

**LIFE SCIENCE INVENTORY  
OF  
COPELAND FOREST  
RESOURCE MANAGEMENT AREA  
SIMCOE COUNTY, ONTARIO**



Prepared for  
Couchiching Conservancy  
by

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## TABLE OF CONTENTS

1.0 BACKGROUND	1
2.0 REASON FOR THIS STUDY AND OBJECTIVES	1
3.0 METHODS	2
3.1 Fauna	2
3.2 Flora	3
3.3 Other Features	4
3.4 Data Compilation, Analysis, and Mapping	4
4.0 RESULTS	4
4.1 Species of Conservation Concern—Fauna	5
4.2 Species of Conservation Concern—Flora	14
4.3 Fauna Breeding and Wintering Habitats	18
4.4 Species Not Found or Breeding Not Confirmed	18
4.5 Vegetation	19
4.6 Areas with High Diversity of Plant Species	27
4.7 Invasive Species	29
4.8 Other Values	30
4.9 Historical Features	31
4.10 Recreational and Other Human Uses	34
4.11 Disturbance	37
5.0 DISCUSSION	37
5.1 Historic and potential species—fauna	37
5.2 Historic species—flora	39
6.0 REPRESENTATION AND EVALUATION OF ANSI STATUS	42
7.0 CONCLUSIONS	43
7.1 Recommendations—Protection of Sensitive Species and Wildlife Values	43
7.2 Recommendations—Human Safety	44
7.3 Recommendations—Additional Information and Research	44
7.4 Recommendations—Future Work	37
8.0 REFERENCES	46
APPENDIX A: BIRD SPECIES OBSERVED	49
APPENDIX B: MAMMAL SPECIES OBSERVED	52
APPENDIX C: AMPHIBIAN AND REPTILE SPECIES OBSERVED	53
APPENDIX D: FISH SPECIES AND BENTHIC TAXA OBSERVED	54
APPENDIX E: INCIDENTAL FAUNA OBSERVED	55
APPENDIX F: VASCULAR PLANT SPECIES OBSERVED	56
APPENDIX G: LIFE SCIENCE CHECKSHEET	65
APPENDIX H: PHOTOS OF FEATURES FOUND IN 2011	70
<b>TABLE OF FIGURES</b>	
Figure 1. Location of Eastern Pondmussels	7
Figure 2. Locations where Olive-sided Flycatchers were heard	9
Figure 3. Locations where Yellow Rails were heard	10
Figure 4. Locations where Snapping Turtle and Milksnake were observed	12
Figure 5. Locations where Monarch Butterfly larvae were observed	13
Figure 6. Locations where Butternut seedlings were observed	15
Figure 7. Locations where Swamp Valerian and Schweinitz's Sedge were observed	17
Figure 8. Woodland quality and presence of spring ephemerals in uplands	23
Figure 9. Areas of exceptionally high plant species diversity	28
Figure 10. Locations of seeps	32
Figure 11. Anthropogenic features present	33

**LIST OF TABLES**

Table 1. Work dates and type of work accomplished at Copeland Forest in 2011	2
Table 2. Faunal species of conservation concern	5
Table 3. Plant species of conservation concern	14
Table 4. A summary of generalized vegetation cover	19
Table 5. Vegetation community types with numbers of hectares (ha) of each type	20
Table 6. A comparison of fauna found 32 years ago with those found in 2011	37

## **1.0 BACKGROUND**

Copeland Forest is a large tract of land located approximately 25 km north of Barrie, Ontario near the village of Craighurst. Situated at the edge of the Oro Moraine, the tract's 1760 hectares contain steep wooded hillsides and level sandy plains shaded by deciduous trees, sandy former farm fields now covered with mature conifer plantations, and a large complex of wetlands that includes swamps, marshes, stream corridors, and thickets. The wetland is the headwaters of three major river systems—the Coldwater River, the Sturgeon River, and North Willow Creek.

There is a long history of human use at Copeland Forest, probably including use by the Wendat (or Huron) prior to the time of European contact (Heidenreich 1963; Bobbette and Webber 1979). During settlement times, some portions were cleared and were farmed for many years. During the 1950s there was a sawmill operation present (Drysdale pers. comm. to Jones 2011) at the location of the former community of Martinville. The land was purchased by the Province of Ontario in 1978-1979 (Bobbette and Webber 1979). Copeland Forest has been used for decades for recreation, including hunting, camping, hiking, nature appreciation, harvesting of wild plants, and other activities. More recently, the list also includes mountain biking, horseback riding, and cross-country skiing. As well, there is a 7 km active railway corridor running roughly east-west through Copeland Forest.

A previous botanical study of Copeland Forest (Bobbette and Webber 1979) found the site to be very diverse, with more than 600 species of vascular plants and more than 20 types of vegetation. Copeland Forest is recognized as a regionally significant Area of Natural and Scientific Interest (ANSI) within Ecodistrict 6E-6 for its representation of swamps and for the headwaters of the Coldwater and Sturgeon Rivers (Hanna 1984).

The landscape immediately surrounding Copeland Forest's boundaries today includes commercial downhill ski areas, golf courses, and new residential subdivisions, as well as farms and county forest tracts. The increase in development in Simcoe County, and the proximity of Copeland Forest to Toronto and to Barrie, one of the fastest growing municipalities in Canada (Statistics Canada 2006), are resulting in increased recreational use of Copeland Forest.

## **2.0 REASON FOR THIS STUDY AND OBJECTIVES**

Recognizing that there may be differing needs among users of Copeland Forest (for example between hunting and biking, or between biking and bird watching), and recognizing that increased usage may have impacts on natural features and sensitive species, the Ontario Ministry of Natural Resources (OMNR) in partnership with the Couchiching Conservancy, a private land trust from Orillia, Ontario, began discussing needs and uses with local stakeholders. From these discussions, it was recognized that there was a need to identify sensitive areas and species that might need protective management measures in order to effectively address resource options and land management issues. This report details the results from a four-season life science inventory of Copeland Forest. The information provided here is intended to provide input to support management strategies for the property.

Therefore, the objectives set out for this study were to:

- update the mapping of vegetation using the Ontario Ecological Land Classification (Lee et al. 1998) and georeferenced by GPS;
- provide information on the presence and location of any sensitive species and its habitat, as well as any sensitive vegetation;

- reconfirm or reassess ANSI potential of Copeland Forest based on current representation within Ecodistrict 6E-6;
- attempt to see if change is detectable since earlier studies;
- look at future management needs and identify priority areas for protective management if necessary.

### 3.0 METHODS

Field work by Judith Jones (J2) and John Morton (JM) began April 25, 2011 and finished January 4, 2012. Table 1 shows the work accomplished by date.

Table 1. Work dates and type of work accomplished at Copeland Forest in 2011.

2011 DATE	Person	Focus of Work
April 25	JM	Early breeding birds; amphibian breeding, herpetiles, evening owls and bats
May 7	J2	Evening bird surveys; early breeding birds; amphibian breeding;
May 10-11	J2	Evening bird surveys; early breeding birds; spring ephemeral vegetation; amphibian breeding;
May 17-18-19	J2	Upland forest vegetation survey; woodland quality and spring ephemerals
May 23-24-25	J2	Breeding bird surveys; upland forest vegetation survey; woodland quality and spring ephemerals
May 27-28	J2	Evening bird survey; breeding bird survey
June 8-9-10	JM	Herpetiles, evening birds, breeding birds, general fauna
June 20-21	J2	Breeding bird surveys; wetland vegetation and species
June 26-27	JM J2	Herpetiles, evening & breeding birds (JM) Breeding birds; wetland vegetation & species (J2)
July 18	JM & J2	Aquatic habitats by canoe (JM&J2) targeted search for Ginseng in fruit (J2)
July 25-26-27	JM	Breeding birds, evening birds, herpetiles
August 4-5	J2	Wetland vegetation and summer species
August 25-26	JM	Benthic macro invertebrate surveys; general fauna and herpetiles
September 14-15	JM	Summer fauna
September 21	J2	Targeted search for Forked Three-awned Grass and fall species
October 27	J2	Assessment and mapping of plantations
November 4	J2	Final search for Butternut plantation
January 4	JM & J2	Winter Fauna usage

Initial habitat scoping was done from satellite imagery and from an initial reconnaissance site visit to determine what species could potentially be present and where. All observations of both fauna and flora were georeferenced using hand-held GPS units with accuracy of 10 m or less. In a small number of instances, faunal locations were plotted by hand onto satellite imagery.

### 3.1 Fauna

From scoping, fauna were sought in appropriate habitat locations by both targeted surveys and random coverage. For amphibians, potential breeding habitat was surveyed by searching for egg masses and parent species in and near vernal pools in upland forest. Evening surveys of calling amphibians were made at 22 stations in wetlands and in upland pond and pool habitats. For herpetofauna, potential habitat was surveyed on sunny days by searching stone piles and sunny

glades for basking individuals and by checking under suitable cover such as logs or other debris. For reptiles, basking individuals were searched for using binoculars at all accessible ponds and at many interior points. Locations for all evening amphibian surveys have been compiled and submitted as a separate spreadsheet.

Evening bird surveys were done starting at dusk and continuing after dark. Calls were played and a response awaited in suitable habitat for Whippoorwill and common owl species. Open areas were searched and observed for Common Nighthawk and other night-displaying species. Calls for woodpeckers and hawks were also played and a response awaited over the entire western half of the main route from the 3rd Line, as well as on the main trails west of the entrance for Horseshoe Valley Road. Breeding bird surveys were done as point counts at 72 locations following protocols in the Ontario Breeding Bird Atlas (2001) with the intent to survey all habitat types, covering as much of the land base as possible, and to target suitable habitat for species at risk, including Least Bittern, Olive-sided Flycatcher, Yellow Rail, Red-headed Woodpecker, Bobolink, and forest interior species. Most points were surveyed more than once on different dates. All species calling or observed and the numbers of individuals present were tallied in 10 minute intervals. The highest level of breeding evidence for each species was recorded. Incidental observations of birds were also recorded during work on other groups. Locations for point counts have been compiled and submitted as a separate spreadsheet.

For summer fauna, random suitable habitats were checked including along interior beaver ponds, stream channels, stone piles, and along the railway tracks. Fish were surveyed incidentally while canoeing in the pond, walking stream channel banks, and while checking for other aquatic groups. Benthic macro invertebrates were surveyed at 6 locations that had suitable stream bottom substrates. Two samples were made at each location. Survey methodology followed the OMNR "Kick and Sweep" protocol for the assessment of water quality (OMNR 1997) for 1 metre square of stream bottom coverage per sample. Freshwater mussel survey methodology utilized glass bottom viewing boxes, long handled scoops and sieves in accordance with federal protocol detection techniques (Department of Fisheries and Oceans 2008). For all faunal groups, incidental sightings were also recorded.

### **3.2 Flora**

Vegetation communities of more than 0.5 ha were documented in layers as percent cover of trees, shrubs, herbs, and non-vascular plants. Classification follows the Ecological Land Classification for Southern Ontario (ELC) (Lee et al 1998) with additional types for naturalized plantations and cultural meadows from the Vegetation Sampling Protocol (SSIS 2011). Complete lists of vascular plants were compiled during vegetation sampling. In addition, vascular plant species were surveyed in as many habitats as possible by targeting all of the different signatures on satellite imagery and then visiting them on the ground. Nomenclature follows FOIBIS (2008). For any rare or at-risk species encountered (as determined by COSEWIC 2012, NHIC 2012, or Oldham and Brinker 2009) locations were mapped and abundance was estimated or counted where feasible. Where population size permitted, a voucher specimen was collected. Specimens have been deposited with the National Collection of Vascular Plants (the herbarium of Agriculture Canada—DAO). Lists of non-vascular plants were not compiled. Soils were sampled for ELC documentation using a 40 cm soil tube and at selected upland sites using a 1 m soil auger.

Woodland quality and spring ephemerals were surveyed using an informal index created by the authors. At each upland deciduous forest location surveyed, a point was scored for each of the following characteristics if present:

Larger or older trees  
Multi-aged stand  
Species richness of the forest floor  
Presence of pits and hummocks on the forest floor  
Greater percentage of forest floor covered by spring ephemeral species than by maple seedlings  
Presence of species that are less common within Copeland Forest, such as Toothwort (*Cardamine diphylla*), Jack-in-the-Pulpit (*Arisaema triphyllum*), Maidenhair Fern (*Adiantum pedatum*), etc.

In addition, a -1 score was given for the presence of beech bark disease, non-native species, or other disturbance. A -1 score was also given if the forest floor had more area covered with maple seedlings or other regeneration than with other forest floor species during mid-May. One additional point was assigned for any exceptional condition, such as an exceptional number of ground flora species or exceptionally large trees. Forest stands scoring the highest were ranked A, and those with lesser scores in these categories were scored AB, B<sup>+</sup>, B, B<sup>-</sup>, or C.

Exceptionally rich areas identified during the above process were also revisited and searched for Ginseng (*Panax quinquefolia*—endangered) in August during its fruiting period. Open, sandy habitat suitable for Forked Three-awned Grass (*Aristida basiramea*—endangered) was identified during summer surveys, and a search was made of suitable habitats during the September bloom period of this annual grass. In addition, a search of several areas was made for a reported plantation of Butternut (*Juglans cinerea*—endangered). Butternut locations provided by OMNR (Robinson, pers. comm. to Jones 2011) were searched on three occasions.

### 3.3 Other Features

Anthropogenic features present, such as building foundations, old structures, and evidence of former or current usage, were documented and georeferenced. Areas of man-made disturbance and the presence of invasive plant species were also documented and georeferenced when encountered. Digital photos were taken of most features.

### 3.4 Data Compilation, Analysis, and Mapping

Raw data were compiled from field notes into Excel spreadsheets and have been submitted separately to OMNR and the Couchiching Conservancy. Digital mapping of vegetation and of rare species and habitats as shapefiles using ArcGIS and as .pdf files has also been submitted separately.

## 4.0 RESULTS

All data presented in this study are the result of field observations by Judith Jones and John Morton, unless otherwise specified. Species that were sought and not found this year that could still become present in future years if suitable habitat exists. Some species not observed in 2011 could still be present. However, every effort has been made to ensure that all habitat types were surveyed, with emphasis on those that potentially could support sensitive species, and as much of the property as possible was visited. In 2011, the following were observed and documented:

- 448 vascular plant species
- 104 bird species (52 possibly breeding; 24 probably breeding, 18 confirmed as breeding)
- 24 mammal species
- 13 benthic invertebrate taxa
- 11 amphibian species (2 salamander/newt; 9 frogs)

- 9 reptile species (7 snakes, 2 turtles)
- 6 fish species
- 1 mussel species
- 1 crayfish species
- 22 insects, incidentally observed (butterflies, dragonflies, damselflies)
- 1 millipede species
- 49 vegetation communities (including plantations) at 120 data points

Complete lists of all species present at Copeland Forest are presented in appendices as follows:

Birds	Appendix A
Mammals	Appendix B
Amphibians and reptiles	Appendix C
Fish and benthic species	Appendix D
Incidental observations (insects, etc.)	Appendix E
Vascular plants	Appendix F

A checklist summary is presented in Appendix G and digital photos in Appendix H. Fungi of Copeland Forest have been studied (Ironsides 2010) and a lichen survey is in progress in 2011.

#### 4.1 Species of Conservation Concern--Fauna

Rare and at-risk fauna observed in this study are listed in Table 2.

Table 2. Faunal species of conservation concern found at Copeland Forest in 2011. National at risk designations from COSEWIC 2012; provincial designations from OMNR 2012; global G rankings from NatureServe 2012; provincial S rankings from NHIC 2012; regional rarity is presumed from other designations.

		At-Risk Designation		Conservation Ranking <sup>1</sup>		
Common Name	Scientific Name	National	Provincial	Global	Provincial	Simcoe
<b>MUSSELS</b>						
Eastern Pondmussel	<i>Ligumia nasuta</i>	Endangered	Endangered	G4	S1	Rare
<b>BIRDS</b>						
Olive-Sided Flycatcher	<i>Contopus cooperi</i>	Threatened	Special Concern	G4	S4	Rare
Yellow Rail	<i>Coturnicops noveboracensis</i>	Special Concern	Special Concern	G4	S4	Rare
Bay-Breasted Warbler	<i>Setophaga castanea</i>	Not At Risk	Not At Risk	G5	S5	Rare
Red-Bellied Woodpecker	<i>Melanerpes carolinus</i>	Not At Risk	Not At Risk	G5	S4	Rare
<b>REPTILES</b>						
Milksnake	<i>Lampropeltis triangulum</i>	Special Concern	Special Concern	G5	S3	Rare
Snapping Turtle	<i>Chelydra serpentina</i>	Special Concern	Special Concern	G5	S3	Rare
<b>BUTTERFLIES</b>						
Monarch	<i>Danaus plexippus</i>	Special Concern	Special Concern	G5	S2 ,S4	Rare

<sup>1</sup> Rankings mean species is the following: 5—secure; 4—apparently secure but uncommon and possibly has some reason for concern long-term; 3—vulnerable, 2—imperiled, 1—critically imperiled.

Eastern Pondmussels (*Ligumia nasuta*) were found in one of the north central stream impoundment areas of the property (Figure 1). Future confirmation of the species identification will be required by appropriate Federal Fisheries and Oceans staff under a *Species at Risk Act* (SARA) collection authorization permit. However, the identification of the species present as the Eastern Pondmussel has a fairly high confidence level. Compared to the Eastern Elliptio (*Elliptio companata*), a similar species:

- Elliptio usually has a thick shell; shells present were thin
- Elliptio shell is usually rough; shells present were smooth
- Posterior end of shell was tapered, more like Pondmussel
- Beak sculpture contained the several-double-looped pattern of Pondmussel, not the U-shaped ridges of Elliptio
- One dead sample (found below water line) showed the nacre more silvery-white as per Pondmussels, not purple or rosy colour of Elliptio.

