

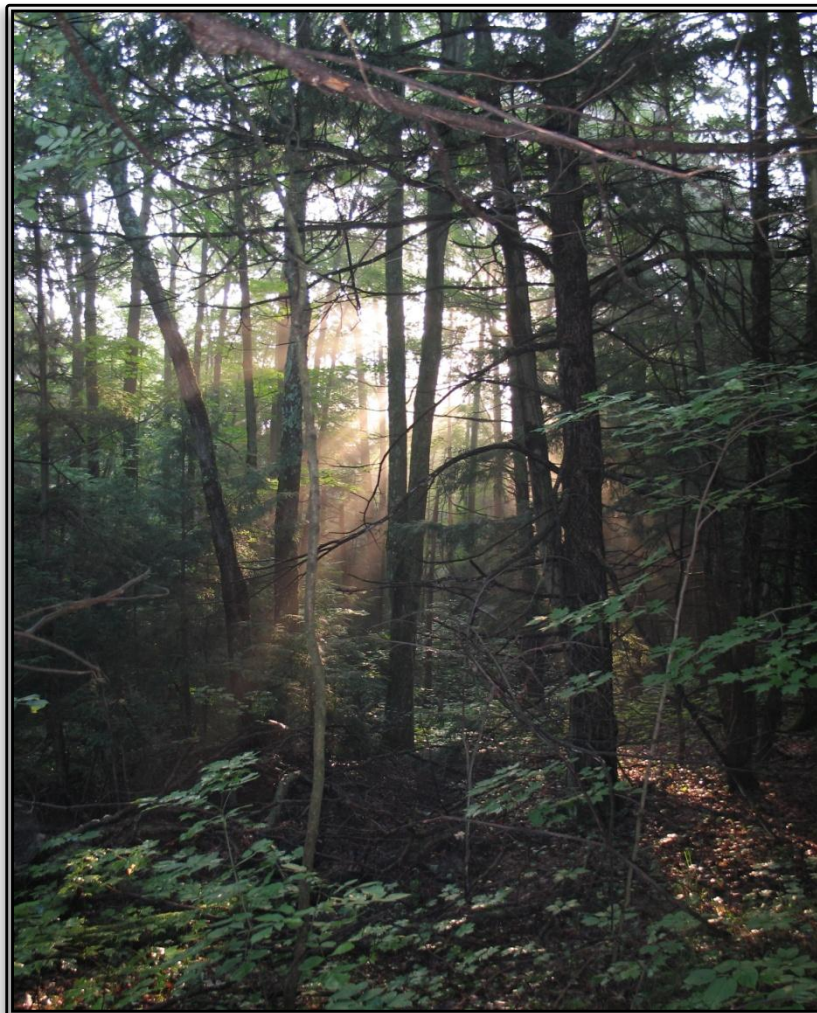


# Burnley Creek Natural Habitat Area

Management Plan

May 31, 2011

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

**Acknowledgements:**

*This project was made possible with funding from the Oak Ridges Moraine Foundation and staffing support provided through the Greater Toronto YMCA Post-Secondary Youth Eco Internship Program.*

## Table of Contents

|  |    |
|--|----|
| 1. INTRODUCTION .....                                    | 1  |
| 2. GOALS AND OBJECTIVES .....                            | 1  |
| 2.1. GOALS.....  | 1  |
| 2.2. OBJECTIVES.....                                     | 1  |
| 3. BACKGROUND .....                                      | 2  |
| 3.1. LOCATION.....                                       | 2  |
| 3.2. LAND ACQUISITION.....                               | 2  |
| 3.3. GENERAL DESCRIPTION .....                           | 2  |
| 3.4. ADJACENT PROPERTIES/LAND USES.....                  | 2  |
| 3.5. HISTORY .....                                       | 6  |
| 3.6. CLIMATE.....  | 8  |
| 3.7. PHYSIOGRAPHY.....                                   | 8  |
| 3.8. SOILS .....   | 10 |
| 3.9. VEGETATION .....                                    | 12 |
| 3.10. WATER RESOURCES.....                               | 15 |
| 3.11. NATURAL AREAS INFORMATION.....                     | 15 |
| 3.12. WILDLIFE & WILDLIFE HABITAT .....                  | 17 |
| 3.13. SPECIES AT RISK.....                               | 17 |
| 3.14. AQUATIC BIOLOGY .....                              | 18 |
| 4. RECOMMENDATIONS.....                                  | 19 |
| 4.1. POLICY.....   | 19 |
| 4.1.1. PERMITTED ACTIVITIES .....                        | 20 |
| 4.1.2. PROHIBITED ACTIVITIES .....                       | 20 |
| 4.2. NATURALIZATION AND WILDLIFE HABITAT PROTECTION..... | 20 |
| 4.3. NATURAL HERITAGE LINKAGES.....                      | 20 |
| 5. REFERENCES .....                                      | 22 |
| APPENDIX A: SPECIES LIST.....                            | 24 |

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**LIST OF FIGURES**

|  |    |
|--|----|
| Figure 1: Burnley Creek Natural Habitat Area – Property Location.....                              | 3  |
| Figure 2: Burnley Creek Natural Habitat Area – Significant Natural Areas.....                      | 4  |
| Figure 3: Burnley Creek Natural Habitat Area – Adjacent Properties/ Land Uses.....                 | 7  |
| Figure 4: Burnley Creek Natural Habitat Area – Property location on the Oak Ridges<br>Moraine..... | 9  |
| Figure 5: Burnley Creek Natural Habitat Area – Soil Types.....                                     | 11 |
| Figure 6: Burnley Creek Natural Habitat Area – Vegetation.....                                     | 13 |
| Figure 7: Burnley Creek Natural Habitat Area – Water Resources .....                               | 16 |

**LIST OF TABLES**

|  |    |
|--|----|
| Table 1: Climate Normal Data from 1971-2000 from Trenton Airport.....                    | 8  |
| Table 2: 'Species at Risk' found in 2006 field inventories (with provincial status)..... | 18 |
| Table 3: Burnley Creek Fish Habitat Conditions.....                                      | 19 |

## **1. INTRODUCTION**

Lower Trent Conservation (LTC) owns over 3,800 acres of natural lands throughout its watershed. These natural areas are protected from development and serve to prevent flooding, reduce erosion, and protect natural heritage. There are a total of 17 properties owned by LTC and these are all grouped into one of three categories: Natural Habitat Areas, Conservation Areas, and Public Safety Lands. Each category has a unique and important purpose. Since each property has specific uses and functions, a management plan should be completed for each property. The management plan serves as a guide to ensure that the management of the property is consistent with the objectives of LTC (Conservation Lands Strategy, 1995).

Natural Habitat Areas are generally large areas with significant natural features. These properties are open to the public; however, they are intended to be low use areas with no trails or facilities and minimal signage. Natural Habitat Areas are to be left in their natural state to aid in flood prevention and/or protect natural features. Natural Habitat Areas fall into one of two categories: Priority A and Priority B. Priority A areas require long-term protection of the natural areas to ensure a healthy watershed. Priority B areas are often smaller and more accessible than Priority A areas, and may show some potential/demand for further development. The Burnley Creek Natural Habitat Area (Burnley Creek NHA) falls into the Priority A category.

The purpose of the Burnley Creek NHA management plan is to guide the management of the area in a fashion that is consistent with LTC's Conservation Lands Strategy. More specifically, to address the following management objectives: 1) guide naturalization and wildlife habitat enhancement, 2) identify maintenance requirements, 3) identify the potential for educational/recreational activities, and 4) identify promoted uses, permitted uses, and prohibited uses of the property.

## **2. GOALS AND OBJECTIVES**

### **2.1. GOALS**

Ensure that the management of the Burnley Creek NHA

- satisfies the requirements set out by the Conservation Lands Strategy
- contributes to the protection of the headwaters of Burnley Creek
- protects natural features, habitat, and natural area linkages on the Oak Ridges Moraine
- contributes to a healthy watershed

### **2.2. OBJECTIVES**

- Limit human disturbances to maintain the natural values of the property
- Protect natural heritage features and wildlife habitat
- Monitor both natural heritage and water resources in the Burnley Creek NHA

### **3. BACKGROUND**

#### **3.1. LOCATION**

The Burnley Creek NHA is located in the Township of Alnwick/Haldimand, approximately 23 kilometres north of Colborne, Ontario. This is illustrated in Figure 1. Legally, the property is identified as Concession 9, parts of lots 5, 6, 7, 8, and 9, formerly Township of Haldimand, Northumberland County (44° 9' 0.0" N, 78° 0' 42.5" W). The property is just southwest of the hamlet of Burnley and abuts County Road 29 on the north and east sides. The main entrance point to the property is at County Road 29 at the bridge crossing for Burnley Creek (just south of Burnley).

#### **3.2. LAND ACQUISITION**

The Burnley Creek NHA was donated to the Lower Trent Region Conservation Authority in 2006 by Robert Wilson. Mr. Wilson wanted to ensure the long-term protection of this property beyond his generation. The property is comprised of three portions which were amalgamated into a single 107 acre parcel.

The donation was processed through Environment Canada's Ecological Gifts Program. The Ecological Gifts Program has been established in order to help conserve and protect Canada's ecologically sensitive lands. As per the agreement, Lower Trent Conservation has agreed to manage this property in order to protect the ecologically sensitive area.

