica petechia
Black-throated Blue Warbler	Dendroica caerulescens
Chestnut-sided Warbler	Dendroica pensylvanica
Pine Warbler	Dendroica pinus
Palm Warbler	Dendroica palmarum
Northern Waterthrush	Seiurus noveboracensis
Common Yellowthroat	Geothlypis trichas
American Redstart	Setophaga ruticilla
House Sparrow	Passer domesticus
Bobolink	Dolichonyx oryzivorus
Eastern Meadowlark	Sturnella magna
Red-winged Blackbird	Agelaius phoeniceus
Northern Oriole	Icterus galbula
Rusty Blackbird	Euphagus Carolinus
Common Grackle	Quiscalus quiscula
Brown Headed Cowbird	Molothrus ater
Scarlet Tanager	Piranga olivacea
Rose Breasted Grosbeak	Pheucticus ludovicianus
Indigo Bunting	Passerina cyanea
Evening Grosbeak	Hesperiphona vespertina
Pine Grosbeak	Pinicola enucleator
American Goldfinch	Carduelis tristis
Savannah Sparrow	Passerculus sandwichensis
Vesper Sparrow	Pooecetes gramineus
Chipping Sparrow	Spizella passerina
Field Sparrow	Spizella pusilla
White Throated Sparrow	Zonotrichia albicollis
Swamp Sparrow	Melospiza georgiana
Song Sparrow	Melospiza melodia

Order, common name and species name are after Peterson.(1981)

APPENDIX B

BRIGHTON FIELD NATURALISTS BIRD SIGHTINGS AUG/7/82

Great Blue Heron
Green Heron
Mallard
Black Duck
Pintail
Blue-winged Teal
Red-tailed Hawk
Marsh Hawk
Osprey
Killdeer
Ring-billed Gull
Mourning Dove
Ruby-throated Hummingbird
Belted Kingfisher
Yellow-shafted Flicker
Hairy Woodpecker
Downy Woodpecker
Eastern Kingbird
Great Crested Flycatcher
Eastern Phoebe
Eastern Wood Pewee
Tree Swallow
Barn Swallow
Blue Jay
Common Crow
Black-capped Chickadee
Catbird
Robin
Cedar Waxwing
Starling
Yellow Warbler
Red-winged Blackbird
Common Grackle
American Goldfinch
Tree Sparrow
Song Sparrow
Baltimore Oriole
Scarlet Tanager
Caspian Tern

APPENDIX C

COMMON MIGRANT BIRDS

This list covers the common migrant birds of the Lower Trent Region, based on the Bird Checklist of Presqu'ile Provincial Park and the list of Birds for the Lower Trent Region Conservation Authority watershed. The naming and order in the list follows the Systematic Checklist in Peterson's Field Guide

Horned Grebe	Podiceps auritus
Canada Goose	Branta canadensis
American Wigeon	Anas americana
Northern Shoveler	Anas clypeata
Redhead	Aythya americana
Ring-necked Duck	Aythya collaris
Canvasback	Aythya valisineria
Greater Scaup	Aythya marila
Lesser Scaup	Aythya affinis
Common Goldeneye	Bucephala clangula
Bufflehead	Bucephala albeola
Oldsquaw	Clangula hyemalis
White-winged Scoter	Melanitta deglandi
Hooded Merganser	Lophodytes cucullatus
Common Merganser	Mergus merganser
Red-breasted Merganser	Mergus serrator
Sharp-shinned Hawk	Accipiter striatus
Semipalmated Plover	Charadrius semipalmatus
Black-bellied Plover	Pluvialis squatarola
Greater Yellowlegs	Tringa melanoleuca
Lesser Yellowlegs	Tringa flavipes
Solitary Sandpiper	Tringa solitaria
Ruddy Turnstone	Arenaria interpres
Redknot	Calidris canutus
Short-billed Dowitcher	Limnodromus griseus
Sanderling	Calidris alba
Semipalmated Sandpiper	Calidris pusilla
Least Sandpiper	Calidris minutilla
White-rumped Sandpiper	Calidris fuscicollis
Dunlin	Calidris alpina
Great Black-backed Gull	Larus marinus
Bonaparte's Gull	Larus philadelphia
Yellow-bellied Flycatcher	Empidonax flaviventris
Alder Flycatcher	Empidonax alnorum
Horned Lark	Eremophila alpestris

Table 16. Herptiles observed in Murray Marsh and accompanying information.

Species	Habitat	Diet	Breeding Evidence	Murray Marsh Status	Provincial Status	National Status
Midland Painted Turtle *Chrysemys picta marginata*	Shallow, permanent water bodies where the aquatic vegetation is profuse and the bottom soft and muddy.	Aquatic vegetation, insects, crayfish and small molluscs.	None	Common	Common	Common
Blandings Turtle *Emydoidea blandingi*	Essentially aquatic but often wanders about on land; marshes and bogs	Invertebrates, wild fruit and green vegetation	Nest	Common	Rare	Rare
Map Turtle *Graptemys geographica*	Rivers and large water bodies	Snails and crayfish	Female laying eggs; nests	Common	Common	Common
Snapping Turtle *Chelydra serpentina*	Any permanent fresh water body	Small aquatic invertebrates, fish, birds, mammals, carrion and vegetation	Females laying eggs; nests	Common	Common	Common
Northern Water Snake *Natrix Sipedon*	Swamps, marshes, bogs	Frogs, salamanders, fish and crayfish	None	Common	Common	Common
Eastern Garter Snake *Thamnophis sirtalis*	Meadows, marshes, woodlands	Frogs, toads, salamanders, fish, tadpoles, earthworms, leeches,	Young snakes found	Common	Common	Common

Table 16. Cont'd

		small mammals, birds and carrion				
Northern Ribbon Snake *Thamnophis sauritus*	Semi-aquatic; seldom wanders far from streams, ponds or bogs.	Salamanders, frogs and small fish	Young snake found	Uncommon	Rare	Rare
Northern Leopard Frog *Rana pipiens*	So called 'meadow' frog; often wanders far from water	Invertebrates	Young frogs abundant	Common	Common	Common
Pickerel Frog *Rana palustris*	Cool, clear water; sphagnum bogs, meadows	Invertebrates	None	Uncommon	Uncommon	Uncommon
Bullfrog *Rana catesbeiana*	Prefers large water bodies with emergent vegetation	Invertebrates and small vertebrates	Seen breeding	Common	Common	Common
Green Frog *Rana clamitans*	Shallow, fresh water	Invertebrates	None	Common	Common	Common
Mink Frog *Rana septentrionalis*	Partial to borders of ponds and lakes; where water lilies are plentiful	Insects	None	Uncommon	Uncommon	Uncommon
Wood Frog *Rana sylvatica*	Moist woods	Insects	None	Common	Common	Common
Spring Peeper *Hyla crucifer*	Woodlands close to small, temporary ponds	Insects	None	Uncommon	Common	Common
American Toad *Bufo americanus*	Hiding places where there is an abundant food supply	Insects	Young	Common	Common	Common

Table 16. Cont'd

Mudpuppy *Necturus maculosus*	Permanent muddy and weed-choked water bodies	Fish, fish eggs, crayfish, aquatic insects and mollusks	None	Uncommon	Uncommon	Uncommon

Common - usually found in suitable habitat

Uncommon - found in suitable habitat but in lesser numbers than the above

Rare - seen but in very low numbers

Provincial status is based on Parsons (1976).

National status is based on Cook (1970).