Approximately 150-200 individuals were observed in depths ranging from 10 cm to 80 cm with several small mussel beds scattered along the pond periphery. Another potential site exists at UTM 602790 4936600 (downstream of the DU pond outlet structure) where mussels were collected but were too small to be conclusively identified. Eastern Pondmussels were once the most common species of freshwater mussel in the lower Great Lakes prior to the invasion of the Zebra Mussel (*Dreissena polymorpha*).

According to COSEWIC (2012), Zebra Mussels have caused a tremendous decline in the Eastern Pondmussel, directly impacting 90% of former suitable habitat areas. There are now only two present known extant populations in Canada, meaning that finding this species at Copeland Forest could potentially be of national importance. No immediate threats to this population were evident, with the potential introduction of Zebra Mussels considered to be negligible given the watershed topography, little recreational boating/canoeing activity or baitfish harvesting. If any in-stream works, water level manipulations or road /culvert maintenance works are required protection plans for this population will be required with authorization of works through the Department of Fisheries and Oceans.

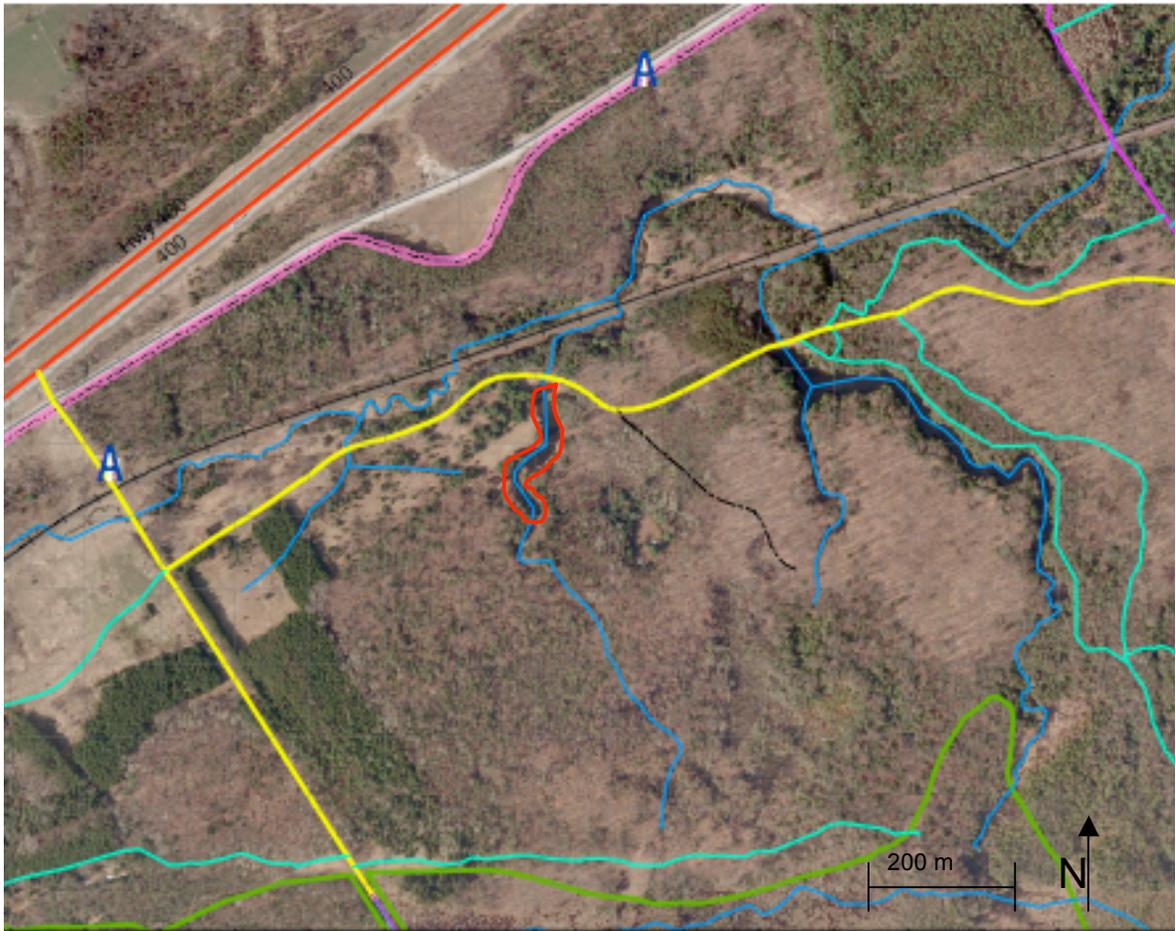


Figure 1. Location of Eastern Pondmussels at Copeland Forest in 2011 (red polygon). For orientation, left-hand **A** is the main parking lot at the 3rd Line off Ingram Road. Yellow lines and purple lines are main trails; turquoise lines are secondary trails.

Olive-sided Flycatchers (*Contopus cooperi*) were heard calling during four different point counts, in two different regions of Copeland Forest (Figure 2; photo 2). All observations were in large wetland areas during breeding season. The presence of the birds in suitable habitat during May and June, and at the same locations on more than one occasion, is a good indication that breeding is possible.

At Copeland Forest, this species was heard in large, open wetlands of cattails and alder or willow thickets, with standing dead trees and areas of ponded water. According to Cheskey (1987), Olive-sided Flycatchers in Ontario mostly nest in spruce or tamarack bogs, along the forested edges of beaver ponds and rivers, and in burned-over forests. Most nesting sites contain dead standing trees, which are used as singing and feeding perches. Nests are placed most often in conifers, on horizontal limbs 2-15 metres from the ground. There is some evidence that the species may display year-to-year fidelity to breeding sites (NatureServe 2012).

Based on this information, there appears to be a lot of suitable habitat in the wetlands at Copeland Forest. There were no threats to Olive-sided Flycatchers observed at Copeland Forest in 2011. However, a general closing-in of forest openings due to a lack of wildfire may be involved in the overall decline of this species (SARA Registry 2012). The general closing in of forests at Copeland Forest is discussed below in Section 5.2.

Yellow Rails (*Coturnicops noveboracensis*) were heard at two locations (Figure 3; Photo 3), both in suitable breeding habitat. One bird was heard during June from the railway tracks in thicket swamp with open patches of sedges. The other bird was heard in early August in the western-most part of the property at the back of an opening that is somewhat visible from the Penetanguishene Road. The habitat there is open sedge meadow mixed with cattails. According to NatureServe (2012), suitable habitat for Yellow Rails varies somewhat by region, but generally consists of grass or sedge marshes or wet meadows in freshwater situations. Some breeding territories within these habitats contain firm footing and only a few remnant pools of water, with the average depth used for nesting being 8 to 15 cm.

Based on this information, there are several areas of potentially suitable habitat, mainly in the interior of the wetland complex. However, as it is difficult to separate patches of short sedge meadow from areas of taller sedges or cattails on satellite imagery, it is not possible accurately say anything further about amount of habitat or specify likely locations without further surveys.

According to the SARA registry (2012) loss and degradation of wetlands due to agricultural and human development is the greatest threat to this species throughout its breeding range. No direct threats to Yellow Rails were observed in 2011, but natural succession of open habitat to shrub thicket or to dense cattail marsh, as a result of changes in water levels or lack of fire (Van der Valk 2006), may affect the species.

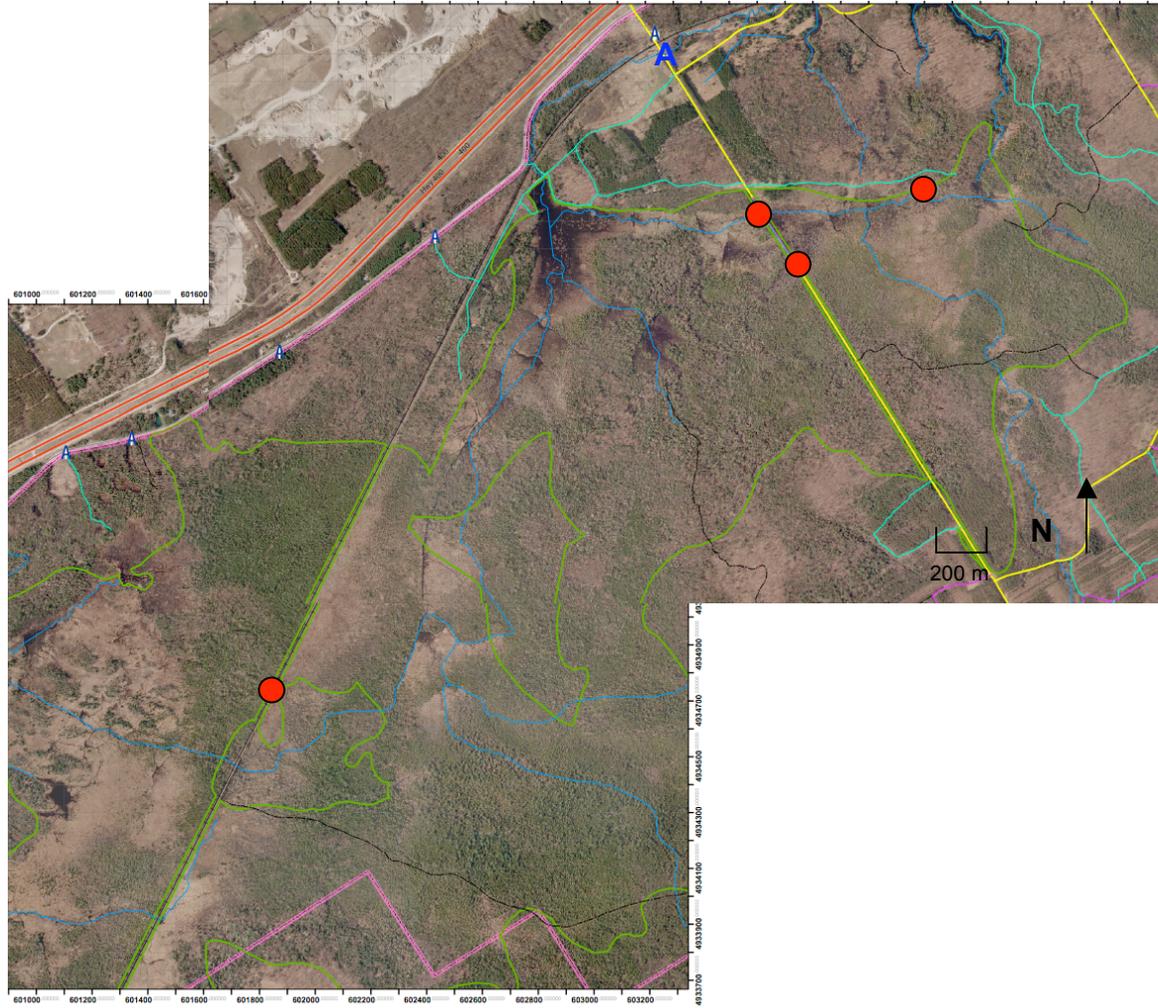


Figure 2. Locations where Olive-sided Flycatchers were heard at Copeland Forest in 2011 (red circles). All observations were on different days. For orientation, A is the main parking lot on 3rd Line. Yellow lines are main trails; turquoise lines are secondary trails; pink line at top is Ingram Road.

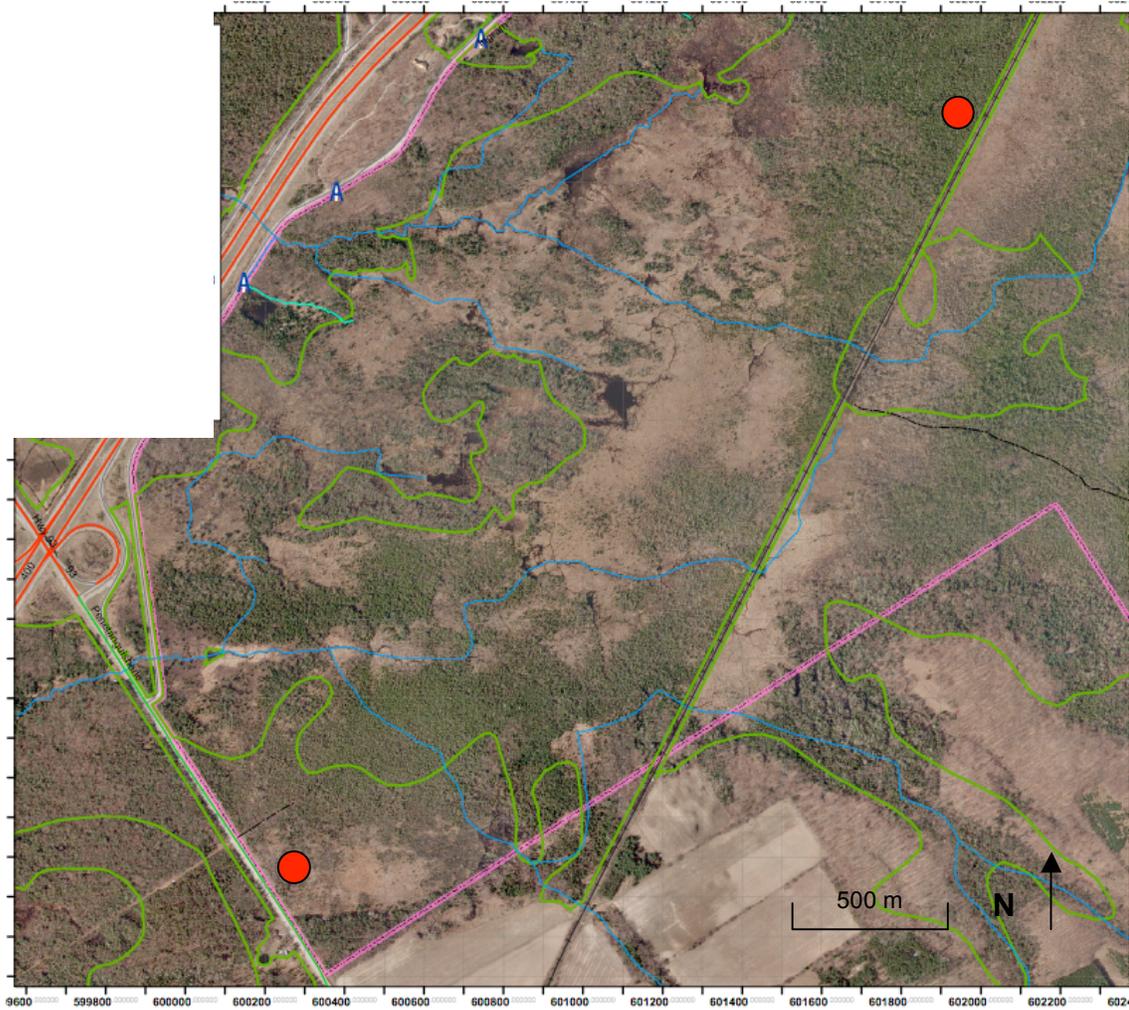


Figure 3. Locations where Yellow Rails were heard at Copeland Forest in 2011 (red circles). Northern dot is a June observation; southern dot is from August. For orientation, double red line in the northwest part of the map is Highway 400; yellow line is Penetanguishene Road; pink line is property boundary.

One Milksnake (*Lampropeltis triangulum*) was found near the railway tracks at the main parking lot at Ingram Road and the 3rd Line (Figure 4, orange dot). There is suitable habitat for this species in many of the long stone piles left from the former farm fields along the edges of the current plantations and in the old building foundations. The individual seen was a young-of-the-year, so some breeding does appear to be occurring. However, the species was seen only on one occasion. No threats to Milksnakes were observed at Copeland Forest so it is unknown why they were not seen more frequently. According to COSEWIC (2012) the main causes for the decline of this species are likely road mortality and deliberate killing by humans.

One Snapping Turtle (*Chelydra serpentina*) was seen in the pond above the Ducks Unlimited dam (Figure 4, red dot). This species relies on habitats that have deeper ponded water (Photo 4). Thus, this is probably the only suitable habitat for this species at Copeland Forest, possibly with the exception of a couple inaccessible ponds in the centre of the wetland complex. Given the water depth and the size of the ponded area in the DU pond, the population of Snapping Turtle is not likely to be very big (probably <10 individuals). No direct threats to Snapping Turtles were observed in 2011.

Monarch Butterfly (*Danaus plexippus*) larvae were observed on Common Milkweed plants (*Asclepias syriaca*) at 5 different locations (Figure 5). Patches of milkweed were frequent in the old fields around the main parking lot at the 3rd Line as well as along the railway tracks.

One Red-bellied Woodpecker (*Melanerpes carolinus*) was observed in a stand of Sugar Maple with a lot of standing dead Beech near the southern property line by the Pine Ridge Ski Club. Three Bay-breasted Warblers (*Setophaga castanea*) were observed in three different parts of the property. These two species are rare in Simcoe County and neither one was listed in the Atlas of Breeding Birds of Ontario (Cadman et al. 2001-2005) in the square containing Copeland Forest. The Bay-breasted Warblers were seen during breeding season in suitable habitat so breeding is possible. The Red-bellied Woodpecker was seen June 26, 2011 but there was no data to support or rule out breeding. These sightings are probably of little conservation importance at this time but are mentioned here so that the species can be sought again in following years.