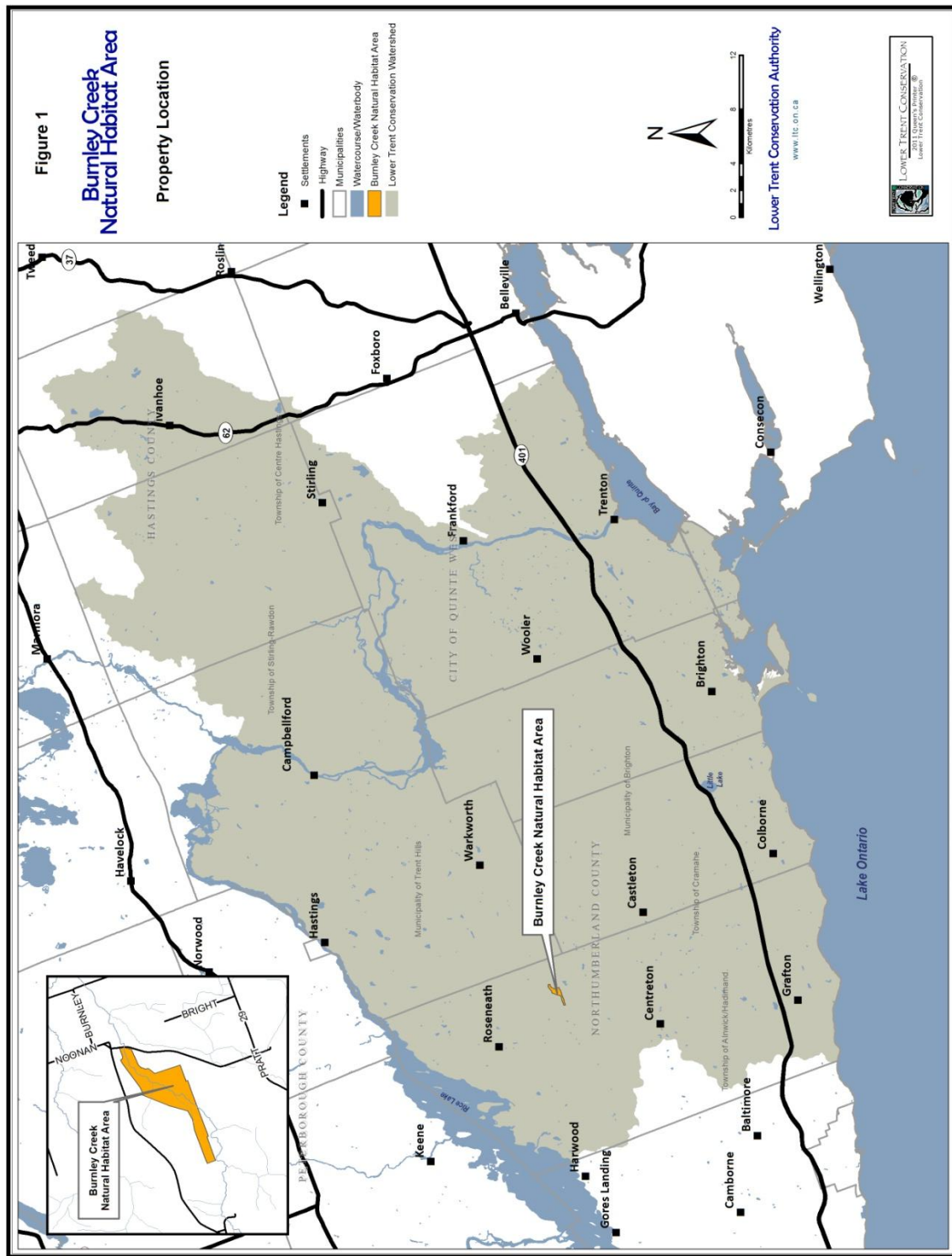
#### **3.3. GENERAL DESCRIPTION**

In total, the Burnley Creek NHA is 107 acres of diverse forest habitat with a tributary of Burnley Creek dividing the property into two portions. It is located on the Oak Ridges Moraine. The majority of the property is covered with shrub swamps, mixed forest swamps, and coniferous forest swamps. A small portion at the southeast corner of the property is a dry-fresh mixed forest. Since the property is mostly wetland and there is limited access, the property has extremely low human disturbance.

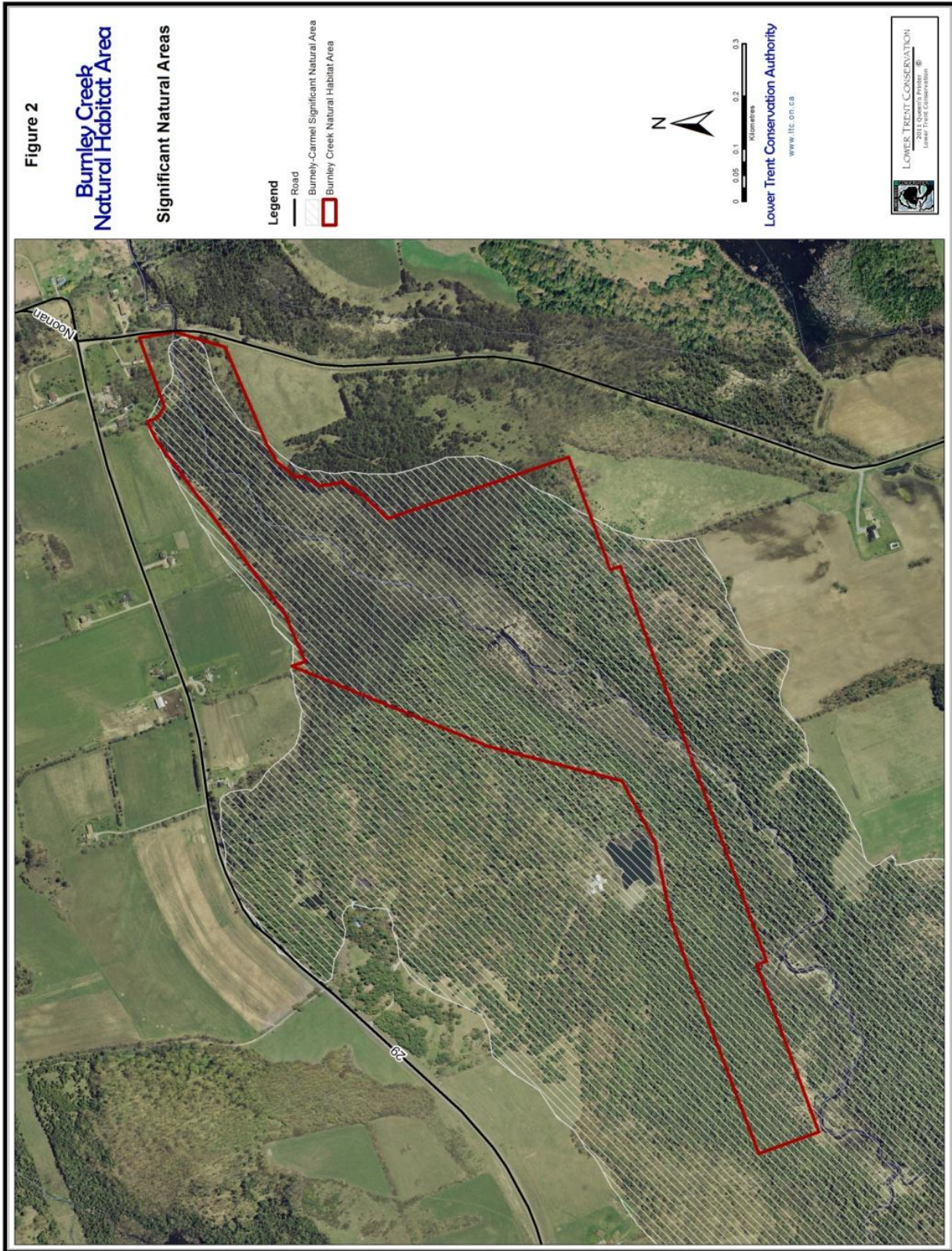
Currently, there are no facilities on the property (i.e., no structures, trails, parking lots or signage).

#### **3.4. ADJACENT PROPERTIES/LAND USES**

The Burnley Creek NHA is surrounded by both forested and agricultural land. It is an important linkage between nearby significant natural areas (Figure 2). The surrounding forested land is owned both privately and by various organizations including: Nature Conservancy of Canada, Lower Trent Conservation, County of Northumberland, and Ontario Parks as seen in Figure 3. These properties help to form a continuous forested corridor along the northeast slope of the Oak Ridges Moraine.









Burnley-Carmel Property (Nature Conservancy of Canada / Ontario Parks)

The Burnley-Carmel properties total 784 acres and are located immediately southwest of the Burnley Creek NHA. Its close proximity to the Burnley Creek NHA adds a level of connectivity with surrounding forests on the landscape. The Burnley-Carmel property is covered with older-growth forests, wetlands, sand barrens, conifer plantations, and oak savannas (Weston, Online). This diversity of habitats helps to sustain a wide variety of plant and animal species. Burnley Carmel is owned by the Nature Conservancy of Canada and managed by Ontario Parks as part of Peter's Woods Provincial Park.

Alderville Woods Natural Habitat Area (Lower Trent Conservation)

The Alderville Woods Natural Habitat Area is owned by LTC and was donated by Jane Hardacre in 2002. It is a total of 115.7 acres and is approximately 1km northwest of the Burnley Creek NHA on the north side of County Road 29 (Figure 2). The property contains mature coniferous, deciduous, and mixed forests, old fields, and wetland areas (NCC, 2004). This property is approximately 90% forested and is the source area for a cold water stream, a tributary of Burnley Creek.