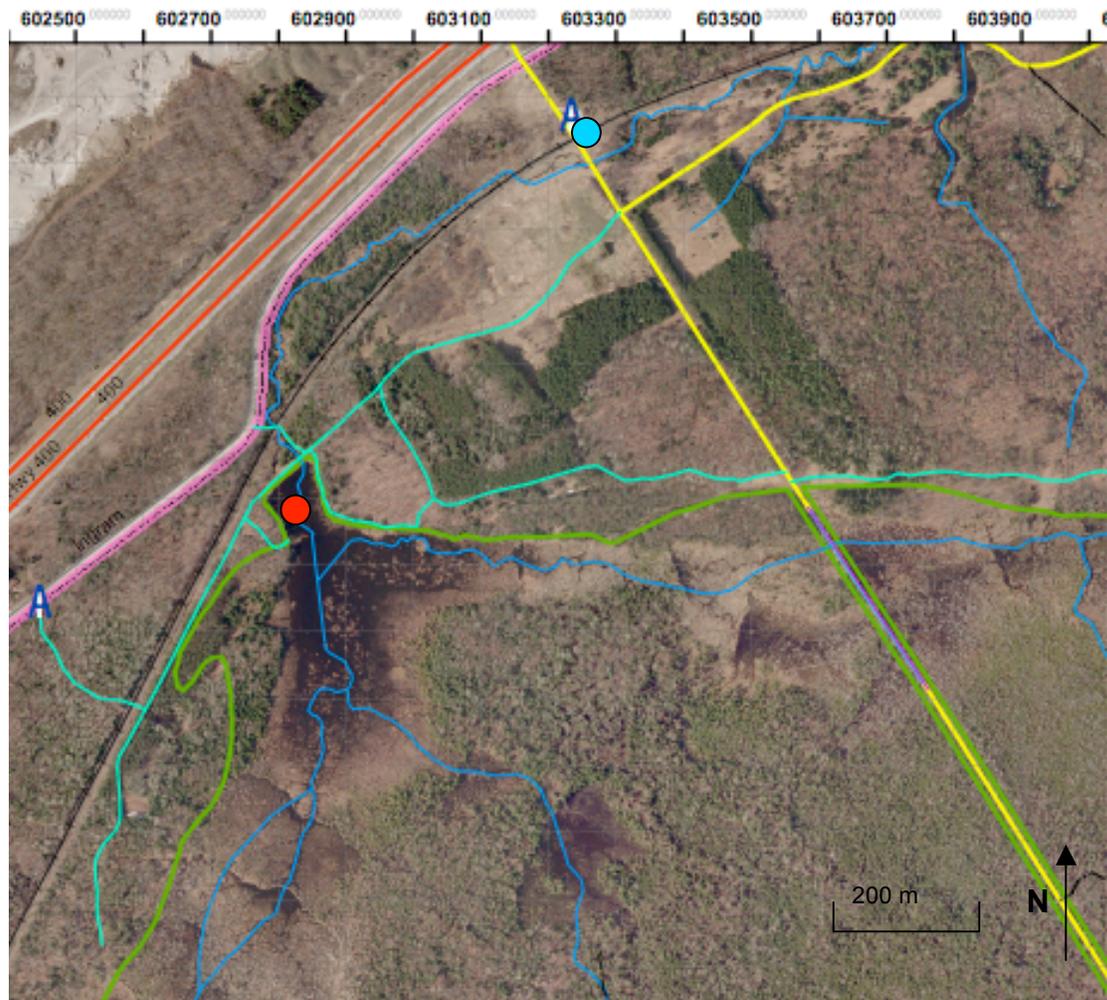


Figure 4. Locations where Snapping Turtle (red dot) and Milksnake (blue dot) were observed at Copeland Forest in 2011. For orientation, the yellow line is the main trail from main parking lot at the 3rd Line off Ingram Road; turquoise lines are secondary trails; pink line is Ingram Road.

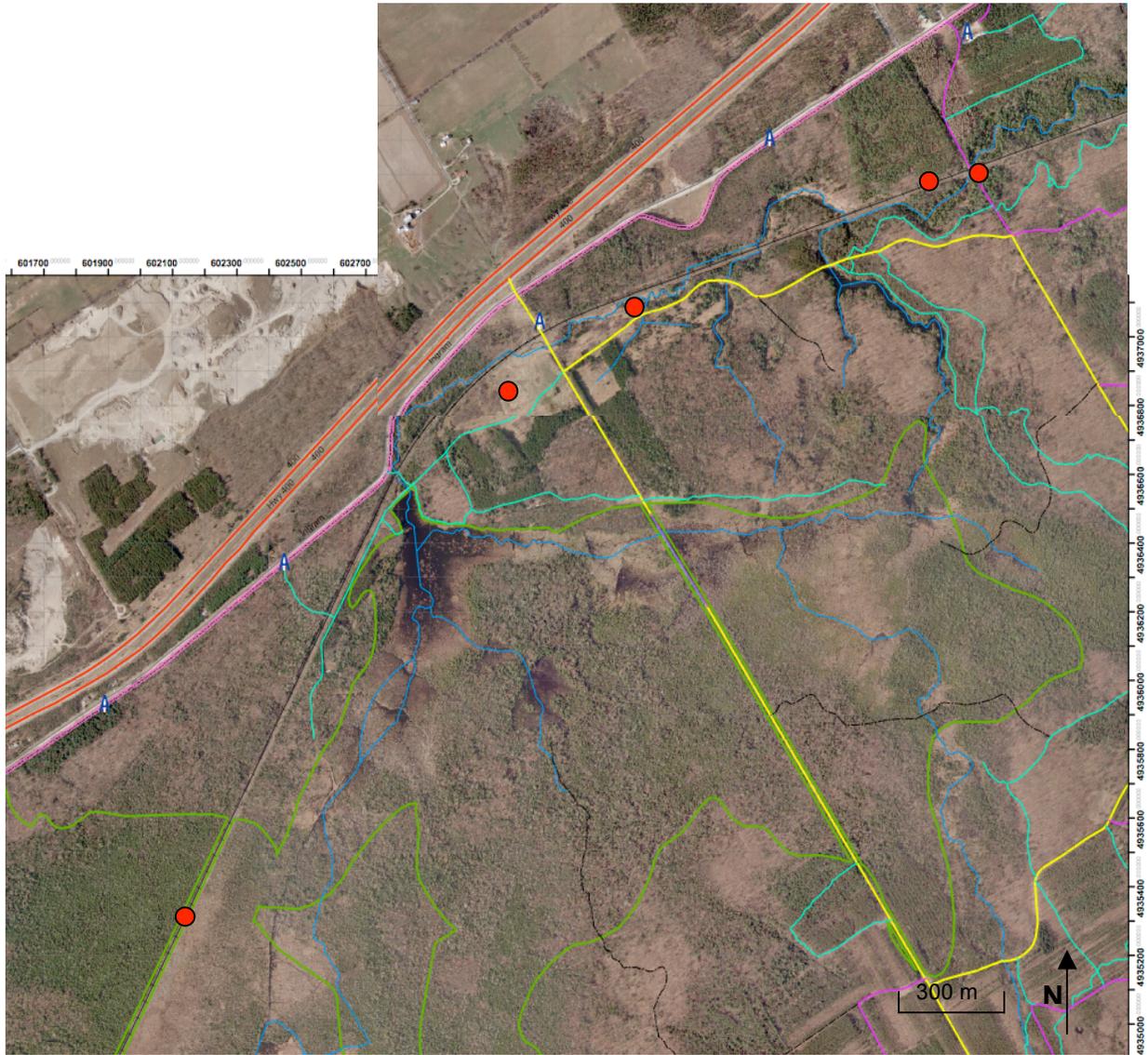


Figure 5. Locations where Monarch Butterfly larvae were observed at Copeland Forest in 2011 (red dots). For orientation, yellow line is the main trail from the main parking lot at the 3rd Line; turquoise lines are secondary trails; pink line at top is Ingram Road.

## 4.2 Species of Conservation Concern—Flora

Table 3 lists plant species of conservation concern found at Copeland Forest in 2011.

Table 3. Plant species of conservation concern found at Copeland Forest in 2011. Ranks from COSEWIC 2012, OMNR 2012, NatureServe 2012, NHIC 2012, Riley 1989. End= endangered.

		At-Risk Designation		Conservation Ranking <sup>2</sup>		
Common Name	Latin Name	National	Provincial	Global	Provincial	Simcoe
<b>AT RISK</b>						
Butternut	<i>Juglans cinerea</i>	End	End	G4	S1	Rare
<b>PROVINCIAL RARE</b>						
Swamp Valerian	<i>Valeriana uliginosa</i>	Not At Risk	Not At Risk	G4Q	S2	Rare
Schweinitz's Sedge	<i>Carex schweinitzii</i>	Not At Risk	Not At Risk	G3G4	S3	Rare
<b>REGIONALLY RARE IN SIMCOE COUNTY</b>						
Ebony Spleenwort	<i>Asplenium platyneuron</i>	G5	S4	NAR	NAR	Rare
Hidden Scale Sedge	<i>Carex cryptolepis</i>	G5	S4	NAR	NAR	Rare
Ground Cherry	<i>Physalis heterophylla</i>	G5	S4	NAR	NAR	Rare
Male Fern	<i>Dryopteris filix-mas</i>	G5	S4	NAR	NAR	Rare
Marsh Clearweed	<i>Pilea fontana</i>	G5	S4	NAR	NAR	Rare
Purple Bladderwort	<i>Utricularia purpurea</i>	G5	S4	NAR	NAR	Rare
Blue Marsh Violet	<i>Viola affinis</i> (Le Conte)	G5	S4?	NAR	NAR	Rare
Camas Lily	<i>Zigadenus elegans</i>	G5T4?	S4	NAR	NAR	Rare
Swamp Fly Honeysuckle	<i>Lonicera oblongifolia</i>	G4	S5	NAR	NAR	Rare
Showy Mountain Ash	<i>Sorbus decora</i>	G4G5	S5	NAR	NAR	Rare
Few-flowered Sedge	<i>Carex pauciflora</i>	G5	S5	NAR	NAR	Rare
Rough Bell Flower	<i>Campanula aparinoides</i>	G5	S5	NAR	NAR	Rare
Running Strawberry Vine	<i>Euonymus obovata</i>	G5	S5	NAR	NAR	Rare
Sedge	<i>Carex gynandra</i>	G5	S5	NAR	NAR	Rare
Northern Stitchwort	<i>Stellaria borealis</i>	G5T?	S5	NAR	NAR	Rare
Heath Aster	<i>Symphotrichum ericoides</i>	G5T?	S5	NAR	NAR	Rare

Three small seedlings (all <1 m tall) of Butternut (*Juglans cinerea*) were found at two locations in the deciduous forest at the top of steep slopes near the eastern property boundary (Figure 6; Photo 5). Two of the seedlings had only three leaves with few leaflets, while the third had several fully-

<sup>2</sup> G = global ranking and S = ranking within Ontario. Rankings are as follows: 5—secure; 4—apparently secure but uncommon and possibly some reason for concern long-term; 3—vulnerable, 2—imperiled, 1—critically imperiled. Q = unresolved taxonomic questions in the species. Region ranking is according to Riley 1989.

developed compound leaves. No live adult trees were observed anywhere in the Copeland Forest. A previously reported plantation was searched for on several occasions within a plantation area along the 5th Line (in the area of UTM 17 605900 4937400), but no evidence of the species was found despite examining downed woody debris and standing dead trees. Trees reported as Butternut from the area of the old picnic ground at the south boundary of the property were all found to be Black Walnut (*Juglans nigra*) (Photo 6).

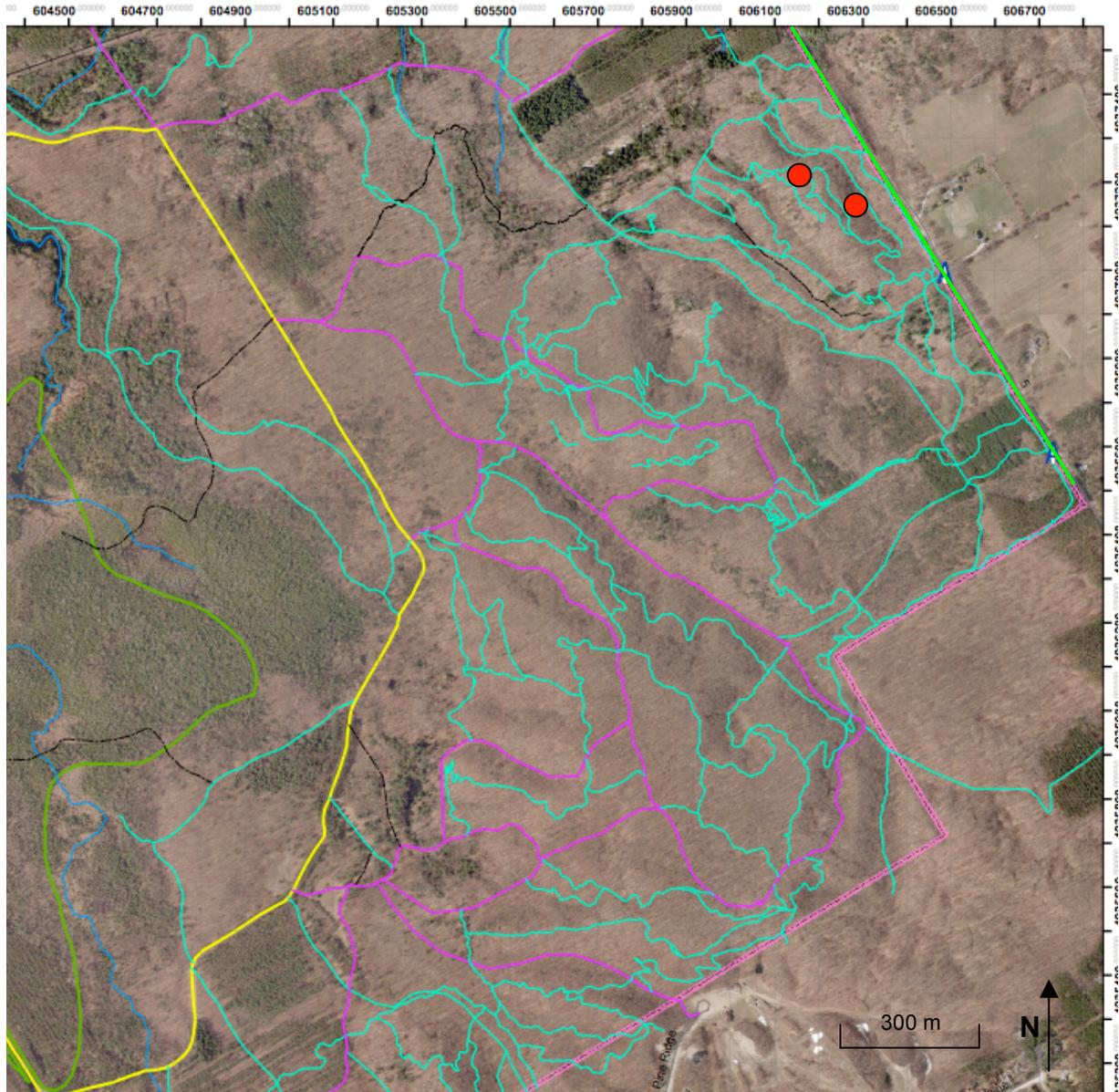


Figure 6. Locations where Butternut seedlings were observed at Copeland Forest in 2011 (red dots). For orientation, the yellow line is the east side of the trail loop from the main parking lot at the 3rd Line off Ingram Road; purple lines are other main trails; turquoise lines are secondary trails. Bright green line is 5th Line Road.

Four plants of Swamp Valerian (*Valeriana uliginosa*) were seen in a small opening in the interior of a Black Spruce – Tamarack swamp (Figure 7, orange dot). Two plants were in flower and were roughly 1 m tall, and the other two plant were approximately 30 cm tall and not in bloom. The habitat was spongy, peaty ground among small conifers (~ 3 m) with sedges (*Carex* spp.) and Labrador Tea (*Ledum groenlandicum*). There is much habitat for this species that was not surveyed, and this was simply a chance encounter. However, as the species was seen at only one location during this study, it can be concluded that the species is not common although apparently suitable habitat is present.

Schweinitz's Sedge (*Carex schweinitzii*) was seen at three locations (Figure 7, red dots; Photo 7). Approximately 10 clumps of plants in flower were present south of the pond on the Third Line. Along a stream course in a cedar swamp at the southwestern part of the property there were 25 clumps of plants, and in a meadow marsh along the outflow below the Dam Lookout Trail, there were more than 100 fruiting stalks from more than 30 clumps of plants. The habitat for this species is wet meadows, stream banks or ponds, and the edges of small water courses. It is highly probably that this species occurs at other locations in the Copeland Forest as well, since there is extensive additional habitat that was not searched.

Table 3 lists sixteen plant species that are regionally rare in Simcoe County (Riley 1989) that were documented. Half of these species are ranked S4 in the Province of Ontario (Oldham and Brinker 2009), meaning that they are uncommon and that there may be some conservation concern for these species, provincially, over the longer term. It does not appear that there is any single reason for these species being regionally rare or provincially uncommon as they come from a variety of habitats and growing conditions. All sixteen species were encountered only once at the Copeland Forest, indicating that the ranking of local rarity assigned 22 years ago is probably still valid, perhaps even more so today.

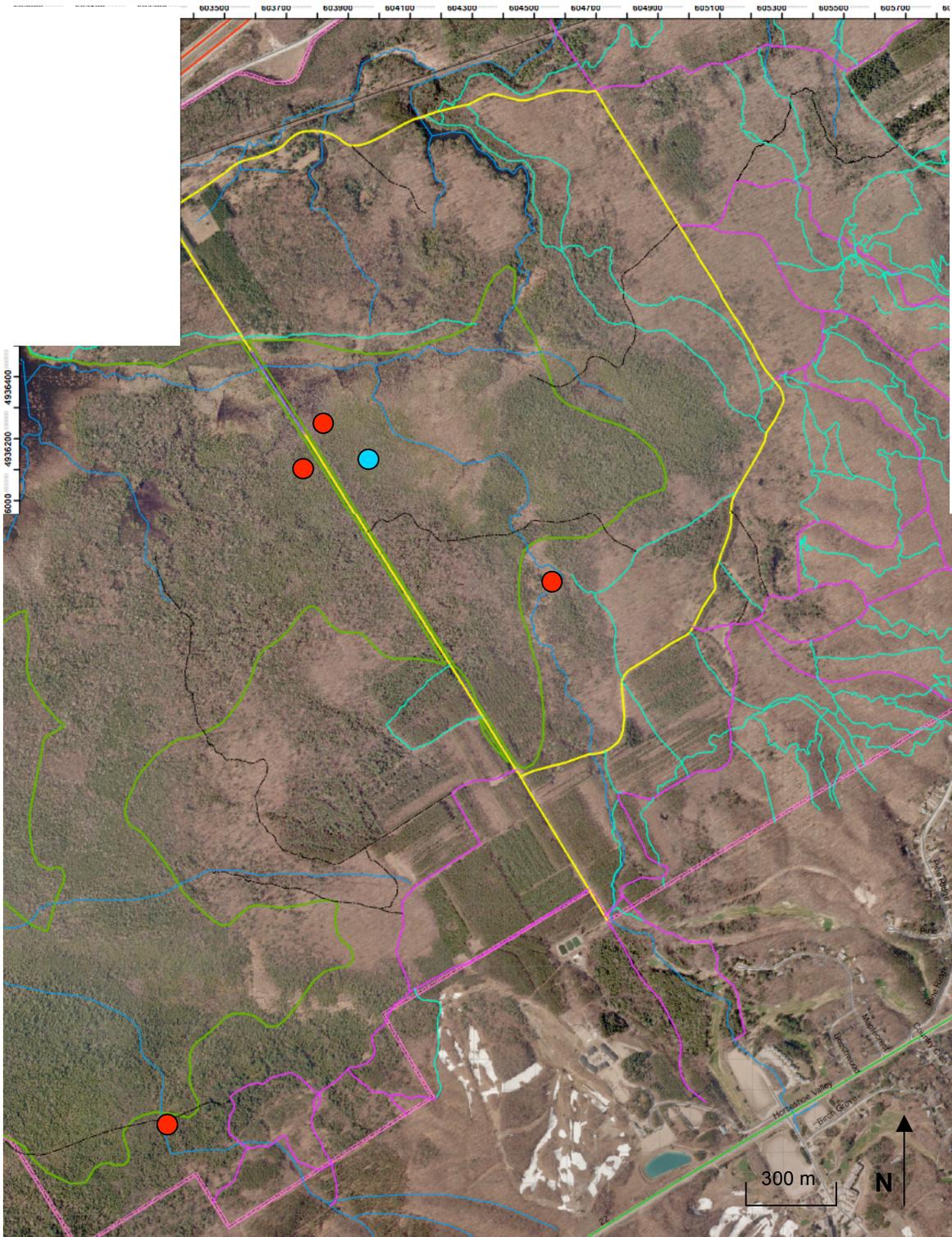


Figure 7. Locations where Swamp Valerian (blue dot) and Schweinitz's Sedge (red dots) were observed at Copeland Forest in 2011. For orientation, the yellow line is the main trail loop from the main parking lot at the 3rd Line off Ingram Road; purple lines are other main trails; turquoise lines are secondary trails; pink line is the property boundary. Green line at southeast corner is Horseshoe Valley Road.

### 4.3 Fauna Breeding and Wintering Habitats

Amphibian breeding was confirmed in ephemeral ponds and vernal pools at 24 locations (Photos 8-10). This survey work was focused within upland habitat as there are certainly numerous sites within the wetlands in the western part of the property. As well, 16 areas with high potential as snake gestation habitat were documented. These include the long, narrow old stone fence lines (Photo 11), old cement building foundations, and numerous sites along the railway tracks (Photo 12). Suitable habitat for turtle nesting was documented at 7 locations which are areas of sandy ground adjacent to permanent surface water features. The list of faunal breeding habitat locations has been submitted separately as spreadsheet data. One area in particular, in the upland at the northeastern corner of the property, had high potential for salamander breeding (shown with an "A" on Figure 8). This area had vernal pools as well as an ephemeral creek, and had mesic<sup>3</sup> ground conditions as opposed to the fairly dry, sandy conditions in most of the rest of the uplands. This is the only area which could contain potentially suitable habitat for Jefferson Salamander.

During January survey work a large stick nest was observed in the larch plantation at the eastern side of the property (UTM 605050 4938500; Photo 13) and in hardwood forest just in from the 5th Line, north of the tracks (UTM 605730 4938040, Photo 14). As these observations were made outside the breeding season, it is unknown whether the nests are still being used and if so by what species.

Two winter den sites were observed to be in use during January faunal surveys. The location for both dens is in the northeastern part of the property near the 5th Line in south-facing slopes of a creek bed. One den is likely being used by a fisher, based on the black hairs found around the entrance (located at UTM 605180 4938550 Photo 15). The second den, which had an entrance 70 cm in diameter, may be in use by a bear (located UTM 605185 4938595 Photo 16).

Winter survey work also confirmed highest White-tailed Deer usage in 2011 to be in the heavy cedar cover in the southwestern quadrant of the property (west of the 3rd Line road), with wintering deer yard core habitat area located at UTM 603600 4934300. Very little deer usage was seen in the eastern half of the property. A lot of east-west movement (tracks observed) occurs along well-used deer runs between the plantations on the west side of the 3rd Line (where there were several bed-down sites) and the heavier cover of the core yarding area to the west. There was also some east-west deer movement through the central part of the property where there is wetland cedar vegetation on both sides of the 3rd Line. These observations were made at a time when only 10-15 cm of snow were present, and it should be noted that deer movements may be different in times of deeper snow conditions.

January observations of also showed that rabbit populations were high in 2011, and that coyotes were present in many parts of Copeland Forest in the winter, probably as a result of this increased food source.

### 4.4 Species Not Found or Breeding Not Confirmed

Ample suitable habitat for Least Bittern is present, but no birds of this species were observed or heard despite surveying many areas and on several different dates. There is also ample habitat for Eastern Ribbon Snake, and this species may yet be found. Two stick nests were observed during winter survey work, but no nesting of raptors was observed during spring field surveys. Two Red-shouldered Hawks (*Buteo lineatus*) were observed by volunteers in August, 2011, at the large beaver pond on the 3rd Line (Hawke pers. comm. 2011) and the species was listed as present in

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<sup>3</sup> Ground contains some moisture during most of the year, but vegetation is not a wetland.

permanent plots monitored by the Canadian Wildlife Service (CWS) to track forest interior birds (in the northeastern corner of the property). Still, breeding of this species within Copeland Forest can not be confirmed based on this information. A Barred Owl was present on several nights along the main trail coming in from the Pine Ridge Ski Club, and again breeding is possible but could not be confirmed. Only one area of potential habitat for Jefferson Salamander was observed, but presence/absence of this species is not confirmed.

Ginseng (*Panax quinquefolius*) and Forked Three-awned Grass (*Aristida basiramea*) were not found anywhere in Copeland Forest in this survey. Very little suitable habitat for Ginseng was found. This would be undisturbed, exceptionally rich areas of deciduous forest with mesic loamy soil. Most of the Sugar Maple forest observed was dry and had very sandy soil. For Forked Three-awned Grass, there are small patches of suitable habitat for the latter species in open sandy disturbed areas. This species has a long-lived seed bank, making it possible it to appear after years of absence (Jones 2007), but since the species was not listed in the 1979 botanical inventory (Bobbette and Webber 1979), it is unlikely this species has been present here in the last 50 years.

#### 4.5 Vegetation

Table 4 shows a generalized summary of vegetation at Copeland Forest. The complete list of 49 vegetation community types documented at Copeland Forest in 2011 based on the Ecological Land Classification of Southern Ontario (Lee at al 1998) is presented in Table 5. Deciduous forest dominated by Sugar Maple covers almost one quarter of the property, wetland vegetation of many kinds covers about half of the property, and a variety of other upland forests and fields account for the remaining quarter of the vegetation.

Table 4. A summary of generalized vegetation cover at Copeland Forest.

General vegetation category	Hectares
sugar maple deciduous forest	398
cedar & cedar-conifer swamp	249
plantations-conifer and deciduous	247
coniferous forest-cedar/hemlock	180
mixed deciduous & conifer swamp	155
cattail/other shallow marsh	110
deciduous swamp	109
thicket swamp	90
mixed forest	83
swamp-marsh complexes	57
black spruce & tamarack swamp	45
open fields and meadows	22
mixed shallow aquatic	11
other deciduous forest	4
TOTAL	1760

Copeland Forest has a great diversity of vegetation types, which is further magnified by having upland forests on both dry and mesic substrates, wetlands on both mineral and organic soils, and plantations in both managed and naturalized forest conditions. Vegetation mapping of Copeland Forest has been prepared to accompany this report and has been submitted separately to Couchiching Conservancy and OMNR.

The number of hectares is not shown for a few vegetation types in Table 5. These are present only as part of a complex or were tallied as part of other polygons. For example, MAS 3-4 Broad-leaved Sedge Shallow Marsh was documented on the ground and occurs in many small patches within cattail marsh. However, it is difficult to distinguish small polygons of sedges within a marsh on satellite imagery. Therefore, this community type is not tallied on its own. Similarly, cedar swamp on organic soil was documented on the ground, but could not be distinguished from cedar swamp on mineral soil on satellite imagery so the hectares of the two are tallied together. Finally, there are several polygons of mesic deciduous forest documented of mappable size (e.g. >0.5 ha) that occurred in a mosaic and were better treated as a complex (discussed below).

Table 5. Vegetation community types at Copeland Forest in 2011, with numbers of hectares (ha) of each type present. Classification from Lee et al. (1998) and SSIS (2011). C# = community occurs as part of complex #1 or complex #2.

ELC code	COMMUNITY TYPE	Ha
CUM 1-1	Cultural meadow/old field	21
MEGM 3-1	Dry-Fresh Poverty Oat Grass Meadow [naturalized old field]	0.6
CUP 1-3	Black Walnut Deciduous Plantation	6
CUP 1-x	Black Cherry Deciduous Plantation	22
CUP 1-y	Black Cherry Mixed Plantation	4
CUP 3-1	Red Pine Coniferous plantation	101
CUP 3-3	Scotch Pine Cultural Plantation	8
CUP 3-8	White Spruce Cultural Plantation	32
FOMM 11-2	Dry-Fresh Red Pine - Hardwood [naturalized plantation] Mixed Forest	30
FOMM 11-3	Dry-Fresh Scotch Pine - Hardwood [naturalized plantation] Mixed Forest	26
FOMM 11-5	White Pine-Oak [naturalized plantation] Mixed Forest	14
FODM 13-1	Dry-Fresh Red Oak [Naturalized Plantation] Deciduous Forest	4
FOC 2-2	Dry-Fresh White Cedar Coniferous Forest	76
FOC 3-1	Fresh-Moist Hemlock Coniferous Forest	101
FOM 2-2	Dry-Fresh White Pine - Sugar Maple Mixed Forest	1
FOM 3-1	Dry-Fresh Hardwood – Hemlock Mixed Forest	16
FOM 5-2	Dry-Fresh Poplar Mixed Forest	0.5
FOM 6-2	Fresh-Moist Hemlock-Hardwood Mixed Forest	52
FOM 8-1	Fresh-Moist Poplar Mixed Forest	8
FOM 8-2	Fresh-Moist White Birch Mixed Forest	C#2
FOM x-x	Fresh-Moist Red Maple Mixed Forest	6
FOD 2-4	Dry-Fresh Red Oak - Hardwood Deciduous Forest	2
FOD 3-1	Dry-Fresh Poplar Deciduous Forest	1
FOD 3-2	Dry-Fresh White Birch Deciduous Forest	0.5
FOD 5-1	Dry-Fresh Sugar Maple Deciduous Forest	} 398
FOD 5-2	Dry-Fresh Sugar Maple - Beech Deciduous Forest	
FOD 5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest	
FOD 6-3	Fresh-Moist Sugar Maple-Yellow Birch Deciduous Forest	1
FOD 7-2	Fresh-Moist Green Ash Lowland Mixed Forest	C#2
SWC 1-1	White Cedar Mineral Coniferous Swamp	189
SWC 1-2	White Cedar - Conifer Mineral Coniferous Swamp	60
SWC 3-2	White Cedar - Conifer Organic Coniferous Swamp	(tallied within SWC 1-2)
SWC 4-2	Tamarack Organic Coniferous Swamp	} 45
SWC 4-3	Black Spruce Organic Coniferous Swamp	

ELC code	COMMUNITY TYPE	Ha
SWM 1-1	White Cedar – Hardwood (Red Maple) Mineral Mixed Swamp	18
SWM 2-1	Red Maple- Conifer Mineral Mixed Swamp	137
SWD 2-1	Black Ash Mineral Deciduous Swamp	14
SWD 3-1	Red Maple Mineral Deciduous Swamp	82
SWD 5-1	Black Ash Organic Deciduous Swamp	13
SWD 4-3	White Birch- Poplar Mineral Deciduous Swamp	C#2
SWT 2-1	Alder Mineral Thicket Swamp	74
SWT 2-2	Willow Mineral Thicket Swamp	16
MAM 2-1	Bluejoint Mineral Meadow Marsh	3
MAM 2-10	Forb Mineral Meadow Marsh	3
MAMM 1-9	Mixed Sedge (Twigrush) Mineral Meadow Marsh	0.6
MAS 2-1	Cattail Mineral Shallow Marsh	103
MAS 3-4	Broad-leaved Sedge (Beaked Sedge) Organic Shallow Marsh (tallied within MAS 2-1)	
SAM 1-4	Pondweed Mixed Shallow Aquatic	10
SAM 1-5	Bur Reed Mixed Shallow Aquatic	1
Complex #1: Wetland vegetation mosaic of MAS 2-1, SWT 2-1, SWC 1-1, SWM 2-1		33
Complex #2: Lowland forest-wetland mosaic of FOM 8-2, SWD 4-3, FOD 7-2		24

### Upland Forests

Upland forests on the eastern side of the property are dominated by Sugar Maple (*Acer saccharum*) on steep slopes and on the level ground below (Photo 17). This vegetation covers 398 ha. In the southern part of this area, Red Oak (*Quercus rubra*) is a frequent associate, while in the northeastern part, Beech (*Fagus grandifolia*) is more commonly the associate. Many Beech are now significantly affected by Beech Bark Disease and are standing dead or have fallen. Eastern Hemlock (*Tsuga canadensis*) is also a frequent associate throughout the upland forests. It is usually present as small groves of trees or widely scattered individuals, rather than as a mixed canopy (mixed vegetation is present elsewhere, discussed below). One area of Red Oak Forest that was apparently natural was documented near the southern property line. There are also areas of planted Red Oak, with trees up to 20 m tall and up to 35-40 cm diameter at breast height (dbh).

The quality of upland deciduous forests at Copeland Forest is very good. Most stands ranked AB to B in quality (Figure 8), with none in poorer than B condition. Diversity of the ground flora varies greatly from areas nearly bare, to ground flora of only maple seedlings, to areas species-rich with spring ephemerals. Generally, areas where relatively more light reached the forest floor had more maple regeneration, while shady areas tended to have less. One area in the northeastern corner of the property was ranked A quality. This location had mesic ground conditions and a much greater diversity of ground flora than the rest of the uplands. The ground surface contained natural microtopography (pits and hummocks) and had an ephemeral creek and vernal pools. Not coincidentally, this site also had the greatest potential for salamander breeding (see above).

One area of White Pine – Sugar Maple Forest was documented on the east side of the 4th Line just south of the railway tracks and creek. This is a small stand (1 ha) of enormous Eastern White Pine (*Pinus strobus*) 25-30m tall with 50 – 100 cm dbh, and an understory of medium-aged Eastern Hemlock and Sugar Maple. These pines are not part of a plantation and may be a remnant of the presettlement or early settlement vegetation. White Pine does not appear to be regenerating under these trees, but it is a component in most vegetation types at Copeland Forest. This stand probably is not a regenerating vegetation type, but rather is the end result of White Pine becoming the super-canopy layer within a maple or hemlock forest.

Upland forests are also present on a band of level tablelands along Ingram Road, west of the 3rd Line. This area appears to have been subject to more extensive forestry activities including both harvesting and reforestation. Most of the upland here was harvested and replanted with Black Cherry (*Prunus serotina*), but there are also a few areas planted with White Spruce (*Picea glauca*), and some natural (unplanted) mixed forest with patchy dominance of Poplars (*Populus tremuloides*, *P. grandidentata*), Balsam Fir (*Abies balsamea*), and White Spruce (Photo 18). There are also upland areas with all gradations of Hemlock and Red Maple: Hemlock Forest, Hemlock-Hardwood Forest (with Red Maple), and Red Maple Mixed Forest (with Hemlock). As these types become wetter they change into Red Maple deciduous and mixed swamps.

Upland forests are also found west of the 3rd Line in the southern half of the property. Most of the land near the entrance from Horseshoe Valley Road was cleared for farm fields and now supports conifer plantations, which are discussed separately. North of these plantations are a few polygons of Sugar Maple Deciduous Forest including one mesic area where Yellow Birch (*Betula alleghaniensis*) is co-dominant with Sugar Maple. These polygons have had some forest management in the last 20 years, as evidenced by decaying stumps and a high density of skinny maple saplings 2 -3 m tall. The location of these polygons around the plantations suggests that sugar maple forest may have been the original vegetation present before the fields were cleared.

Soils in the upland forests were fairly uniform throughout the area. Generally, the A horizon consists of 10 – 15 cm of silty sand or ashy grey silt over a B horizon of deep, coarse, golden brown sand (Photo 19). The duff and humus layers (the L,F,H horizon) were surprisingly shallow or absent, meaning that usually only a thin layer of leaves was present directly covering the sandy substrate. There was no indication as to whether duff and humus layers may have been thicker at some time in the past, or whether the shallowness of the layer may be the result of some impact—either from human activities, such as forestry, or possibly from exotic earthworms which are known to affect duff and humus (Bohlen et al. 2004). On ridges and higher ground, the silt layer is thinner or absent. Bobbette and Webber (1979) classify the upland soil here as belonging to the Tioga Soil Series, which are well drained, loamy sand, sandy loam and fine sandy loam deposits, generally stone-free with frequent scattered, rounded granite boulders.