Peter's Woods Provincial Park (Ontario Parks)

Peter's Woods Provincial Park is an 81.5 acre parcel of land that is approximately 2.5km southwest of the Burnley Creek NHA. Peter's Woods is home to one of the most mature deciduous woodlands on southern Ontario. It is considered an "older-growth" forest and boasts a White Oak estimated to be 450 years old and a Sugar Maple estimated to be 460 years old (Martin, 2001). Facilities on this property are limited to a parking lot and a single trail (OMNR, 2009).

Northumberland County Forest (Northumberland County)

The Northumberland County Forest (NCF) is comprised of multiple parcels of land within the Township of Alnwick/Haldimand in Northumberland County. In total, the NCF is 1903 acres of land which is covered in plantations (60%) and natural areas (40%). Ninety-seven percent of the NCF is on the Oak Ridges Moraine. The forest has very rare Black Oak savanna ecosites (only 2% of the historical habitat remains) (NCF, 2009). The NCF's east-west orientation helps to increase the connectivity of forests along the Oak Ridges Moraine.

Webber (Nature Conservancy of Canada)

The 157 ha (388 acres) Webber Property was secured by the Nature Conservancy of Canada (NCC) in 2007 by a partial donation of the lands. The long term goal is to maintain and enhance black oak savanna, tallgrass woodland, tallgrass prairie and sand barren, and thus support viable populations of associated species at risk and specialized species assemblages, including grassland birds.

Shelter Valley Cold Creek Headwaters

The 91 hectares (224.4 acres) Shelter Valley Cold Creek Headwaters property was purchased in 2009 and it is located in 2 sections, one of which is directed adjacent to the NCC Webber property. The site is a mix of tallgrass communities and forests.

Van hove and Evens

This 4.6 ha (11.24 acre) property in Cramahe Township was purchased in 2006 to enhance the tallgrass prairie community that is present and to benefit prairie plants and animals and to provide an effective natural buffer for, and expansion of, the Red Cloud Cemetery Prairie which it borders.

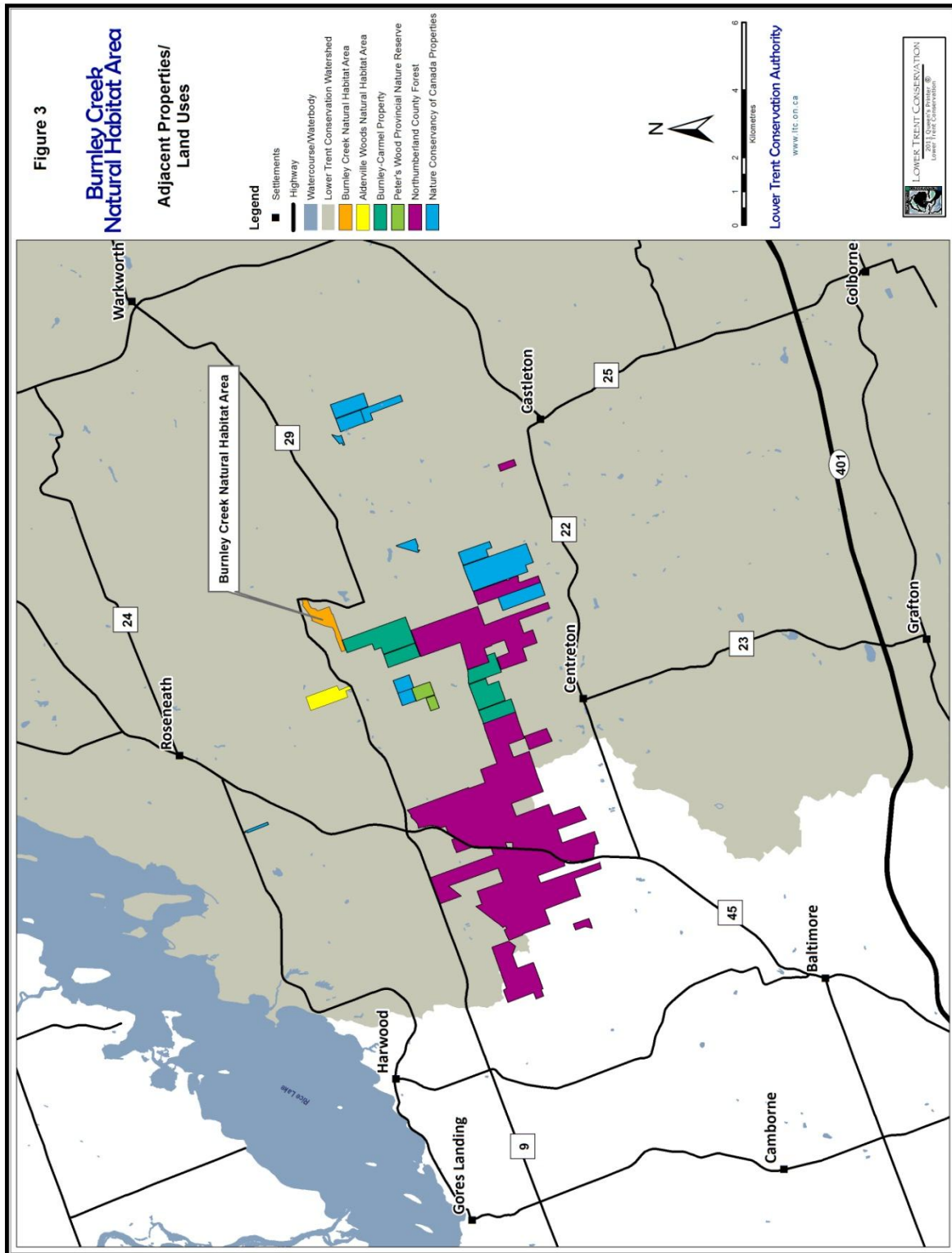
Barr Property

The 12.6 ha (31 acres) Barr property is located in Northumberland County in Alnwick-Haldimand Township and was donated to the NCC in 2005. The property is a mix of tallgrass communities including oak savanna, oak and pine woodland and sand barrens. Active management on the property has included prescribed burns and non native species removal.

**3.5. HISTORY**

During the early to mid 1800's, the forests in Northumberland County were heavily cleared for ship building materials, fuel, and agriculture. Since the dominant soil type in the area is the Pontypool series, there is a high quantity of sand in these soils. Heavy deforestation resulted in issues with erosion, flooding, and soil infertility. In the early 1920's, an intense reforestation program helped to reduce soil erosion and degradation in the area (NCF, 2009).

Prior to acquisition by LTC in 2006, the Burnley Creek NHA had only been used for recreational purposes by the previous owners. Currently, it is a low use property. This helps to ensure the long-term protection of this natural area.



### 3.6. CLIMATE

Compared to the climate of the southern reaches of the Lower Trent Conservation watershed, which is influenced by the modifying effects of Lake Ontario, the Burnley Creek NHA has slightly colder winters and slightly warmer summers and a growing season of 190-200 days (Honey & Burns, 1987). Thirty year 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: Climate Normal Data from 1971-2000 from Trenton Airport

|                         | Year  | January | April | July | October |
|-------------------------|-------|---------|-------|------|---------|
| <b>Temperature</b>      |       |         |       |      |         |
| Daily Mean(°C)          | 7.0   | -7.5    | 6.1   | 20.5 | 8.3     |
| Days>0°C                | 307.7 | 12.7    | 29.6  | 31   | 31      |
| <b>Precipitation</b>    |       |         |       |      |         |
| Total Precipitation(mm) | 893.8 | 70.1    | 77.1  | 56.1 | 76.0    |
| Snowfall(cm)            | 169.4 | 46.7    | 6.4   | 0    | 0.4     |
| Mean Snow Depth(cm)     | 3     | 10      | 0     | 0    | 0       |

### 3.7. 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.

#### Oak Ridges Moraine

The Burnley Creek NHA is located on the northeastern slopes of one of southern Ontario's most significant physical landforms, the Oak Ridges Moraine (Figure 4). It stretches 160km on an east-west orientation between the Niagara Escarpment and the Trent River. The ORM is an interlobate kame moraine with irregular heights, widths and quite steep margins (Miryntech, 1963). The headwaters of many cold water rivers and streams are located on the Oak Ridges Moraine. It is an enormous groundwater recharge area for South Central Ontario and has a high diversity of habitat (ORMF, website).

During the height of the Wisconsin glaciation, southern Ontario was completely covered by the Laurentide ice sheet. However, in southern Ontario, the ice-sheet was made up of multiple lobes (*i.e.* Lake Ontario lobe, Lake Huron lobe, Georgian Bay/Lake Simcoe lobe). As the ice sheet began to retreat, a gap was created between the Lake Ontario lobe (south side) and the Georgian Bay lobe (north side). Torrential floodwaters from under the ice sheet dumped sediment in the gap between these lobes. This deposition of sediment in this gap was the





formation of Lake Algonquin (currently Lake Huron and Lake Michigan) and Lake Iroquois (currently Lake Ontario). However, the continually retreating ice uncovered various drainage avenues which drained these lakes and left the Great Lakes system as it is today (ORMF, website).

### 3.8. SOILS

The diversity of soil types within the Burnley Creek NHA can be attributed to the Wisconsin glaciations and the formation of the Oak Ridges Moraine. The various soil types within the Burnley Creek NHA, as seen in Figure 5, has resulted in increased habitat diversity and therefore increased species diversity. Upland sandy areas were deposited during the development of the Oak Ridges Moraine. Subsequently lowland mucky areas developed in the shallow swamps of the Burnley Creek NHA. The dominant soil type within the Burnley Creek NHA is Muck, with small portions of the property having Pontypool Sand or Bondhead Loam (Hoffman and Acton, 1974).