Dry, upland Eastern White Cedar Coniferous Forest (Photo 20) is present in some areas of Copeland Forest at the dry end of the moisture gradient that becomes White Cedar Coniferous Swamp at the wetter end. Dry cedar forest found as a distinct vegetation type on the west side of the 3rd Line. This is discussed further under wetlands, below.

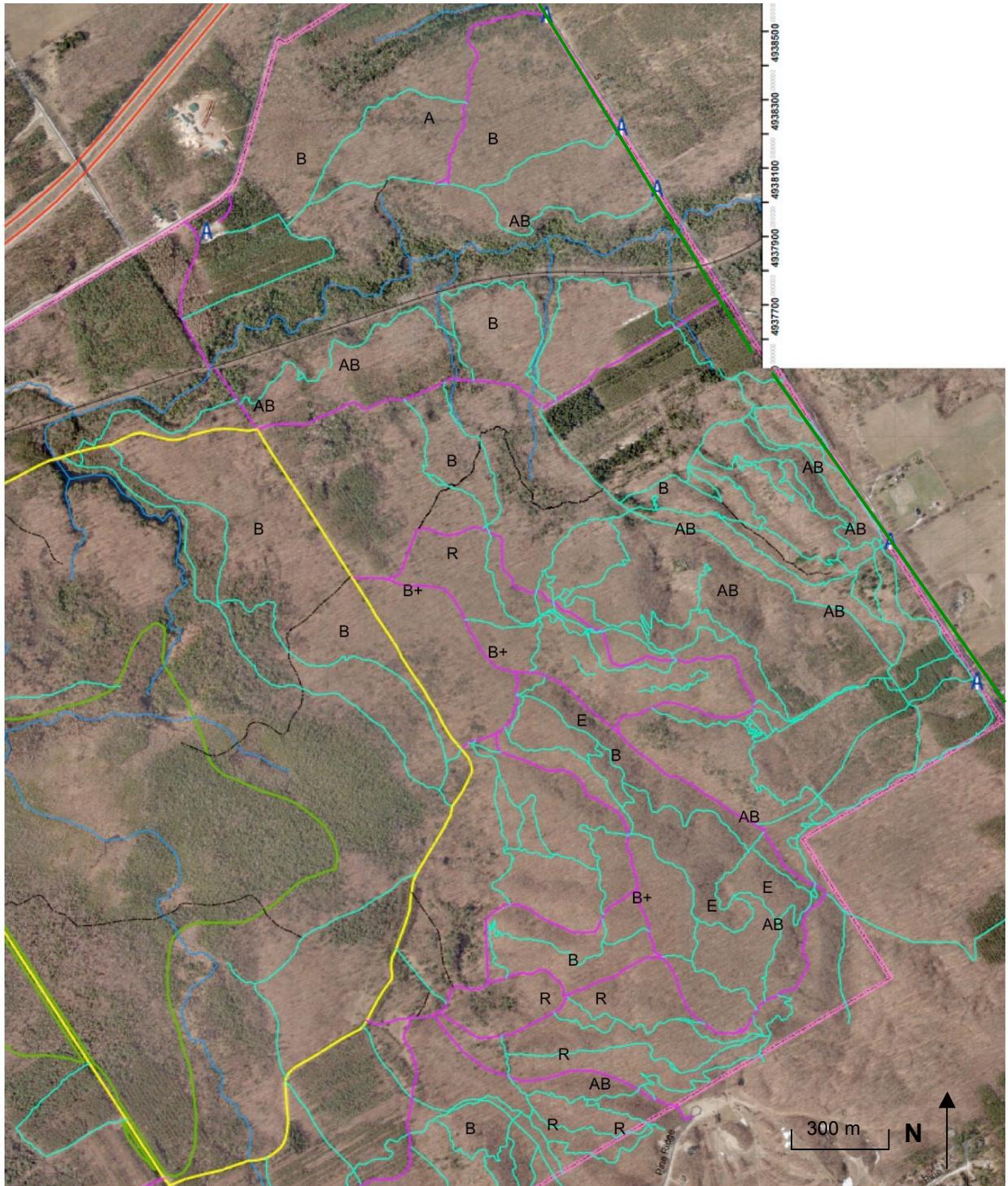


Figure 8. Woodland quality and presence of spring ephemerals in uplands at Copeland Forest. For an explanation of the index used to rank stands, see Methods. Legend: A, AB, B+, B, C = forest conditions where A has the largest trees, least disturbance, and most ephemeral species; R = maple regeneration; E = ephemerals are especially rich. For orientation, the yellow line is the main trail loop from the main parking lot at the 3rd Line off Ingram Road; purple lines are other main trails; turquoise lines are secondary trails; pink line is the property boundary. Green line is 5th Line Road.

### **Lowland Forests**

Lowland forests are present at lower elevations or with more mesic conditions than upland forests. Along the north side of the railway tracks between the 4th and 5th Lines, there is a significant band of Fresh-Moist Hemlock Coniferous Forest on and at the bottom of the slope that goes down to the Coldwater River. The ground flora is species-rich with plants common in coniferous forests, such as Starflower (*Trientalis borealis*), Mitrewort (*Mitella nuda*), and Blue Bead Lily (*Clintonia borealis*). Painted Trillium (*Trillium undulatum*) was uncommon within Copeland Forest and was only seen in this vegetation type.

In the centre of the property on either side of the 3rd Line, there is a complex of mesic mixed forest vegetation that include moist forest dominated by Green Ash (*Fraxinus pensylvanica*) as well as mesic areas dominated by White Birch (*Betula papyrifera*) or Poplar, grading into deciduous swamps of Red Maple, White Birch, or Poplar. Canopy dominance is patchy rather than being a mix of species and may be the result of a combination of past forest management as well as changing ground moisture. This vegetation has been mapped as Complex #2 on the vegetation mapping.

Soils sampled in lowland and mesic forests generally contained 7 – 10 cm of smooth black silt over reddish-brown medium to fine-grained sand (Photo 21). Bobbette and Webber (1979) discuss the soils in the central area surrounding the lowland complex as belonging to the Alliston Soil Series, which is similar in texture to the Tioga Series but present in lowland positions with imperfect drainage, resulting in being less susceptible to drought and erosion.

### **Wetlands—Swamps**

Swamps are wetlands that have tree cover (Lee et al. 1998). Four types of swamp vegetation have extensive coverage at Copeland Forest: White Cedar Mineral Coniferous Swamp (189 ha) (Photo 22); Red Maple – Conifer Mineral Mixed Swamp (137 ha), Red Maple Deciduous Swamp (82 ha) (Photo 23), and White Cedar – Conifer Mineral Coniferous Swamp (60 ha). These vegetation types often grade into one another but can fall into different classification categories depending on which trees are the tallest and most numerous. Red Maple Deciduous Swamp often has White Cedar present but not sizeable enough or dense enough to be classified as part of canopy.

As well, White Cedar – Conifer Swamp where Tamarack (*Larix laricina*) or Black Spruce (*Picea mariana*) are associates sometimes grades into Black Spruce or Tamarack Coniferous Swamps which generally have short trees (<3 m tall) and mossy or peaty ground cover on organic soil. These are mainly found in the interior of the wetland where organic soil has built up under standing water. Two other types of vegetation on organic soil were also documented: Black Ash Organic Deciduous Swamp, and White Cedar – Conifer Organic Coniferous Swamp. Both were present at the western-most side of the property.

Actually, true organic soil (e.g. >40 cm in depth) was encountered only in a few locations and does not appear to be widespread. It may perhaps be more frequent than was observed in this study if it is present in the more inaccessible parts of the wetland where water is deeper. Still, extensive organic soil development would not be expected where persistent upwelling of ground water would cause water to flow, or where the mineral substrate is deep sand that permits some drainage. Although Bobbette and Webber (1979) show organic soils as present under most of the western side of the property, in truth they seem to be present only patches, perhaps due to local microtopography in the Granby Soil that resulted in standing water, or perhaps as a result of the interruption in surface hydrology caused by the train tracks.

A few areas of Black Ash Mineral Deciduous Swamp were present where Black Ash (*Fraxinus nigra*) was the canopy dominant, and isolated patches of other deciduous swamp types dominated by Balsam Poplar (*Populus balsamifera*) or White Birch were documented in the mixed forest – swamp complex present in the centre of the property along the 3rd Line.

In the centre of the wetland, there is a large area that is a mosaic of open cattail marsh with islands of cedars, and intervening patches of red maple swamp and alder thicket swamp. Many patches of vegetation in this area are <0.5 ha. This area is mapped as Complex #1 on the vegetation mapping.

#### **Wetlands—Thickets**

Large areas of Alder Mineral Thicket Swamp are present at Copeland Forest. They range from a semi-open state with younger Speckled Alder (*Alnus rugosa*) <2 m tall and marshy ground flora to extensive impenetrable tangles of nothing but Alder ~3m tall and almost no ground flora. There are also Willow Mineral Thicket Swamps, dominated by Meadow Willow (*Salix petiolaris*) sometimes with Pussy Willow, Shining Willow, or Bebb's Willow (*S. discolor*, *S. lucida*, *S. bebbiana*). Much of the centre of the wetland at the western side of the property north of the tracks is a complex of alder thickets, willow thickets, areas of open cattail or graminoid marsh, and small islands of cedar swamp vegetation. Often there are numerous fallen trees and areas of deep standing water, making it extremely difficult to traverse.

#### **Wetlands—Meadow Marshes, Shallow Marshes, Stream Channels**

Cattail Mineral Shallow Marsh (Photo 24) is by far the most common type of shallow marsh at Copeland Forest, present throughout most of the centre of the property and containing standing or flowing water for much of the growing season. Broad-leaved Cattail (*Typha latifolia*) is the dominant cover with patches of sedges, shallow aquatics, and standing dead trees also present. These areas are surprisingly species rich. As mentioned above, large areas of Cattail Marsh are present interspersed with thicket swamps and islands of cedar swamp in the centre of the property. Cattail Marsh is also present along some stream channels, around the outside of most small ponds, and in some of the man-made ponds designed for water reservoirs along Ingram Road. This vegetation type is extensive, covering at least 103 ha.

At the southwestern-most corner of the property in an area of organic soil, there are two areas of shallow marsh dominated by Beaked Sedge (*Carex utriculata*) which are Broad-leaved Sedge Organic Shallow Marsh. This vegetation may be notable as it was the location where the threatened bird Yellow Rail was heard. This vegetation was surrounded and intercalated with Black Ash Deciduous Organic Swamp (Photo 3). As mentioned above, this sedge meadow is difficult to distinguish from cattail marsh on satellite imagery, so it may be more common than has been documented here, and is likely additionally present in some parts of the interior of the wetland.

Meadow Marshes differ from shallow marshes in that the former are generally only seasonally flooded and may be only moist to dry by mid-summer. Several areas of Bluejoint Mineral Shallow Marsh (Photo 25) were documented, particularly along stream channels through or at the edges of upland or lowland forests. Bluejoint grass (*Calamagrostis canadensis*) up to 1.5m tall is dominant with associates such as Touch-me-not (*Impatiens capensis*) and Reed Canary Grass (*Phalaris arundinacea*) also present. Some stream channels are dominated by tall broad-leaved plants ("forbs") such as Joe-Pye-Weed (*Eupatorium maculatum*), Boneset (*E. perfoliatum*) and Swamp Milkweed (*Asclepias incarnata*) and can be classified as Forb Mineral Meadow Marsh. One of the most species-rich meadow marshes is the area below the beaver dam at the end of the Dam Lookout Trail east of the 3rd Line.

As well, at the north side of the property off Ingram Road, there are two small wet areas that support Mixed Sedge Mineral Meadow Marsh, dominated by Twigrush (*Cladium mariscoides*) (Photo 26). This species is mostly known from coastal fen areas along the shores of Georgian Bay (Lee et al. 1998). At Copeland Forest, these Mixed Sedge Meadows also contained Slender Sedge (*Carex lasiocarpa*) and other species of sedges (*Carex* spp.). It's possible that these are man-made areas, perhaps borrow pits for the construction of Highway 400 or some other shallow scrape that filled in with water.

### **Ponds—Shallow Aquatic Vegetation**

Despite appearances on satellite imagery, only a few areas of true ponded water exist year-round at Copeland Forest. Areas that appear to be open standing water on leaf-off imagery are actually covered with cattails or alders when seen with leaves on in Googleearth or on the ground.

The largest and most diverse example of shallow aquatic vegetation is in the pond that is the result of the Ducks Unlimited (DU) dam. This area of approximately 4 ha contains a mix of Pondweed Mixed Shallow Aquatic Vegetation surrounded by patches of Cattail Shallow Marsh. The aquatic area contains submerged species such as Flat-stemmed Pondweed (*Potamogeton zosteriformis*) and Common Bladderwort (*Utricularia vulgaris*), floating plants like Yellow Pond-lily (*Nuphar variegatum*), and emergent plants such as Water Smartweed (*Polygonum amphibium*). The water depth within this pond was primarily shallow (<1m), and contained tussocks of sedges, standing dead trees, and emergent stumps.

The other ponds along the main trail at the north end of the property east of the 3rd Line contained Bur Reed Shallow Aquatic Vegetation (Photo 23) and were dominated by stands of emergent Common Bur Reed (*Sparganium emersum*). These ponds were not particularly species-rich, but this vegetation may be important as a water quality indicator species, as it was present in the habitat of the endangered Eastern Pondmussel.

Several other ponds exist in the uplands at Copeland Forest. Aquatic vegetation was not classified within these ponds because they were under the minimum size for ELC mapping (<0.5 ha). However, these small ponds are important sites for amphibian breeding and some contain a good diversity of sedge species.

### **Plantations and Fields**

Lines of piled stones and open-grown deciduous trees (Photo 26) under conifers attest to the historical presence of farm fields at many locations in Copeland Forest. Almost all fields were eventually planted with trees. Judging from the size of some of these trees today, the oldest conifer plantations date back to at least the early 1940s if not before. A great variety of plantations are present at Copeland Forest, both in terms of species planted and in terms of tree sizes and ages. As well, some plantations have understory regeneration well underway and are now better classified as naturalized forests (Photo 27). A total of 247 ha of plantations are present.

A wide variety of species were planted including:

Red Pine	<i>Pinus resinosa</i>
Scotch Pine	<i>Pinus sylvestris</i>
White Pine	<i>Pinus strobus</i>
Jack Pine	<i>Pinus banksiana</i>
White Spruce	<i>Picea glauca</i>
Tamarack	<i>Larix laricina</i>
Black Walnut	<i>Juglans nigra</i>
Black Cherry	<i>Prunus serotina</i>

Red Oak	<i>Quercus rubra</i>
White Oak	<i>Quercus alba</i>
Bur Oak	<i>Quercus macrocarpa</i>
Butternut	<i>Juglans cinerea</i> (according to Robinson pers. comm. 2011)

Many plantations of Scotch Pine do not seem to have done very well. Quite a few of the canopy trees died leaving large light gaps. This permitted understory species to grow and allowed healthy regeneration of deciduous species. These plantations are now classified as Scotch Pine - Hardwood [naturalized plantation] Mixed Forest. There are a few Red Pine plantations that were thinned or that were planted in a mix with Scotch Pine that died. These plantations have extensive regeneration and are classified as Red Pine - Hardwood [naturalized plantation] Mixed Forest.

Many plantations, especially those at the eastern boundary of the property, have lines of deciduous species planted in between the conifers. Uncommon species for Simcoe County such as White Oak and Bur Oak are found here. Presumably, Butternut was also planted here (Robinson pers. comm. to Jones 2011), but the species could not be found either as live trees or as downed woody debris despite focused searching. Extensive plantings of Black Walnut are present along the southern boundary of the property (near the old picnic area).

#### 4.6 Areas with High Diversity of Plant Species

In addition to habitats for species of conservation concern and areas of importance to fauna, some areas have been identified as having an exceptionally high diversity of plant species (Figure 9). These areas are:

- 1) the area ranked A in the woodland quality assessment in the northeast corner of the property, which contained all of the ephemerals or ground flora that are less common in Copeland Forest: Christmas Fern (*Polystichum acrosticoides*), Maidenhair Fern (*Adiantum pedatum*), Toothwort (*Cardamine diphylla*), Squirrel Corn (*Dicentra canadensis*), and Jack-in-the-Pulpit (*Arisaema triphyllum*);
- 2) the coniferous forest and marshy stream bank on the north side of the Coldwater River east of the 4th Line, which contained uncommon species such as Green-headed Coneflower (*Rudbeckia laciniata*), Great Lobelia (*Lobelia siphilitica*), Marsh Clearweed (*Pilea fontana*), and Nodding Sedge (*Carex gynandra*);
- 3) the banks of the central pond, which was the only site for Hay-scented Fern (*Dennstaedtia punctilobula*) and Sweet Flag (*Acorus americanus*);
- 4) the cedar swamp along the old logging trail ("Ladyslipper Trail") running northwest from the old picnic area near the Horseshoe Valley entrance, which was a rich area for swamp and fen species such as Large Cranberry (*Vaccinium macrocarpon*), Labrador Tea (*Ledum groenlandicum*), Blunt-leaved Orchid (*Platanthera obtusata*), and Swamp Fly Honeysuckle (*Lonicera oblongifolia*);
- 5, 7, & 9) small remnants of open sandy habitat within the walnut plantations, in the old campground, and at the edges of some plantations on the east side, which contain a uncommon native species of open ground such as the Ebony Spleenwort (*Asplenium platyneuron*), Heath Aster (*Symphyotrichum ericoides*), White Vervain (*Verbena urticifolia*), and many others;



Figure 9. Areas of exceptionally high plant species diversity (orange outlines). Two others, the DU pond and a meadow marsh on the west side of the property are not shown but are discussed in the text. Areas of high woodland quality are also not mapped but are shown in Figure 8. For orientation, A is the main parking lot on the 3rd Line off Ingram Road. Yellow line is main trail loop; purple lines are other main trails; turquoise lines are secondary trails; pink line is property boundary.

6) the beaver pond and meadow marsh at the end of the Dam Lookout Trail, which contained a huge list of marsh species;

8) the wet ground around the ponds and small creeks at the bottom of the slopes in the upland forest, which contained a great diversity of sedges, duckweeds (*Lemna minor*, *L. trisulca*, *Wolffia* spp.), and marsh species;

10) not mapped: an area of meadow marsh along a stream channel south of Ingram Road at the western side of the property at UTM 600632 4934861, which contained Marsh Bellflower (*Campanula aparinoides*), Three-way Sedge (*Dulichium arundinaceum*), Rattlesnake Grass (*Glyceria canadensis*), Marsh St. John's Wort (*Triadenum fraseri*) and many marsh species.

As well, the assessment of woodland quality (Figure 8) points to areas of greatest species diversity within the deciduous forest, including , an AB area known as Trillium Hollow in the southeast corner, and an area marked E that was exceptionally rich. In addition, the Ducks Unlimited pond, which is a habitat for species of conservation concern and which supported a huge diversity of bird life, also contained a great diversity of plant species several not found elsewhere, such as Water Shield (*Brasenia schreberi*), Labrador Bedstraw (*Galium labradoricum*), Purple Bladderwort (*Utricularia purpurea*), Nuttall's Bur Reed (*Sparganium americanum*), and Flat-stemmed Pondweed.



#### 4.7 Invasive Species and Other Biological Impacts

Given the high recreational use of Copeland Forest and the size of the property, the presence of invasive species is surprisingly low. Still, several species are present that are cause for concern.

Garlic Mustard (*Alliaria petiolata*) is present in the upland forest in the eastern side of the property. It is especially dense along the main trail that comes in from the Pine Ridge Ski Club, with other isolated patches of infestation located in the southeastern corner of the property. In 2011 volunteers removed a great deal of Garlic Mustard from the main trail; however, it is obviously a very labour-intensive task and will probably need a more extensive plan that includes other actions. This is explored further in the Recommendations section of this document.

Purple Loosestrife (*Lythrum salicaria*) is present in the wetlands around the DU pond, in the wetlands along the ponds on the 3rd Line, and in the ditches near the main parking lot. At this point, it does not appear to be densely present nor crowding out other species, but simply appears to be present intermingled with other marsh vegetation such as willows, cattails, and tall grasses.

Spotted Knapweed (*Centaurea maculosa*) is present in the old farm fields that are still open and not planted with trees. It is also present in some of the old campground clearings and along the trails coming from the main parking lot. As most of Copeland Forest is forested or wetland and Spotted Knapweed is not shade tolerant or a wetland species, there is not a lot of habitat for this species to invade. However, it may continue to spread in the open areas at the north end of the property and along sunny parts of trails.

Probably more worrisome is the presence of small patches of Common Reed (*Phragmites australis*) along the railway embankment. This species has the capability to spread into adjacent wetlands although currently this does not appear to have happened yet. This situation should be closely monitored since Yellow Rails, and many other species rely on wetland openings that could be filled in by Common Reed. See Recommendations.

One patch of Leafy Spurge (*Euphorbia esula*) was observed on the trail coming in from Pine Ride Ski Club. This was the only location seen, and there were only a few plants present. It may be a good idea to eradicate this species before it becomes a problem.

Beech Bark Disease is present and affects nearly all Beech trees observed. Many trees have died and are standing dead or have fallen on the ground. Others are partially affected. The disease is particularly evident in the northeastern part of property.

Interestingly, the common invasives Common Buckthorn (*Rhamnus cathartica*) and Dog Strangling Vine (*Cynanchum rossicum*) were not seen at Copeland Forest. Also surprisingly, no escape or spread of Scotch Pine was observed. Common Buckthorn may be present but overlooked and would be expected under conifer plantations growing from seeds brought in and dropped by birds.

In 2011, Eastern Forest Tent Caterpillars consumed a great deal of the canopy in the northeast corner of the upland forest (Photo 28). This is a native species which is part of the natural ecosystem and has natural cycles of boom and bust. The effects of tent caterpillars had a noticeable impact on the upland forest in 2011. In areas where the forest is disturbed and the ground flora contains non-native plant species, the lack of canopy leaves allowed increased light to reach the forest floor, resulting in much greater growth of these species than would have normally been possible in the deep shade of the summer forest. Thus, this year's caterpillar impacts may result in some long-term effects in terms of the weediness of the upland forest.

#### 4.8 Other Values

Groundwater seeps within Copeland Forest contribute to the three main rivers that flow from the area. Seeps are located in several areas: along the steep, north-facing slopes above the Coldwater River; at the foot of several steep east-facing slopes at the eastern-most side of the property above a series of small shady ponds linked by a small creek; and at the bottom of a semi-circle of small hills at the southeastern-most side of the main trail loop from the 3rd Line (Figure 10).

These seeps are characterized by ground flora typical of damp ground, such as stream banks or meadowmarshes. Common plants include Bluejoint grass, Touch-me-not, Watercress (*Nasturtium officinale*), and sedges (*Carex* spp.). However, unlike in meadow marshes, here the upwelling groundwater has so permeated the soil that it is impossible for a person to step anywhere without sinking in deeply. It is very deceptive because parts of the ground appear vegetated and solid, but patches of open black muck are a clue to the water that is present. In the spring, surface water at these seeps was running into rivulets and flowing into small creeks before joining more permanent stream courses. The saturated ground is fragile and easily dislodged or churned up. Thus, these areas could be susceptible to damage and erosion of the substrate if people, horses, or other animals enter into them.

Water quality in streams within Copeland Forest is generally very good. Results from benthic invertebrate sampling in this study (Appendix D) show an excellent representation of taxa found only in good water quality. The sampling protocol used focuses on identification of macroscopically-recognizable groups rather than on identification to species which can be extremely labour-intensive and thus prohibitively costly. The presence of five different Group I pollution-sensitive taxa shows that there are currently no impacts occurring to water quality. Since the large wetlands on the western side of Copeland Forest contain the headwaters of these streams, water quality is one indication that the hydrologic system that occurs there (including groundwater discharge and recharge) is intact and not currently being impacted by human activities.

#### 4.9 Historical Features

Many anthropogenic features attest to the history of human usage of Copeland Forest (Figure 11). At four locations there are old cement building foundations, some with old building structure materials, present, and at a few other sites there are old garden plants, such as Periwinkle (*Vinca minor*), that show the historical presence of residential dwellings. All these sites are along outside roads around Copeland Forest or on the 3rd Line trail.

There are also at least four locations that were old campgrounds or picnic areas with broken or rotten wooden picnic tables and old metal fire pits (Photo 29). Some of these sites have old outhouses, non-functioning water taps, and/or rusted metal garbage cans. At present, there do not appear to be any safety issues with these structures, but their locations have been noted in the master data spreadsheet in case the opportunity arises in the future to remove this decaying infrastructure.

Several kinds of structures associated with hunting are present. Several old deer feeding stations (covered wooden bins where grain can be placed) are located in woodland to the west side of the 3rd Line trail, but these stations do not appear to have been used for quite some time. Blinds for hunting ducks are present around the DU pond, and tree stands for hunting White-tailed Deer and/or Black Bear are present in the southwestern part of the property.

Many man-made ponds are present, dug in the 1920s-1930s for water reservoirs to assist with fire fighting (Hawke pers. comm. 2011). These ponds are old enough now that they have naturalized vegetation and are used by native aquatic species.

South of the tracks and west of the DU pond there are some small, square, grassy clearings surrounded by old chicken wire fencing. The past use of these areas is not known, but it looks like the fencing was there to keep animals in or out of the area (possibly deer exclusion to promote food plot growth). Similarly, within some of the surrounding old small clearings, dead apple trees were observed with individual protective page wire fencing still intact (again probably exclusion fencing to prevent over browsing by White-tailed Deer).

At the eastern side of the property, in and along side of a series of plantations, there are many (>30?) square holes in the ground, roughly 1.5m x 1.5m and 1m deep. These may be the result of past harvesting of live trees with root balls.

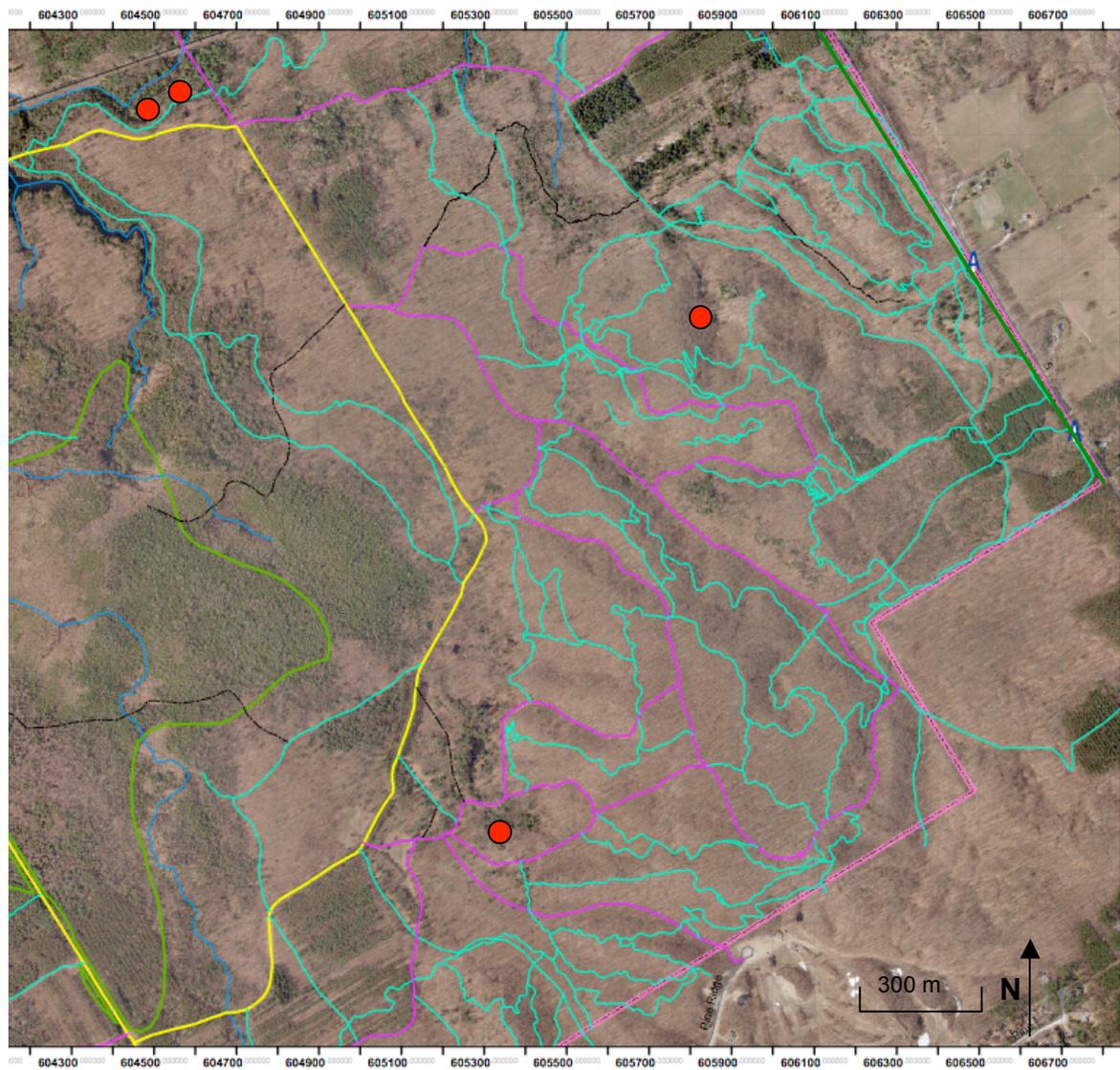


Figure 10. Locations of seeps (red dots) documented in 2011 at Copeland Forest. For orientation, yellow line is main trail from 3rd Line parking lot; purple lines are other main trails; turquoise lines are secondary trails; pink line is property boundary; green line is 5th Line Road.

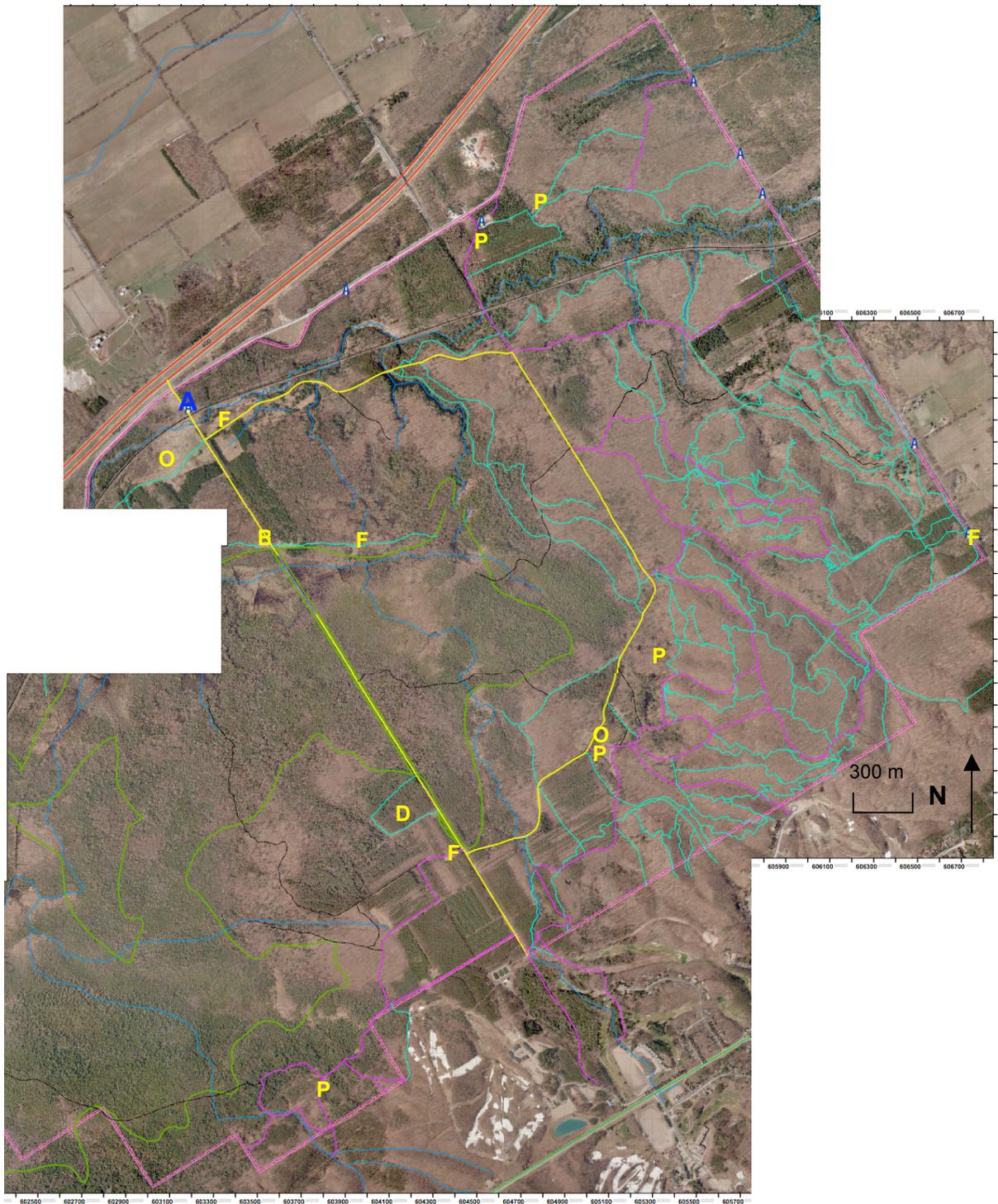


Figure 11. Anthropogenic features present in the eastern half of Copeland Forest in 2011. One foundation along Ingram Road, 500 m northeast of Highway 93 is not shown. Legend: B = old garbage barrel; D = deer feeding location; F = foundation of old building; O = outhouse; P = picnic or camping area with old metal fire pits or old tables. For orientation, A is the main parking lot at the 3rd Line off Ingram Road. Yellow and purple lines are main trails; turquoise lines are secondary trails; pink line is property boundary.

#### **4.10 Recreational and Other Human Uses**

Recreational and other human uses were studied to assess their impacts on the biological features of Copeland Forest. The following recreational uses were documented at Copeland Forest in 2011:

- Mountain Biking
- Horseback Riding
- Jogging
- Dog-walking
- Cross-country Skiing
- Hiking
- Nature Appreciation (bird watching, sketching, etc.)
- Hunting
- Target practice with clay pigeons
- Picking Wild Plants
- Geocaching

##### **Mountain Biking**

On one Saturday in May, more than 200 mountain bikers were observed, including two groups of more than 50 people. Mountain bikes were observed (by Jones) on every visit to Copeland Forest (most of which were on weekdays) throughout the four seasons of this study. Most bikers are using the main trails through the upland forest on the eastern side of the property, but small groups of three or four more adventurous bikers were also frequently observed on the smaller, more hilly trails. These bikers tended to be male and between the ages of 16 and 30. Bikers were not observed west of the 3rd Line except at the southern-most part of the property near the old picnic area (west of the entrance from Horseshoe Valley Road).