#### 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 wetland areas of Burnley Creek NHA have allowed for the development of this rich organic soil.

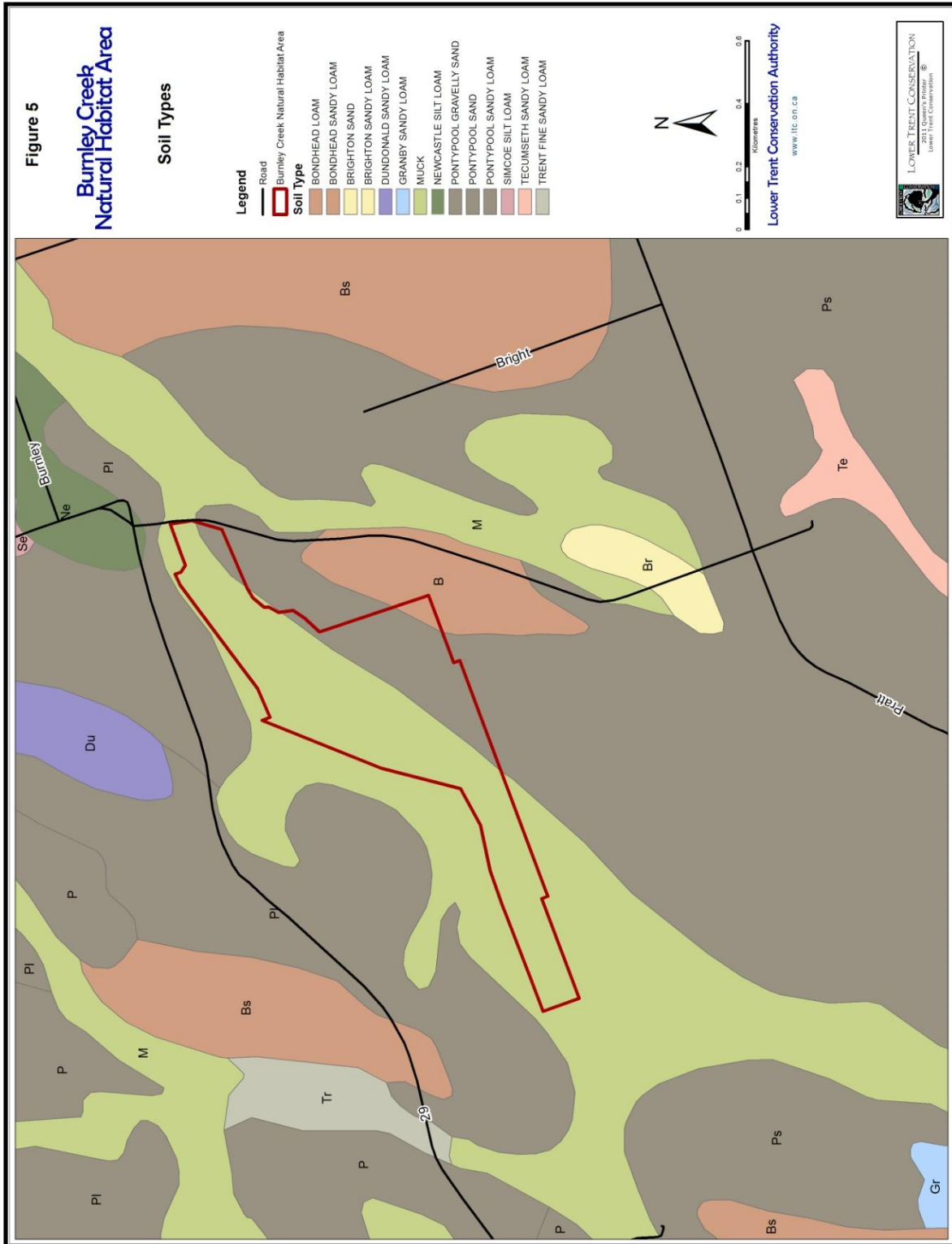
#### Pontypool Series

The second most common soil type in the Burnley Creek NHA is Pontypool Sand. Pontypool Series soils are calcareous medium and fine grained sand with rapid drainage. However, the high sand content also makes these areas more susceptible to erosion by both wind and water.

About 50% of the Pontypool Series soils found in Northumberland County have been identified as Class 6 for agriculture. Class 6 typically means that these areas are unsuitable for cultivation but are suitable for permanent pasture. The remaining 50% of the Pontypool Series soils have been identified as Class 4 for agriculture. This suggests that there are severe restrictions to what crops can be grown. Some others require special conservation practices and very careful management.

Historically, these soils have been used for general farming and growing cereal grains. However, in areas with steeper slopes, permanent pasture is most common. Since beef cattle and hogs are the main animals locally produced, hay and pasture occupy the largest acreage in the area.

Upland areas surrounding Burnley Creek have been identified as Pontypool Sand and Pontypool Sandy Loam, medium sand, slightly stoney, with irregular slopes ranging from 10-30% (Hoffman and Acton, 1974).



### Bondhead Series

A very small portion of the Burnley Creek NHA is comprised of Bondhead Loam. 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.

The Bondhead Loam is a calcareous loam or sandy loam tills that were 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. The low magnesium coupled with the steep slopes can limit agriculture in these areas. Therefore, in these areas, livestock and dairy farming are the main farm practices. When the slopes aren't too steep for farming, hay, pasture, silage corn, grain corn, winter wheat, and mixed grains are the main crops grown on Bondhead Loam (Hoffman and Acton, 1974).

### 3.9. VEGETATION

The mucky, organic soils which dominate the Burnley Creek NHA contribute to the shrub swamp or mixed forest swamps in this area. In 1995, an inventory of the Burnley-Carmel Headwaters Significant Natural Area was conducted by LTC. This inventory provides detailed information on the ecosystem community types found in the Burnley Creek NHA. In 2006, an inventory of the Burnley Creek NHA was completed to identify all trees, shrubs, and wildflowers on the property. Refer to Appendix A for a list of all species encountered on these inventories and Figure 6 for a map of the vegetation communities.

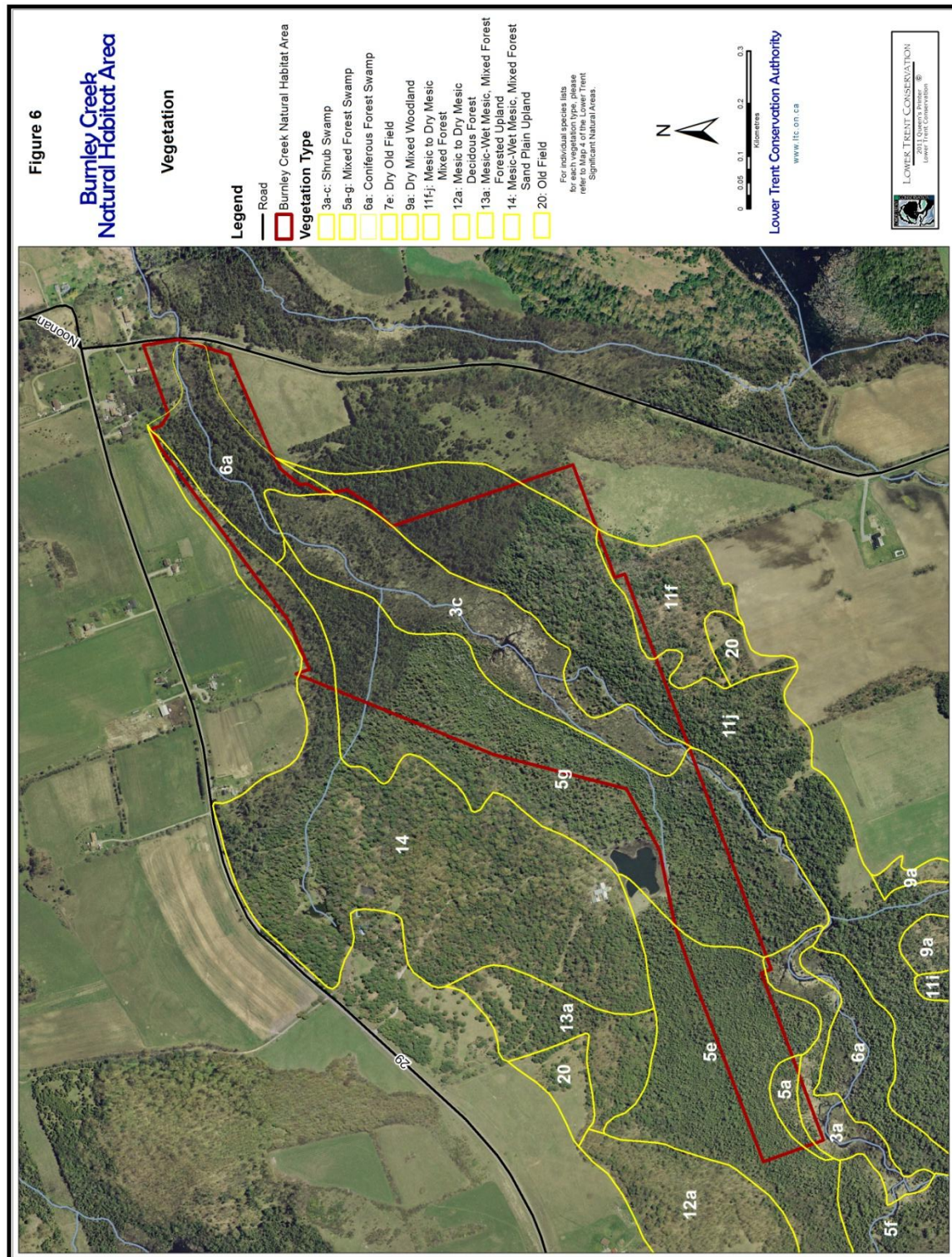
#### Shrub Swamp (3a & 3c)

The Burnley Creek NHA is bisected into northwest and southeast sections by a shrub swamp along a tributary of Burnley Creek (3c). This is a young and dense community with approximately 90% shrub cover and 10% tree cover. Shrub species that dominate the area are: speckled alder, Canada elderberry, and red-osier dogwood. The dominant tree species in this area is white cedar, however white birch, white spruce, and balsam fir are also present (Brownell, 1995). This community is classified as an Organic Thicket Swamp Ecosite-SWT3 (Lee et. al, 1998).