The effects of mountain bikers are visible in much of the upland forest. Many recently-created trails are clearly the result of off-trail mountain bike use, as evidenced by the very narrow width of the trail, which is smaller than the space needed for an average person's walking gait. As well, the increasing proliferation of trails is resulting in a loss of ground flora in some areas. For example, near UTMs 606100 4936450 and 605550 49368, there are more trails than would be needed simply to access and view the forest on foot. The proliferation of trails seems to stem, in part, from bikers taking alternate routes around small obstacles, and repeated use then wearing away or dislodging the duff and humus. The combination of loss of ground cover and increased density of trails in a small area may potentially lead to impacts from erosion. In 2011, damage from erosion was not observed on mountain bike trails; however, there is the potential for it if there is heavy rainfall or rapid snow melt.

The spread of the invasive species Garlic Mustard appears to be another impact resulting from mountain bike use, judging by its presence along small trails in the upland forest. While this species can also be spread by hikers, horses, and dogs, mountain bikes likely have a greater potential to spread Garlic Mustard in higher quantities and over a larger area. This is due to the number of mountain bikers using Copeland Forest, the area they can cover within the property, and the force with which the tires contact the ground. See the Recommendations section for a discussion of managing the impacts of mountain bikers.

##### **Horseback Riding**

Horseback riders were also observed (by Jones) on every visit to Copeland Forest. There were usually two people together, usually women between the ages of 30-60. Again, most horseback riders tended to use the main trails through the upland forest, but riders were also using the trails that run west from the entrance from Horseshoe Valley Road around the old picnic area. Most

riders appear to bring the horses to the site by trailer, parking in the lot at the 4th Line, although a few enter from the southern access points, as evidenced by droppings. Horses are able to walk in muddy places that human feet would normally avoid, and the wet spots in several trails through the uplands have gotten churned up and expanded a bit from horseback riding usage. Horses may also spread invasive species and may introduce the seeds of non-native species in their droppings.

### **Jogging**

Joggers were observed on almost every visit to Copeland Forest when the weather was not raining. These were usually just one person or two people together, rather than groups. There were both men and women, usually in the age group 25 – 40, and were mostly seen on the main trails in the uplands and the trails west of the 3rd Line from Horseshoe Valley Road. No impacts from joggers were observed.

### **Dog Walking**

Many families with dogs were seen during evening visit to the Copeland Forest from the main parking lot. Dogs were also seen at many day-time visits to the site usually walking with a single adult human. In both situations, most dogs were on leashes, but some were not. Conflicts between dogs were not observed, but concerned families whose dogs had run off seemed to be a problem, and small kids getting jumped on other people's dogs seemed to be an issue. Dog feces was seldom observed, so people are either picking up after their dogs, or the dogs are not defecating on the main trails. Many dog tracks were observed during the winter visit, so dogs walking appears to be a year-round activity at Copeland Forest. It was clear from the tracks that many dogs were not leashed during the winter season, possibly chasing/harassing wintering deer and causing increased stressors.

### **Cross-Country Skiing, Snowshoeing**

Copeland Forest is heavily used by cross-country skiers. This use was only observed during one weekday at the very beginning of the ski season, but even then there were more than 30 skiers observed in a few hours. Given the proximity of Copeland to large commercial ski facilities, it can be inferred that on a weekend day during the peak season, the numbers of users per day may be in the hundreds depending on weather and snow conditions, and that total usage may be in the thousands for the entire season. The adjacent Horseshoe Resort has a lease to use the trails for skiing, and grooms and maintains several parts of the trail system (Howes pers. comm. to Jones 2012). A great deal of work to prepare the area for skiing (including mowing along roads and trailsides, putting up trail markers, and grading some trails) was observed during the fall. There are also many ungroomed trails that were observed as used by skiers.

Trail maps (Photo 30) posted at several locations indicate that dogs and people walking are not allowed on ski trails. However, this seems to be inconsistent with other signage within Copeland Forest. As well, there are also several new trails laid out for snowshoeing and off-trail skiing that are only marked with flagging tape and laminated paper trail signs. Some of these trails traverse areas of the forest where there is no trail during the summer and thus could become new trails if users continue to access the area outside of winter months or if the flagging tape is not removed. Potential impacts from these trails may need to be assessed because they were already in use with only 10-15 cm of snow cover, and they are in places where there was no trail previously.

### **Hiking and Nature Appreciation**

Hikers or people taking a walk were occasionally seen, especially in the spring during Trillium week and in the fall when the leaves were changing. These tended to be older folks. In the spring, one group of 10 bird watchers was observed. This use may be greater than observed in this study since Jones and Morton may not have been on the same trails as these people. Hikers

and bird watchers used both main and secondary upland trails, perhaps because these trails are the most well-known, although there was no reason apparent for less usage of trails off Ingram Road.

### **Hunting and Target Practice**

Hunting was not as frequent or widespread as might be inferred from current signage at Copeland access points. No hunters were observed during the spring wild turkey season or in the early part of the fall season for turkey or small game. Hunting was not observed until the morning of November 4, 2011, when trucks were noted, parked at several access points along Ingram Road. Used shotgun shells were found during the summer in this area, showing that this is the main area used by hunters. As well, visitors hunting rabbits were observed during the January visit. Finally, the west side of the large field near the main parking lot is being used for sporting shotgun target practice, as evidenced by the large number of broken clay pigeons.

### **Picking Wild Plants**

During May, in the period when the spring ephemerals were at their height, three families were observed picking wild leeks in the deciduous forest off the trail that runs south from the 4th Line parking lot. In subsequent observations of the general area, the place where leeks were picked was not obvious, so the amounts picked and the manner of picking were not extensive or highly disturbing. It can be inferred that the leeks were for personal use rather than for commercial sale. No impacts were observed from picking other than a small area where plants had been removed.

### **Geocaching**

Copeland Forest hosts at least 20 geocaches (Groundspeak 2011). Geocaching is an outdoor activity that involves an on-the-ground search for hidden treasure. Members of the on-line community [www.geocaching.com](http://www.geocaching.com) look up coordinates for small, hidden "caches" and use GPS to find them on public lands. Most of the geocaches at Copeland Forest are hidden a few steps off main trails in the uplands, but a few are accessed from trails from Ingram Road, and a couple are located in cedar swamps. Only one person searching for geocaches was actually observed; however, logs within these geocaches (which are also posted on-line by participants) show that the caches at Copeland are very active and being sought year-round.

There are few issues associated with geocaching other than that it can attract a lot of people to walk into specific areas, and often a small foot trail develops where people walk off the main trail to get to the cache. Also, if the cache is hidden under something, searchers may disturb the area by turning over logs or stones. Many caches at Copeland Forest are hanging on low branches or are in upright stumps, so little disturbance was observed other than a small amount of trampling directly in the area of the caches.

### **Research**

Research being done by Ministry of the Environment to monitor climate change was observed in the southwestern part of the property (UTM 604000 4934550) (Photo 31). More than 20 trees are marked with red paint at this location. Permanent plots used by the Canadian Wildlife Service to monitor forest birds were also observed. Two locations for CWS plots were observed, marked with a plastic tag attached to a tree. CWS reports a total of 5 plots at the following locations:

UTM	
<u>Easting</u>	<u>Northing</u>
605772	4938001
605599	4938030
605450	4938136
605377	4938205
605419	4938345

#### 4.11 Disturbance

A small area of tree cutting was observed just east of the DU pond. The trees cut were all ash or poplar species, and the zone of cutting was a narrow strip. Most of the disturbance was just felled trees, but the wood had not been removed. The purpose of the cutting is not known. It could have been to create a new pathway that would lead to the wetland/water's edge. The cutting may also have been to clear an open sight-line for hunting (where game moving in and out the sight-line can be easily seen).

Dumping of garden refuse (leaves, twigs, weeds, grass clippings, etc.) was observed at three access points into Copeland Forest: at the parking spot on Ingram Road that is just west of the trail to the DU dam, at the parking spot on the 5th Line at the southeastern-most corner of the property; and at the access point on the 5th Line just south of the railway tracks. Refuse materials were left either where the cars park (e.g. cars had to drive over it to park) or left on the flat ground at the edge of the trails into Copeland Forest so that it wasn't visible until entering the property. This activity is not of great concern, but could potentially introduce problem species into the forests in the future if waste materials contain insect pests or seeds of potentially invasive species.

On two occasions during 2011 field work, evidence of recent campfires and "partying" activities were observed in old campground areas.

### 5.0 DISCUSSION

#### 5.1 Historic and potential species—fauna

A wildlife inventory of Copeland Forest was done in 1979 (Craig et al. 1979). The authors of the study give very little information about survey methods used, but they do say the property was divided into 120 squares and every square was visited and surveyed for at least 15 minutes, including all of the interior of the wetland. Thus, it would appear that the earlier inventory covered more area than the current study, but the survey methods in 1979 apparently were not as focused as in the current study since it appears there were no targeted surveys for groups other than birds. Also, the level of identification skills of the observers is not known. Taking all this into consideration, despite the greater coverage and larger focus on birds, the 1979 inventory found only 69 species of birds compared to 101 species found in 2011. The results are similar in other species groups as well. A comparison of the results of the 1979 survey to the current one is presented in Table 6.

Table 6. A comparison of the numbers of fauna species found 32 years ago with those found in 2011 by group.

Group	1979 survey	2011 survey
Birds	69	102
Mammals	14	24
Amphibians	7	11
Reptiles	5	8

The differences in numbers are somewhat due to greater survey expertise in 2011, but also at least in part due to significant habitat changes over time, such as expanded forest cover, increased forest interior habitat, maturity of woodlands, and reduced human influences. In addition, several bird species that were present in 1979 and not seen in 2011 are known to be species currently in

decline or at risk (COSEWIC 2012; OMNR 2012). Species seen by Craig et al. but not seen in 2011 include:

Common Name	Latin Name	COSEWIC/SARO <sup>4</sup> designation
Bank Swallow	<i>Riparia riparia</i>	
Barn Swallow	<i>Hirundo rustica</i>	threatened/threatened
Bobolink	<i>Dolichonyx oryzivorus</i>	threatened/threatened
Canada Warbler	<i>Cardellina canadensis</i>	threatened/special concern
Chimney Swift	<i>Chaetura pelagica</i>	threatened/threatened
Green Heron	<i>Butorides striatus</i>	
Loggerhead Shrike	<i>Lanius ludovicianus</i> var. <i>migrans</i>	threatened/endangered
Purple Martin	<i>Progne subis</i>	
Rusty Blackbird	<i>Euphagus carolinus</i>	special concern/not ranked

At the time of the 1979 wildlife inventory, many conifer plantations did not exist or were only recently planted with very small, widely spaced trees. Thus, there was much more open habitat that could have supported Bobolink and Loggerhead Shrike. Today, there is very little open field habitat at Copeland Forest, with the exception of the fields at Ingram Road and the 3rd Line, which may be too small for Bobolink. No suitable (short-grass) habitat for Loggerhead Shrike was found in 2011. Suitable breeding habitat for Chimney Swift was also not present.

Of the above list, only Bobolink and Barn Swallow were reported in the square containing Copeland Forest in the Ontario Breeding Bird Atlas (Cadman et al. 2001-2005). However, the observations for the first two species probably come from agricultural areas outside Copeland Forest. None of the species listed above have been reported by the Canadian Wildlife Service (CWS) in permanent plots for monitoring forest birds (CWS unpublished data).

Potentially suitable habitat for Canada Warbler is present at Copeland Forest although the species was not seen in 2011. Understory shrubs and thickets within moist mixed forest are present in transitional forests around Red Maple and Black Ash swamps. These are present along the 3rd Line, at places along the western half of the railway corridor, and south of Ingram Road (see vegetation mapping). The decline and current scarcity of this species makes it unlikely to be present at Copeland, but it should still be sought.

Least Bittern (*Ixobrychus exilis*) was not heard or seen in 2011 and has not been historically reported from Copeland Forest or the surrounding atlas square. However, a lot of potentially suitable habitat for this species is present. Habitat for Least Bittern is shallow marsh consisting mostly of large areas of cattails or sedges with some mixed vegetation of shrubs and hummocks, and with patches of open water also present. This is a very secretive species that is usually heard rather than seen when present. Again, the decline and scarcity of the species make it unlikely to be present at Copeland, but suitable habitat exists particularly in the system that flows into the DU pond and in the open marshes in the interior of the wetland.

Red-headed Woodpecker (*Melanerpes erythrocephalus*) was not observed in this study, nor was the species recorded by Craig et al. (1979). It was reported only once in the square containing Copeland Forest in the Ontario Breeding Bird Atlas (Cadman et al. 2005) and has not been reported by CWS. Plantations where many trees have died and are standing dead (see vegetation

<sup>4</sup> COSEWIC – Committee on the Status of Endangered Wildlife in Canada; SARO - Species At Risk in Ontario.

mapping for codes that begin with FOMM) may provide some marginally suitable habitat, but on the whole, the likelihood of Red-headed Woodpecker using Copeland Forest appears very low.

The CWS plots reported the presence of Long-eared Owl (not at risk) in 2000 and 2003 but not more recently. This species was not found in 2011 but should continue to be sought to see if it is present.

## 5.2 Historic species—flora

The botanical study by Bobbette and Webber (1979) found 599 species of vascular plants, of which 111 species were non-native or Eurasian species and 488 were native species. The current study found only 448 vascular plant species of which 388 are native species. It is not known how much field time was devoted to the 1979 study, but judging by the number of plants collected in 1979 and the fact that a 156 page report dedicated solely to botany was produced, it is possible that the 1979 survey included more field time devoted to plants than the current study. Bobbette and Webber were both experienced botanists at the time, and both are known to the authors of the current study. Thus, the 1979 data can be taken as credible.

Most of the difference in numbers of species can be accounted for, and is primarily due to the reduction or loss of two habitats that were formerly much more common at Copeland Forest and which are now present only as small remnants. The loss of these habitats is due in part to natural succession closing in formerly open areas, and in part to changes in water levels and flooding from the installation and presence of the Ducks Unlimited dam.

Open, sandy ground (called Poverty Brackenland and Poverty Grassland by Bobbette) was formerly widespread in old fields and along the fringes of what were then recently planted plantations with young trees. This habitat is now only present in small remnant patches of less than ½ ha in size, and at one site along Ingram Road. Most fields are now tall conifer plantations with no open ground. The one semi-open area off Ingram Road is now densely grassy and heavily vegetated with Poverty Grass (*Danthonia spicata*), Bracken Fern (*Pteridium aquilinum*), and Blackberry (*Rubus alleghaniensis*), and contains almost no bare ground. More than 30 species of open habitats or bare sandy ground were listed in 1979 but were not observed in 2011, including these:

Rough Hair-grass	<i>Agrostis scabra</i>
Ticklegrass	<i>Agrostis hyemalis</i>
Thimbleweed	<i>Anemone cylindrica</i>
Arrow-leaved Aster	<i>Aster sagittifolius</i> (= <i>Symphotrichum urophyllum</i> )
Indian Hemp	<i>Apocynum cannabinum</i>
Sedge	<i>Carex cumulata</i>
Sedge	<i>Carex houghtoniana</i>
Sedge	<i>Carex merritt-fernaldii</i>
Sedge	<i>Carex muhlenbergii</i>
Sedge	<i>Carex umbellata/rugosperma</i>
Sneezeweed	<i>Conyza canadensis</i>
Ridge-seed Spurge	<i>Euphorbia glyptosperma</i>
Hairy Spurge	<i>Euphorbia vermiculata</i>
Fragrant Cudweed	<i>Gnaphalum obtusifolium</i>
Clammy Cudweed	<i>Gnaphalum viscosum</i>
Bluets	<i>Hedyotis longifolia</i>
Muhlygrass	<i>Muhlenbergia frondosa</i>
Mexican Muhlygrass	<i>Muhlenbergia mexicana</i>
Small-flowered Evening Primrose	<i>Oenothera parviflora</i>

Little Sundrops	<i>Oenothera perennis</i>
Adder's Tongue	<i>Ophioglossum vulgatum</i>
Thin-leaved Panic Grass	<i>Panicum linearifolium</i>
Northern Panic Grass	<i>Panicum boreale</i>
Hairy Beardtongue	<i>Penstamon hirsutus</i>
American Figwort	<i>Scrophularia lanceolata</i>
Early Goldenrod	<i>Solidago juncea</i>
Sand Dropseed	<i>Sporobolus cryptandrus</i>
Ensheathed Dropseed	<i>Sporobolus vaginiflorus</i>
Hoary Vervain	<i>Verbena stricta</i>

The other habitat that exists only as small remnants is open sedge flat. According to Bobbette and Webber (1979) these openings had a fen-like composition and contained several species that were locally rare at the time. The primary place where sedge flats were formerly present is at the location that is now flooded by the DU dam, which formerly was an area of open boggy patches (Bobbette pers. comm. to Jones 2011). In addition, many of these species were also present in frequent openings in cedar swamps (Bobbette pers. comm. to Jones 2011). However, due to natural succession, much of the cedar swamp is now closed in and well-shaded, and some former areas of sedge marsh are now converted to alder thickets. Furthermore, changes in water levels due to beaver activities have changed some areas of vegetation. Still, small openings do exist here and there, and some of these species may still be present somewhere even though they were not encountered in openings that were visited in 2011.