Another shrub swamp (3a) is located at the southwest corner of the Burnley Creek NHA. This area has little tree cover and approximately 40% shrub cover. The dominant shrub species in this area are: red osier dogwood, speckled alder, highbush cranberry, Canada elder and pussy willow. These shrub species are indicative of wet areas. This community is classified as an Organic Thicket Swamp Ecosite-SWT3 (Lee et. al, 1998).

#### Mixed Forest Swamp (5a, 5e, & 5g)

The portion of Burnley Creek NHA on the northwest side of Burnley Creek is dominated by a mixed forest swamp. These areas have similar tree species that vary in abundance. Black ash, white cedar, white spruce, and balsam fir are the most common tree species found in these areas.





At the southwest corner of the Burnley Creek NHA there is a small mixed forest swamp (5a), just north of the shrub swamp (3a) mentioned earlier. This mixed forest swamp only has about 35% tree cover. Black ash is the dominant tree species (40%) with some balsam fir (20%), white spruce (20%), and white cedar (20%). This area is identified as White Cedar Organic Mixed Swamp Ecosite-SWM4 (Lee et. al. 1998).

Surrounding the 5a mixed forest swamp to the north is a similar mixed forest swamp (5e). Unlike 5a, this area is completely forested and is dominated by white cedar (30%). A variety of other tree species are also present including: yellow birch (20%), hemlock (10%), black ash (10%), American elm (10%), and red maple (10%). The occasional white birch, basswood, and tamarack are also found in this area. This area has a higher diversity of tree species as 5a but is also identified as White Cedar Organic Mixed Swamp - SWM4 Ecosite (Lee et. al., 1998).

On the northwest side of Burnley Creek is the final mixed forest swamp found on this property (5g). Like 5e, it is nearly completely forested. The dominant tree species is white spruce (30%) with some white cedar (20%), balsam fir (20%), tamarack (10%), and black ash (10%) with the occasional trembling aspens, balsam poplars, and white birches making up the remaining 10% (Brownell, 1995). Similar to 5a and 5e, this site is also identified as White Cedar Organic Mixed Swamp - SWM4 Ecosite (Lee et al, 1998).

#### Coniferous Forest Swamp (6a)

A small portion at the northeast corner of the Burnley Creek NHA is a coniferous forest swamp (6a). A coniferous forest swamp is identified as having at least 75% of the tree species being conifers. The tree species distribution in this swamp is: white cedar (40%), white spruce (30%), balsam fir (20%), and white birch (10%). This area is identified as a White Cedar-Conifer Organic Coniferous Swamp Type-SWC3-2 (Lee et al. 1998).

#### Forested Upland (11f & 11j)

The southeast corner of the Burnley Creek NHA consists of dry, upland, mixed forest types. The primary community in this area is 11j. This is a long, narrow forest community that runs parallel to Burnley Creek. The area is dominated by white pine (30%) and white cedar (30%), with some white birch (20%), red and white oak (10%), and largetooth and trembling aspen (10%). The occasional balsam fir, white spruce, and red pine are also present. This area is identified as a Dry-Fresh White Cedar Mixed Forest Ecosite-FOM4 (Lee et al, 1998).

The southern property boundary of the Burnley Creek NHA cuts through the vegetation community 11f. This area is dominated by hardwood tree species but some conifers are present. The tree species distribution is: white oak (40%), black oak (20%), white pine (30%), with largetooth and trembling aspen making up the remaining 10% (Brownell, 1995). This area is identified as Dry Oak-Pine Mixed Forest Ecosite-FOM1 (Lee et al, 1998).

#### Sand Plain Upland (14)

The final vegetation community (14) within the Burnley Creek NHA is a sliver of land on the northern boundary, adjacent to communities 5g and 6a. This site is identified as a Fresh-Moist



Hemlock Mixed Forest Ecosite-FOM6 (Lee et al. 1998). The tree species distribution is: hemlock (40%), sugar maple (30%), white cedar (10%), beech (10%), white ash (10%) with occasional red maples and yellow birches. This area was noted by researchers to be a mature stand that is in excellent condition (Brownell, 1995).

### 3.10. WATER RESOURCES

#### General Description

The Burnley Creek NHA is bisected by a tributary of Burnley Creek. Burnley Creek flows northwest from Burnley, through Warkworth and drains into the Trent River. Since the headwaters of Burnley Creek are on the Oak Ridges Moraine, the sandy soils of the area make it an important groundwater recharge area. The Burnley-Carmel headwaters contain several seepage areas and major springs that contribute to surface water flow of Burnley Creek (Brownell, 1995). The drainage area for the entire Burnley-Mill Creek watershed is just over 90km<sup>2</sup>.

#### Flood Prevention

The majority of the Burnley Creek NHA is comprised of both shrub swamps and mixed forest swamps. These wet areas retain large amounts of meltwater and surface runoff, which help to reduce local flooding and erosion.

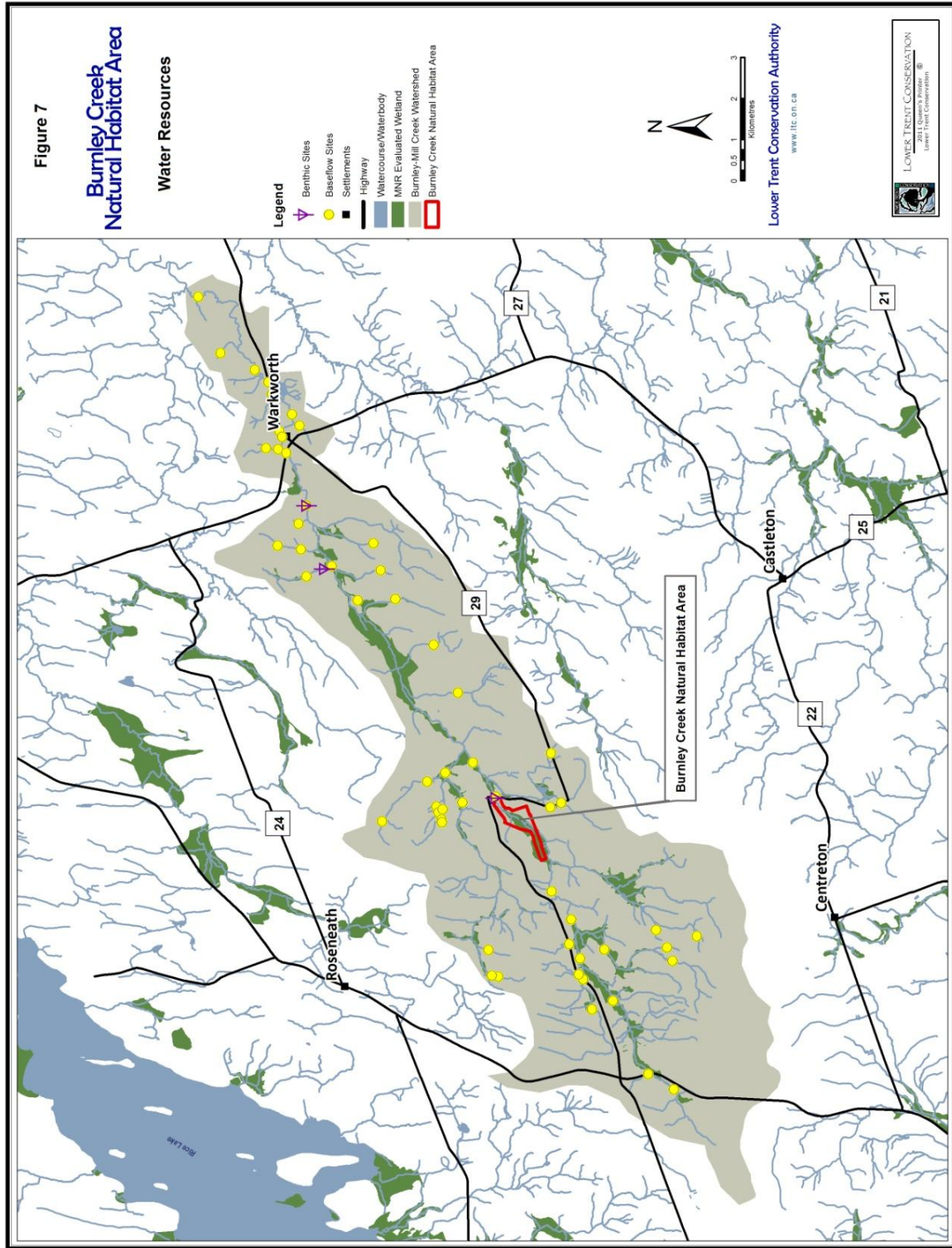
#### Baseflow

The baseflow monitoring program at LTC measures stream discharges throughout the watershed. In the Burnley Creek watershed, there is a total of 56 monitoring locations, 15 upstream of the Burnley Creek NHA and one site immediately downstream (ML28). The locations of these sites can be seen in Figure 7. Since 2007, there has only been one flow measurement at site ML28, the discharge was 0.174m<sup>3</sup>/s. The analysis of the 2007 flow value indicates a baseflow index value of 0.635 for Burnley Creek. This value is the ratio of baseflow to total stream flow. The baseflow index value suggests that baseflow contribution at this site accounts for 63.5% of the total flow. The remaining 36.5% of flow is supplied from surface water runoff. This value is slightly higher than most other watercourses measured in the baseflow study. This can likely be attributed to the geology of the area; high sand content allows water to quickly filter through the soil instead of running over the surface.

Prior to 2007, site BMC02 was the closest site to the Burnley Creek NHA. Unfortunately, BMC02 does not give direct flow values for the Burnley Creek NHA because several tributaries flow into the creek between the NHA and monitoring site.

### 3.11. NATURAL AREAS INFORMATION

Numerous wetlands located within the Burnley Creek watershed are grouped together to form the Burnley (Mill) Creek Provincially Significant Wetland. This provincially significant wetland is 92.1% swamp and 7.9% marsh (NHIC, 2011). Wetlands are designated 'Provincially Significant' by the Ontario Ministry of Natural Resources based on an evaluation which considers biological, social, hydrological, and special features.



This area has also been identified as a regionally significant Area of Natural and Scientific Interest (ANSI) by the Ontario Ministry of Natural Resources. It is known as the Burnley Creek Life Science ANSI. Life Science ANSI's are areas that contain many natural landscapes, communities, plants and animals that have values related to natural heritage protection, scientific study, or education.

### 3.12. WILDLIFE & WILDLIFE HABITAT

#### Birds

In the spring and summer of 2006, an inventory of the property's birds, amphibians, and reptiles was completed by a local naturalist. The monitoring consisted of 12 site visits (10 mornings and 2 evenings) when birds and amphibians are most active. This inventory covered both the Burnley Creek NHA (107ac.) and the adjacent property to the north (163ac.). A total of 108 species of birds were observed during the inventory, 93 were found on the adjacent property and 85 in the Burnley Creek NHA. A total of 91 bird species showed some evidence of breeding on these properties, with 31 confirmed, 35 probable, and 25 possible (McRae, 2006).

Of the 23 warbler species found in the inventory, 21 showed evidence of breeding on this site. This is a high diversity of warblers for such a small property. Several of these species are federally, provincially, or regionally rare. Potential breeding species were located which are more typically associated with Ontario's Carolinian (Cerulean and Hooded Warbler, Louisiana Waterthrush) and Boreal (Yellow-bellied Flycatcher, Northern Parula) forest communities. Refer to the Appendix for the complete list of species found during the inventory.

#### Reptiles

Three species of reptiles were found in the 2006 field inventories. Suitable habitat areas were targeted for these inventories as well as searching adjacent roads for road kills. Refer to Appendix A for a list of identified reptile species.

#### Amphibians

Eight amphibian species were found in the 2006 field inventories. The late start of the field monitoring coupled with navigating through dense vegetation in the dark, made the amphibian inventories difficult. A complete list of the amphibians identified in the inventories can be found in Appendix A.

#### Mammals

The mammals documented in the 2006 inventories were only incidental sightings or evidence (tracks, scat, etc.). No attempt was made to search for these animals; therefore the list in the Appendix is incomplete. Further investigations could be conducted to develop a more complete species list.

### 3.13. SPECIES AT RISK

A total of six bird species identified as 'Species at Risk' were documented in the 2006 inventory of the Burnley Creek NHA and surrounding properties. Table 2 lists these species and their

ranking. Of the six species, evidence suggested that four species could potentially be breeding on these properties. The remaining two species were seen and/or heard but are not likely breeding there.

There is also one reptile species (Common Snapping Turtle) and one species of insect (Monarch) found in the Burnley Creek NHA that are listed as a 'Special Concern' by the Ontario Ministry of Natural Resources.

Table 2: 'Species at Risk' found in 2006 field inventories (with provincial status)

| Species               | COSEWIC         | OMNR RANK       | G-Rank | S-Rank   |
|-----------------------|-----------------|-----------------|--------|----------|
| <b>Birds</b>          |                 |                 |        |          |
| Caspian Tern          | Not at Risk     | Not at Risk     | G5     | S3B      |
| Whip-poor-will        | Threatened      | Threatened      | G5     | S4B      |
| Cerulean Warbler      | Endangered      | Special Concern | G4     | S3B      |
| Louisiana Waterthrush | Special Concern | Special Concern | G5     | S3B      |
| Hooded Warbler        | Threatened      | Special Concern | G5     | S3B      |
| Canada Warbler        | Threatened      | Special Concern | G5     | S4B      |
| <b>Reptiles</b>       |                 |                 |        |          |
| Snapping Turtle       | Special Concern | Special Concern | G5     | S3       |
| <b>Insects</b>        |                 |                 |        |          |
| Monarch               | Special Concern | Special Concern | G5     | S2N, S4B |

G-Rank-Global Rank 1- Extremely Rare 5-Very Common

S-Rank-Provincial Rank 1-Critically Imperiled, 2-Imperiled, 3-Vulnerable, 4-Apparently Secure, 5-Secure

Range in S-Rank (i.e. Monarch) indicates uncertainty.

Since, the Burnley Creek NHA is a very lightly used property with very little disturbance, it is an ideal habitat area for hundreds of species. Habitat loss and fragmentation throughout Ontario is one of the largest threats to species at risk. By preserving the habitat at Burnley Creek NHA, and establishing corridors with surrounding properties, LTC is aiding in the survival of these species at risk.

### 3.14. AQUATIC BIOLOGY

#### Benthics

Benthic samples have been collected from a site immediately downstream of the Burnley Creek NHA (BMC07). Since certain species are intolerant of certain conditions, the presence or absence of aquatic invertebrates can be indicative of stream health. Samples have been collected on an annual basis from 2003-2010. Each collected sample has been analyzed to identify the species richness and the health of the watercourse. BMC07 and additional benthic sites throughout the Burnley Creek watershed can be seen on Figure 7.

The Simpson's Index is a measure of species richness. A value of 0 would represent zero diversity, while values closer to one are indicative of high diversity. The average diversity value (Simpson's Index) for BMC07 for the past 5 years is 0.31 with an upward trend from year to year. This suggests that the diversity within Burnley Creek in this area is increasing. Also, the

average Simpson's Index from 2003-2009 among all 43 monitoring locations is 0.25. So relative to the other sites monitored by LTC, BMC07 has above average diversity.

The Hilsenhoff Index uses the presence of certain species to assess the overall quality of the watercourse. A value of 0 indicates no apparent organic pollution whereas a value of 10 indicates severe organic pollution. The average Hilsenhoff Index value for BMC07 from 2003-2009 was 5.26 with a downward trend from year to year. This suggests that Burnley Creek has good water quality with some organic pollution (Hilsenhoff, 1988). However, the downward trend suggests that the water quality within Burnley Creek is improving.

### Fish

The data pertaining to the fish habitat within the Burnley Creek NHA is extremely limited. In 1989, fish habitat was assessed at seven points along Burnley Creek. The point closest to the Burnley Creek NHA was Site #5 located at Lot 2, Concession 9, formerly Haldimand Township. This site is only 2 lots downstream of the Burnley Creek NHA. This investigation identified the headwaters of Burnley Creek as a cold water stream of good quality; the upper reaches have somewhat suitable trout production, although it is reaching the upper limits of the trout's tolerance. Conversely, the lower portions of Burnley Creek are subject to sedimentation due to the cattle and dairy farms on the surrounding landscape. Based on this investigation, Site #5 is determined to be Highly Sensitive to Disturbance, while Site #6 was identified as being Moderately Sensitive to Disturbance. Table 3 outlines the findings of this assessment for Site #5 and Site #6.

Table 3: Burnley Creek Fish Habitat Conditions

| Site #  | Fish Species Collected                                      | Bank Stability | Bottom Substrate              | Stream Cover |
|---|---|----------------|-------------------------------|--------------|
| 5<br>Lot 2/Con 9<br>Haldimand Twp.                    | Brook Trout (MS)<br>Suckers (T)<br>Minnows (T)<br>Rock Bass | 100% stable    | Rubble, gravel,<br>silt, sand | 50% open     |
| 6<br>Upstream of #5<br>Lot 19/Con 8<br>Haldimand Twp. | Suckers (T)<br>Minnows (T)                                  | 80% stable     | Muck, detritus,<br>sand, silt | 80% open     |

MS-Moderate Sensitivity T-Tolerant

## **4. RECOMMENDATIONS**

Recommendations for the Burnley Creek NHA have been divided into three categories: policy, naturalization and wildlife habitat protection, and natural heritage linkages.

### **4.1. POLICY**

The Conservation Lands Strategy (1995) identifies Priority A Natural Habitat Areas as low use areas to provide for the long-term protection of natural areas and ensure healthy watersheds



for the enjoyment of present and future generations. This property is open to the public; however, public use is not promoted. Permitted and prohibited uses that support the long-term preservation of the natural values of the property are provided below.

**4.1.1. PERMITTED ACTIVITIES**

- Wildlife viewing and nature appreciation
- Nature photography

**4.1.2. PROHIBITED ACTIVITIES**

Activities that have the potential to disturb or alter the natural heritage features and functions of the property are prohibited. Specific prohibited activities are outlined in the Conservation Areas Regulation (R.R.O. 1990, Regulation 116) established under the *Conservation Authorities Act*.

**RECOMMENDATIONS**

1. Maintain Burnley Creek NHA in its natural state with no trails/facilities
2. Signage will be minimized to avoid promotion of the area for public use

**4.2. NATURALIZATION AND WILDLIFE HABITAT PROTECTION**

The Burnley Creek NHA is a regionally and provincially significant property with a diversity of ecological communities and species and linkages to nearby natural areas. Protection of natural habitats and linkages has long been recognized as important to allow species to migrate. Given the potential impacts of climate change, this is even more critical to support adaption to evolving ecological settings. The following recommendations have been developed to this end:

**RECOMMENDATIONS**

3. Continue to monitor wildlife and vegetation to detect changes in species diversity and abundance (specifically 'Species at Risk'). Databases and the appendix will be updated accordingly.
4. Continue to monitor baseflow and benthics in order to track changes in water resources and stream health
5. Research fish habitat and species present within the Burnley Creek NHA and update the fish database.
6. Monitor for, and remove, invasive species as appropriate
7. Adopt a "leave it alone" philosophy.

**4.3. NATURAL HERITAGE LINKAGES**

Since habitat loss and fragmentation are some of the leading threats to Ontario's wildlife, establishing healthy connected forests is essential in the conservation of many species. There are numerous protected forests in the vicinity of the Burnley Creek NHA, however these forests are still fragmented.

### **RECOMMENDATIONS**

8. Consider acquisition of lands surrounding the Burnley Creek NHA when opportunities arise in order to promote connectivity of these forests and other natural habitats.
9. Communicate with local landowners and reinforce the importance of the conservation of these sensitive natural features.

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## **APPENDIX A: SPECIES LIST**



## Vascular Plants

|  |                                       |
|--|---------------------------------------|
| <i>Abies balsamea</i> (L.) Mill          | Balsam Fir                            |
| <i>Acer negundo</i> L.                   | Manitoba Maple                        |
| <i>Acer rubrum</i> L.                    | Red Maple                             |
| <i>Acer saccharum</i> Marsh.             | Sugar Maple                           |
| <i>Alnus incana</i> spp. <i>Rugosa</i>   | Speckled Alder                        |
| <i>Amelanchier arborea</i> (Michx. F)    | Downy Serviceberry                    |
| <i>Arisaema atrorubens</i>               | Jack-in-the-Pulpit                    |
| <i>Asarum canadense</i>                  | Wild Ginger                           |
| <i>Betula alleghaniensis</i> Britt.      | Yellow Birch                          |
| <i>Betula papyrifera</i> Marsh.          | White Birch                           |
| <i>Caltha palustris</i>                  | Marsh Marigold or Cowslip             |
| <i>Carex</i> spp                         | Sedges                                |
| <i>Cicuta maculate</i>                   | Water Hemlock                         |
| <i>Cornus rugosa</i>                     | Round-leaved Dogwood                  |
| <i>Cornus stolonifera</i>                | Red-Osier Dogwood                     |
| <i>Erthronium americanum</i>             | Dogtooth Violet or Trout Lily         |
| <i>Eupatorium maculatum</i>              | Spotted Joe-Pye Weed                  |
| <i>Eupatorium perfoliatum</i>            | Boneset                               |
| <i>Fagus grandifolia</i> Ehrh.           | American Beech                        |
| <i>Fraxinus americana</i> L.             | White Ash                             |
| <i>Fraxinus nigra</i> Marsh.             | Black Ash                             |
| <i>Gentiana andrewsii</i>                | Closed Gentian                        |
| <i>Iris versicolor</i>                   | Blue Flag Iris                        |
| <i>Larix laricina</i> (Du Roi) K. Koch   | Tamarack                              |
| <i>Lobelia cardinalis</i>                | Cardinal Flower                       |
| <i>Nuphar variegatum</i>                 | Bullhead Lily of Yellow Pond Lily     |
| <i>Nymphaea odorata</i>                  | Fragrant or Fragrant White Water Lily |
| <i>Ostrya virginiana</i> (Mill.) K. Koch | Ironwood                              |
| <i>Parnassia glauca</i>                  | Grass of Parnassus                    |
| <i>Physostegia virginiana</i>            | Obedient Plant or False Dragonhead    |
| <i>Picea glauca</i> (Moench) Voss        | White Spruce                          |
| <i>Picea marina</i> (Mill.) BSP          | Black Spruce                          |
| <i>Pinus resinosa</i> Ait.               | Red Pine                              |
| <i>Pinus strobus</i> L.                  | White Pine                            |
| <i>Podophyllum peltatum</i>              | May-Apple                             |
| <i>Polygonatum bulflorum</i>             | Smooth Solomon's Seal                 |
| <i>Pontedaria cordata</i>                | Pickrelweed                           |
| <i>Populus balsamifera</i> L.            | Balsam Poplar                         |
| <i>Populus grandidentata</i> Michx.      | Largetooth Aspen                      |
| <i>Populus tremuloides</i> Michx.        | Trembling Aspen                       |
| <i>Prunus pensylvanica</i> L.f.          | Pin Cherry                            |

|  |                                  |
|--|----------------------------------|
| <i>Prunus virginiana</i> L. var. <i>virginiana</i> | Chokecherry                      |
| <i>Quercus alba</i> L.                             | White Oak                        |
| <i>Quercus rubra</i> L.                            | Red Oak                          |
| <i>Ribes</i> spp.                                  | Gooseberries and currants        |
| <i>Rubus</i> spp.                                  | Brambles/raspberries             |
| <i>Sagittaria latifolia</i>                        | Arrowhead                        |
| <i>Salix discolor</i> Muhl.                        | Pussy Willow                     |
| <i>Scirpus</i> spp.                                | Bullrush                         |
| <i>Sparganium americanum</i>                       | Bur Reed                         |
| <i>Sumbucus canadensis</i>                         | Canada Elderberry                |
| <i>Thuja occidentalis</i> L.                       | Eastern White Cedar              |
| <i>Tilia americana</i> L.                          | Basswood                         |
| <i>Tilia cordata</i> Mill.                         | Small-leaf Linden                |
| <i>Trillium erectum</i>                            | Red or Purple Trillium           |
| <i>Trillium grandiflorum</i>                       | Large-Flowered or White Trillium |
| <i>Tsuga Canadensis</i> (L.)                       | Hemlock                          |
| <i>Typha latifolia</i>                             | Cattail                          |
| <i>Ulmus americana</i> L.                          | American Elm                     |
| <i>Viburnum acerfolium</i>                         | Maple-leaved Viburnum            |
| <i>Viburnum trilobum</i> Marsh.                    | Highbush Cranberry               |
| <i>Zizania aquatic</i>                             | Wild Rice                        |

## Birds

|                              |                           |
|------------------------------|---------------------------|
| <i>Actitis macularia</i>     | Spotted Sandpiper         |
| <i>Agelaius phoeniceus</i>   | Red-winged Blackbird      |
| <i>Aix sponsa</i>            | Wood Duck                 |
| <i>Ammodramus savannarum</i> | Grasshopper Sparrow       |
| <i>Anas platyrhynchos</i>    | Mallard                   |
| <i>Archilochus colubris</i>  | Ruby-throated Hummingbird |
| <i>Ardea herodias</i>        | Great Blue Heron          |
| <i>Bombycilla cedrorum</i>   | Cedar Waxwing             |
| <i>Bonasa umbellus</i>       | Ruffed Grouse             |
| <i>Branta Canadensis</i>     | Canada Goose              |
| <i>Buteo lineatus</i>        | Red-shouldered Hawk       |
| <i>Buteo platypterus</i>     | Broad-winged Hawk         |
| <i>Buteo jamaicensis</i>     | Red-tailed Hawk           |
| <i>Butorides virescens</i>   | Green Heron               |
| <i>Caprimulgus vociferus</i> | Whip-poor-will            |
| <i>Cardinalis cardinalis</i> | Northern Cardinal         |
| <i>Carduelis tristis</i>     | American Goldfinch        |
| <i>Carpodacus purpureus</i>  | Purple Finch              |
| <i>Cathartes aura</i>        | Turkey Vulture            |
| <i>Catharus fuscescens</i>   | Veery                     |

|                                  |                              |
|----------------------------------|------------------------------|
| <i>Catharus guttatus</i>         | Hermit Thrush                |
| <i>Certhia americana</i>         | Brown Creeper                |
| <i>Ceryle alcyon</i>             | Belted Kingfisher            |
| <i>Charadrius vociferous</i>     | Killdeer                     |
| <i>Circus cyaneus</i>            | Northern Harrier             |
| <i>Coccyzus erythrophthalmus</i> | Black-billed Cuckoo          |
| <i>Colaptes auratus</i>          | Northern Flicker             |
| <i>Columba livia</i>             | Rock Pigeon Introduced       |
| <i>Contopus virens</i>           | Eastern Wood-Pewee           |
| <i>Corvus brachyrhynchos</i>     | American Crow                |
| <i>Corvus corax</i>              | Common Raven                 |
| <i>Cyanocitta cristata</i>       | Blue Jay                     |
| <i>Dendroica caerulescens</i>    | Black-throated Blue Warbler  |
| <i>Dendroica cerulea</i>         | Cerulean Warbler             |
| <i>Dendroica coronata</i>        | Yellow-rumped Warbler        |
| <i>Dendroica fusca</i>           | Blackburnian Warbler         |
| <i>Dendroica magnolia</i>        | Magnolia Warbler             |
| <i>Dendroica pensylvanica</i>    | Chestnut-sided Warbler       |
| <i>Dendroica petechia</i>        | Yellow Warbler               |
| <i>Dendroica pinus</i>           | Pine Warbler                 |
| <i>Dendroica striata</i>         | Blackpoll Warbler            |
| <i>Dendroica virens</i>          | Black-throated Green Warbler |
| <i>Dolichonyx oryzivorus</i>     | Bobolink                     |
| <i>Dryocopus pileatus</i>        | Pileated Woodpecker          |
| <i>Dumetella carolinensis</i>    | Gray Catbird                 |
| <i>Empidonax alnorum</i>         | Alder Flycatcher             |
| <i>Empidonax flaviventris</i>    | Yellow-bellied Flycatcher    |
| <i>Falco sparverius</i>          | American Kestrel             |
| <i>Geothlypis trichas</i>        | Common Yellowthroat          |
| <i>Hirundo rustica</i>           | Barn Swallow                 |
| <i>Hydroprogne caspia</i>        | Caspian Tern                 |
| <i>Hylocichla mustelina</i>      | Wood Thrush                  |
| <i>Icterus galbula</i>           | Baltimore Oriole             |
| <i>Larus delawarensis</i>        | Ring-billed Gull             |
| <i>Megascops asio</i>            | Eastern Screech Owl          |
| <i>Meleagris gallopavo</i>       | Wild Turkey                  |
| <i>Melospiza georgiana</i>       | Swamp Sparrow                |
| <i>Melospiza melodia</i>         | Song Sparrow                 |
| <i>Mniotilta varia</i>           | Black-and-white Warbler      |
| <i>Molothrus ater</i>            | Brown-headed Cowbird         |
| <i>Myiarchus crinitus</i>        | Great Crested Flycatcher     |
| <i>Oporonis philadelphia</i>     | Mourning Warbler             |
| <i>Pandion haliaetus</i>         | Osprey                       |
| <i>Parula americana</i>          | Northern Parula              |

|                                  |                              |
|----------------------------------|------------------------------|
| <i>Passer domesticus</i>         | House Sparrow Introduced     |
| <i>Passerculus sandwichensis</i> | Savannah Sparrow             |
| <i>Passerina cyanea</i>          | Indigo Bunting               |
| <i>Pheucticus ludovicianus</i>   | Rose-breasted Grosbeak       |
| <i>Picoides pubescens</i>        | Downy Woodpecker             |
| <i>Picoides villosus</i>         | Hairy Woodpecker             |
| <i>Pipilo erythrophthalmus</i>   | Eastern Towhee               |
| <i>Piranga olivacea</i>          | Scarlet Tanager              |
| <i>Poecile atricapilla</i>       | Black-capped Chickadee       |
| <i>Pooecetes gramineus</i>       | Vesper Sparrow               |
| <i>Progne subis</i>              | Purple Martin                |
| <i>Quiscalus quiscula</i>        | Common Grackle               |
| <i>Regulus calendula</i>         | Ruby-crowned Kinglet         |
| <i>Regulus satrapa</i>           | Golden-crowned Kinglet       |
| <i>Sayornis phoebe</i>           | Eastern Phoebe               |
| <i>Scolopax minor</i>            | American Woodcock            |
| <i>Seiurus aurocapillus</i>      | Ovenbird                     |
| <i>Seiurus motacilla</i>         | Louisiana Waterthrush        |
| <i>Seiurus noveboracensis</i>    | Northern Waterthrush         |
| <i>Setophaga ruticilla</i>       | American Redstart            |
| <i>Sialia sialis</i>             | Eastern Bluebird             |
| <i>Sitta canadensis</i>          | Red-breasted Nuthatch        |
| <i>Sitta carolinensis</i>        | White-breasted Nuthatch      |
| <i>Sphyrapicus varius</i>        | Yellow-bellied Sapsucker     |
| <i>Spizella passerina</i>        | Chipping Sparrow             |
| <i>Spizella pusilla</i>          | Field Sparrow                |
| <i>Strix varia</i>               | Barred Owl                   |
| <i>Sturnella magna</i>           | Eastern Meadowlark           |
| <i>Sturnus vulgaris</i>          | European Starling Introduced |
| <i>Tachycineta bicolor</i>       | Tree Swallow                 |
| <i>Troglodytes aedon</i>         | House Wren                   |
| <i>Troglodytes troglodytes</i>   | Winter Wren                  |
| <i>Turdus migratorius</i>        | American Robin               |
| <i>Tyrannus tyrannus</i>         | Eastern Kingbird             |
| <i>Vermivora pinus</i>           | Blue-winged Warbler          |
| <i>Vermivora ruficapilla</i>     | Nashville Warbler            |
| <i>Vireo gilvus</i>              | Warbling Vireo               |
| <i>Vireo olivaceus</i>           | Red-eyed Vireo               |
| <i>Vireo solitarius</i>          | Blue-headed Vireo            |
| <i>Wilsonia canadensis</i>       | Canada Warbler               |
| <i>Wilsonia citrina</i>          | Hooded Warbler               |
| <i>Wilsonia pusilla</i>          | Wilson's Warbler             |
| <i>Zenaida macroura</i>          | Mourning Dove                |
| <i>Zonotrichia albicollis</i>    | White-throated Sparrow       |

## Fish

|                              |             |
|------------------------------|-------------|
| <i>Ambloplites rupestris</i> | Rock Bass   |
| <i>Catostomidae</i>          | Suckers     |
| <i>Cyprinidae</i>            | Minnows     |
| <i>Salvelinus fontinalis</i> | Brook Trout |

## Aquatic Invertebrates

|                      |                      |
|----------------------|----------------------|
| <i>Oligochaeta</i>   | Segmented Worms      |
| <i>Hirudinea</i>     | Leeches              |
| <i>Isopoda</i>       | Aquatic Sowbugs      |
| <i>Pelecypoda</i>    | Clams                |
| <i>Amphipoda</i>     | Scuds                |
| <i>Decapoda</i>      | Crayfish             |
| <i>Acarina</i>       | Water Mites          |
| <i>Ephemeroptera</i> | Mayflies             |
| <i>Anisoptera</i>    | Dragonflies          |
| <i>Zygoptera</i>     | Damselflies          |
| <i>Plecoptera</i>    | Stoneflies           |
| <i>Hemiptera</i>     | True Bugs            |
| <i>Megaloptera</i>   | Helgrammites         |
| <i>Trichoptera</i>   | Caddisflies          |
| <i>Lepidoptera</i>   | Aquatic Moths        |
| <i>Coleoptera</i>    | Beetles              |
| <i>Gastropoda</i>    | Snails               |
| <i>Chironomidae</i>  | Blood Worms          |
| <i>Tabanidae</i>     | Horse and Deer Flies |

## Amphibians and Reptiles

|                            |                        |
|----------------------------|------------------------|
| <i>Bufo americanus</i>     | American Toad          |
| <i>Chelydra serpentina</i> | Common Snapping Turtle |
| <i>Chrysemys picta</i>     | Midland Painted Turtle |
| <i>Hyla versicolor</i>     | Gray Treefrog          |
| <i>Plethodon cinereus</i>  | Red-backed Salamander  |
| <i>Pseudacris crucifer</i> | Spring Peeper          |
| <i>Rana catesbeiana</i>    | Bullfrog               |
| <i>Rana clamitans</i>      | Green Frog             |
| <i>Rana pipiens</i>        | Northern Leopard Frog  |
| <i>Rana sylvatica</i>      | Wood Frog              |
| <i>Thamnophis sirtalis</i> | Eastern Garter Snake   |



## Insects

|                                  |                                     |
|----------------------------------|-------------------------------------|
| <i>Actias luna</i>               | Luna Moth                           |
| <i>Artogia rapae</i>             | Cabbage White                       |
| <i>Basilarchia archippus</i>     | Viceroy                             |
| <i>Basilarchia arthemis</i>      | White Admiral or Banded Purple      |
| <i>Catocala relict</i>           | White Underwing                     |
| <i>Chalceria heteronea</i>       | Blue Copper                         |
| <i>Colias philodice</i>          | Common Sulphur or Clouded Sulphur   |
| <i>Colias eurytheme</i>          | Orange Sulphur or Alfalfa Butterfly |
| <i>Danaus plexippus</i>          | Monarch                             |
| <i>Icaricia icarioides</i>       | Common Blue                         |
| <i>Nymphalis antiopa</i>         | Mourning Cloak                      |
| <i>Papioio Canadensis</i>        | Canadian Tiger Swallowtail          |
| <i>Polygonia comma</i>           | Comma                               |
| <i>Polygonia interrogationis</i> | Question Mark                       |
| <i>Pterourus glaucus</i>         | Tiger Swallowtail                   |
| <i>Satyrodes Appalachia</i>      | Appalachian Brown                   |
| <i>Satyrodes Eurydice</i>        | Eyed Brown                          |
| <i>Sphinx Canadensis</i>         | Canadian Sphinx Moth                |
| <i>Vanessa cardui</i>            | Painted Lady                        |

## Mammals

|                                |                       |
|--------------------------------|-----------------------|
| <i>Canis latrans</i>           | Coyote                |
| <i>Castor canadensis</i>       | Beaver                |
| <i>Odocoileus virginianus</i>  | White-tailed Deer     |
| <i>Ondatra zibethicus</i>      | Muskrat               |
| <i>Procyon lotor</i>           | Raccoon               |
| <i>Sciurus carolinensis</i>    | Eastern Gray Squirrel |
| <i>Tamias striatus</i>         | Eastern Chipmunk      |
| <i>Tamiasciurus hudsonicus</i> | Red Squirrel          |
| <i>Ursus americanus</i>        | Black Bear            |
| <i>Vulpes vulpes</i>           | Red Fox               |
| <i>Zapus hudsonius</i>         | Meadow Jumping Mouse  |