Two small remnants of sedge meadow remain at the north side of the property along Ingram Road. However, these are well-vegetated with a dense cover of Twigrush and don't contain much diversity. It is possible that some remnants of sedge flat habitat remain in the southwestern corner of Copeland Forest since this is where Yellow Rails were heard, and Yellow Rails prefer sedge flats for habitat. At least 30 species listed by Bobbette and Webber are associated with sedge flats and open wet meadows and were not found in 2011 including:

Buxbaum's Sedge	<i>Carex buxbaumii</i>
Sedge	<i>Carex canescens</i>
Sedge	<i>Carex cristatellata</i>
Garber's Sedge	<i>Carex garberi</i>
Sedge	<i>Carex prairea</i>
Sedge	<i>Carex projecta</i>
Sedge	<i>Carex scoparia</i>
Sedge	<i>Carex sterilis</i>
Sedge	<i>Carex tenera</i>
Sedge	<i>Carex vaginata</i>
Golden Saxifrage	<i>Chrysosplenium americanum</i>
Round-leaved Sundew	<i>Drosea rotundifolia</i>
Spikerush	<i>Eleocharis erythropoda</i>
Spikerush	<i>Eleocharis obtusa</i>
Bog Cotton	<i>Eriphorum viridi-carinatum</i>
Bottle Gentian	<i>Gentiana andrewsii</i>
Shrubby St. John's Wort	<i>Hypericum kalmianum</i>
St. John's Wort	<i>Hypericum majus</i>
Rush	<i>Juncus brachycephalus</i>
Rush	<i>Juncus brevicaudatus</i>
Rush	<i>Juncus nodosus</i>
Loessel's Twayblade	<i>Liparis loesselii</i>

Buck Bean	<i>Menyanthes trifoliata</i>
Beak Rush	<i>Rhynchospora capitellata</i>
Ragged Fringed Orchid	<i>Platanthera lacera</i>
Northern Club Rush	<i>Scirpus hudsonianus</i>
Nodding Ladies Tresses	<i>Spiranthes cernua</i>

In general, the flooding of the DU dam area, and recent beaver activity has probably resulted in deeper water and year-round flooded conditions in some of the wetlands, perhaps resulting in a loss of diversity among species that would normally be found in other damp ground, such as the edges of marshes, wet woods or stream banks.

In addition, several woodland species were not found in 2011 despite extensive time and survey coverage spent in the upland deciduous forest. The disappearance of these species probably indicates a general loss of biodiversity in the upland forest. Many of these species are associated with the moister areas of deciduous forest such as around vernal pools or in pit-and-hummock topography, both of which were uncommon at Copeland Forest. Most of the deciduous forest was on the dry end of the moisture spectrum and on very sandy-well drained soil, so it is possible that forests have become drier in the last 30 years. Forest management since 1979 may also have resulted in the loss of some species (through loss of canopy and resultant drying of the ground or through direct disturbance to the ground). Certainly, the loss of the canopy to Eastern Forest Tent Caterpillars resulted in drier than usual ground conditions in 2011. There may be other potential causes as well; for example, studies have shown that non-native earthworms can cause a decline in species diversity in forest flora (c.f. Muratake 2003; Bohlen et al. 2004). Worms were not examined at Copeland Forest, but they may be a potential issue if present. As well, anthropogenic activities in general can impact forests by reducing the symbiotic ectomycorrhizal fungi that most woody species require (Baxter et al. 1999).

Woodland species not found in 2011 include these and possibly other species:

Upland Bent Grass	<i>Agrostis perennans</i>
Spikenard	<i>Aralia racemosa</i>
Squawroot	<i>Conopholis americana</i>
Early Coral Root	<i>Corallorhiza trifida</i>
Striped Coral Root	<i>Corallorhiza striata</i>
Spotted Coral Root	<i>Corallorhiza maculata</i>
Honeywort	<i>Cryptotaenia canadensis</i>
Rattlesnake Plantain	<i>Goodyera repens</i>
Rattlesnake Plantain	<i>Goodyera tessellata</i>
Ginseng	<i>Panax quinquefolius</i>
Round-leaved Orchid	<i>Platanthera orbiculata</i>
Bluegrass	<i>Poa alsodes</i>
Zigzag Goldenrod	<i>Solidago flexuosa</i>
Blue-stemmed Goldenrod	<i>Solidago caesia</i>

A collection of Ginseng was listed in the study by Bobbette and Webber (1979), which might lead to the conclusion that the species may have been common in Copeland Forest at one time. However, Webber (pers. comm. 2012) reports that in 1979 only one plant was observed, and that the voucher collection was only one leaflet. She stated that the plant observed was probably introduced from a bird dropping and says that in her experience she has often seen Ginseng in that situation (e.g. one plant from a bird dropping). Bobbette (pers. comm. 2012) does not recall seeing Ginseng at Copeland Forest but certainly still has very good recall of other species that

were present and of the layout of the vegetation in 1979. Thus, it is a reasonable assumption that Ginseng was certainly not common or widespread in 1979.

Webber no longer remembers where the Ginseng specimen was deposited. A number of herbaria were contacted in an attempt to locate the specimen, including University of Toronto (TRT), Erindale (TRTE), and Agriculture Canada (DAO), without success. As well, the specimen was not present with the bulk of the other 1979 specimens from Copeland Forest (Benvenuti pers. comm. 2012), which are currently housed at the Wyevale Centre.

Some of the difference in numbers of plant species in the earlier study is due to greater emphasis being put on vegetation in the current study. Several common native species reported in 1979 but not seen in 2011 are certainly still present and probably were simply overlooked including these species and several others:

Pearly Everlasting	<i>Anaphalis margaritacea</i>
New England Aster	<i>Aster novae-angliae</i>
Golden Sedge	<i>Carex aurea</i>
Peck's Sedge	<i>Carex peckii</i>
Bittersweet	<i>Celastrus scandens</i>
Fireweed	<i>Epilobium angustifolium</i>
Annual Fleabane	<i>Erigeron annuus</i>
Woodland Strawberry	<i>Fragaria vesca</i>
Dotted Smartweed	<i>Polygonum punctatum</i>
Swamp Cinquefoil	<i>Potentilla palustris</i>
Tall Miner's Lettuce	<i>Prenanthes altissima</i>
Autumn Willow	<i>Salix serissima</i>
Narrow-leaved Speedwell	<i>Veronica scutellata</i>

Thus, there has been a loss of biodiversity in plant species in the last 32 years, in at least three habitats, and possibly in others. There may be an increasing trend in faunal diversity over the same time period, but the earlier data are probably not as reliable for comparison.

## 6.0 REPRESENTATION AND EVALUATION OF ANSI STATUS

Copeland Forest was designated a regionally significant ANSI within Ecodistrict 6E-6 for its representation of swamp vegetation on two landforms, the sand plain—shorecliff of the Simcoe Uplands and the clay and organic substrates of the Simcoe Lowlands (Hanna 1984). Data from this current study show Copeland Forest contains 826 ha of wetlands of which 705 ha is swamp and thicket swamp. Other sites in Ecodistrict 6E-6 with this combination of landform-vegetation types are Bass Lake Provincial Park and surrounding wetlands, Duclos Point Provincial Nature Reserve, McGinnis Point ANSI, and Minesing Swamp. Of these, only Minesing Swamp has greater area and contains a comparable or better diversity of vegetation communities than Copeland Forest. However, Bass Lake PP and Duclos PNR already provide representative swamp vegetation within the protected area system of Ontario, and Minesing Swamp also provides protected representation although it is a conservation area. As well, an increase in significance level for Copeland Forest would not increase the amount of protection it receives from development. Therefore, no increase in significance level is recommended.

An updated checklist which evaluates the representation, condition, diversity, ecological functions, and special features of Copeland Forest is presented in Appendix G.

## 7.0 CONCLUSIONS

### 7.1 Recommendations—Protection of Sensitive Species and Wildlife Values

Human activities and invasive species were observed to be impacting some of the biological features of Copeland Forest in 2011, and some potential impacts were also recognized. Suggestions for specific actions to address these impacts or considerations are detailed below.

Limit off-trail activities and prevent new trail construction in the area of the Butternut seedlings and near winter denning areas along the stream banks at the eastern side of the property. Trails in these areas may need to be closed off, perhaps with barricades. Signage stating that there is an endangered species present (without specifying exactly what it is) may be useful to explain the closure.

For Eastern Pondmussel, if any maintenance of the adjacent culvert or road bed, any changes to the culverts or road bed, any in-stream work or water level manipulation is required, protection plans for this population would need to be considered and work authorizations will be required by the Department of Fisheries and Oceans.

Protect the areas of highest woodland quality and most amphibian breeding potential (the A-ranked woodland in the northeast corner, and the AB areas) because these areas contain the core of the intact, functional forest ecosystem, provide breeding habitat for amphibians, birds, and other species, and contain a seed source for the restoration of less-common species. To prevent entry of invasive species, trail proliferation, and damage to the ground, some of these actions may be needed: signage requesting users not to leave the trail, limiting trail usage to foot traffic only, or complete trail closure of some trails.

To prevent disturbance to wildlife, time the mowing of fields near the 3rd Line parking lot to be done after July 15 to allow birds nesting in the fields time to complete their reproductive cycle. Some additional enforcement may be required to ensure that dogs are kept on-leash and not allowed to run loose, potentially disturbing wildlife. Winter use of the denning area in the northeast corner and of the deer yard in the southwestern quadrant should be limited.

Plan prompt eradication of the currently small population of Common Reed to prevent spread into adjacent wetlands, and monitor the spread of this species along the railway embankment and along the Penetanguishene Road to prevent impacts to Yellow Rail habitat. Best management practices on this species (OMNR 2011) may be helpful. As well, a comprehensive plan to deal with Garlic Mustard at Copeland Forest is needed. Some interim methods (spraying, cutting, etc.) to slow the spread of this species should be considered while trying to achieve a longer-term goal of control or semi-eradication. Some patches in the interior should be addressed as soon as possible so that they can be removed while they are still small and success more likely. Consider limiting bicycle and horse activity through the areas of greatest infestation to prevent further spread of Garlic Mustard. Examine whether closing the entrance from Horseshoe Valley during Garlic Mustard's fruiting period would be useful.

Discuss whether it is still desirable to extract forest resources from Copeland Forest and whether some plantations should be harvested or thinned to provide income or to promote regeneration of understory species.

Meet with management from adjacent resorts to ensure that commercial usage meshes with overall property management goals. Involve commercial users in protection actions such as

deflecting winter use from deer yards and denning areas, and closing certain trails to mountain bikers.

In general, some areas of Copeland Forest may need to be closed to mountain bikers and horses to prevent further trail proliferation, spread of invasives, and damage to the ground. Planning is needed to look at areas of woodland quality, denning areas, Butternut seedling locations, and amount of trail usage, to determine where trail closures are desirable or feasible. Some type of enforcement or management presence on-site may be required to ensure that protection measures are respected.

## **7.2 Recommendations—Human Safety**

Assess status of plantations with dead or dying trees for safety issues. Warning signage or trail closure may be needed if there is danger of falling trunks or limbs. Monitor Beech Bark Disease areas as well, and consider safety issues if there is danger of falling dead trunks or limbs.

To improve users' ability to orient themselves while at Copeland Forest, consider posting a trail map at major entry points, as well as occasional route information inside the property. Colour coding or naming trails may also help.

The issues Copeland Forest faces, such as the increasing number of users, the spread of invasives, human safety, trail signage, differing user needs, etc., are similar to the issues more frequently found in parks. Copeland Forest is currently supporting a large amount of recreational use, and the people using the forest appear to come mostly from a semi-urban population. This is a different group of people than those who use crown land for hunting, trapping, fishing, or snowmobiling. When preparing management and protection for Copeland Forest it may be instructive to think in terms of park strategies that concentrate on signage, education, interpretation, and use of protective zonation for sensitive areas with continued recreational use in other areas.

An assessment of life science values within Copeland Forest to those elsewhere in the ecodistrict shows that Copeland Forest is appropriately designated a regional ANSI. However, assessing availability of similar mountain bike or cross country ski experiences in the region might be more instructive than comparing life science values to see what sorts of management strategies will be needed. As well, the desirability of continued resource extraction, the need for revenue generation from forest management, and the availability of public recreational land, are probably also important factors in determining management strategies for Copeland Forest.

## **7.3 Recommendations—Future Work**

Continue to check for the presence of species at risk that were not found (or not widely encountered) in 2011 but for which there is suitable habitat: Least Bittern, Red-headed Woodpecker, Whip-poor-will, Eastern Ribbon Snake, Milksnake, and Forked Three-awned Grass. Information gaps on other species or groups could also be filled, for example, surveys for gastropods and non-vascular plants.

In order to better compare the current situation to future changes, it may be useful to quantitatively document some of the vegetation at Copeland Forest using the Vegetation Sampling Protocol. This will allow detailed monitoring of future change. As well, impacts in areas of high diversity may need monitoring so that actions can be taken if it becomes necessary (for example, if new invasive species come in or if garbage is being left).

Future research on the presence and distribution of exotic earthworms in the upland forest would be useful to determine if earthworms are causing an impact to duff and humus layers and to ground flora.

The presence of old, decaying infrastructure (outhouses, fire pits, broken picnic tables) highlights the lack of a current functioning presence of these things. Similarly, an old metal garbage barrel (even a full one) encourages people to leave garbage thinking that someone will come to pick it up, and old fire pits suggest that the area could still be used for camping or partying. It is recommended that a goal be set to remove all of these items as soon as it becomes feasible.

However, some of the human history of the area should be protected and presented to the public to help maintain interest in and appreciation for Copeland Forest. The old house foundations, the age of trees in the oldest plantations, the long stone piles and open grown trees are all heritage items that create an understanding of the past. These should be protected.

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## APPENDIX A: BIRD SPECIES OBSERVED AT COPELAND FOREST IN 2011

Bold type indicates a species of conservation concern (with further details given in Table 2 in the main body of this document).

### Breeding Codes as per Bird Studies Canada Protocol

Conf = Confirmed: active nest, egg shells, feeding young

Pr = Probable: pairs observed, nest building, courtship display

Po-H = Possible: Observed in suitable nesting habitat

Po-S = Possible: Singing/Calls in suitable nesting habitat

Ob -X = Observed in breeding season but no evidence of breeding

Ob = Observed bird outside of the Breeding Season

Common Name	Scientific Name	General Habitat	Breeding Evidence
Alder Flycatcher	<i>Empidonax alnorum</i>	Wetland	Po-S
American Black Duck	<i>Anas rubripes</i>	Wetland	Po-H
American Crow	<i>Corvus brachyrhynchos</i>	Open	Ob
American Goldfinch	<i>Carduelis tristis</i>	Open	Conf
American Redstart	<i>Setophaga ruticilla</i>	Forest	Pr
American Robin	<i>Turdus migratorius</i>	Open	Conf
American Woodcock	<i>Scolopax minor</i>	Forest	Po-H
Baltimore Oriole	<i>Icterus galbula</i>	Open	Pr
Barred Owl	<i>Strix varia</i>	Wetland	Po-S
Bay-breasted Warbler	<i>Setophaga castanea</i>	Forest	Po-H
Belted Kingfisher	<i>Ceryle alcyon</i>	Wetland	Pr
Black-and-white Warbler	<i>Mniotilta varia</i>	Forest	Pr
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	Open	Po-S
Blackburnian Warbler	<i>Setophaga fusca</i>	Forest	Po-S
Black-capped Chickadee	<i>Poecile atricapillus</i>	Forest	Conf
Black-throated Blue Warbler	<i>Setophaga caerulescens</i>	Forest	Po-S
Black-throated Green Warbler	<i>Setophaga virens</i>	Forest	Pr
Blue Jay	<i>Cyanocitta cristata</i>	Forest	Conf
Blue-headed Vireo	<i>Vireo solitarius</i>	Forest	Po-S
Blue-winged Teal	<i>Anas discors</i>	Wetland	Conf
Broad-winged Hawk	<i>Buteo platypterus</i>	Forest	Po-H
Brown Creeper	<i>Certhia americana</i>	Forest	Pr
Brown Thrasher	<i>Toxostoma rufum</i>	Open	Pr
Brown-headed Cowbird	<i>Molothrus ater</i>	Open	Po-H
Canada Goose	<i>Branta canadensis</i>	Wetland	Conf
Cape May Warbler	<i>Setophaga tigrina</i>	Forest	Po-S
Cedar Waxwing	<i>Bombycilla cedrorum</i>	Forest	Pr
Chesnut-sided Warbler	<i>Setophaga pennsylvanica</i>	Forest	Po-H
Chipping Sparrow	<i>Spizella passerina</i>	Open	Po-H
Common Grackle	<i>Quiscalus quiscula</i>	Open	Pr

Common Name	Scientific Name	General Habitat	Breeding Evidence
Common Merganser	<i>Mergus merganser</i>	Wetland	Po-H
Common Raven	<i>Corvus corax</i>	Forest	Ob
Common Yellowthroat	<i>Geothlypis trichas</i>	Wetland	Pr
Dark-eyed Junco	<i>Junco hyemalis</i>	Forest	Po-H
Downy Woodpecker	<i>Picoides pubescens</i>	Forest	Conf
Eastern Kingbird	<i>Tyrannus tyrannus</i>	Open	Po-H
Eastern Phoebe	<i>Sayornis phoebe</i>	Open	Conf
Eastern Screech-Owl	<i>Otus asio</i>	Forest	Po-S
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	Open	Po-H
Eastern Wood-Pewee	<i>Contopus virens</i>	Forest	Po-H
European Starling	<i>Sturnus vulgaris</i>	Open	Pr
Field Sparrow	<i>Spizella pusilla</i>	Open	Po-S
Gray Catbird	<i>Dumetella carolinensis</i>	Open	Conf
Gray Jay	<i>Perisoreus canadensis</i>	Forest	Po-H
Great Blue Heron	<i>Ardea herodias</i>	Wetland	Ob-X
Great Crested Flycatcher	<i>Myiarchus crinitus</i>	Wetland	Po-H
Great Horned Owl	<i>Bubo virginianus</i>	Forest	Po-S
Hairy Woodpecker	<i>Picoides villosus</i>	Forest	Conf
Hermit Thrush	<i>Catharus guttatus</i>	Forest	Po-S
Herring Gull	<i>Larus argentatus</i>	Wetland	Ob
Hooded Merganser	<i>Lophodytes cucullatus</i>	Wetland	Pr
House Sparrow	<i>Passer domesticus</i>	Open	Pr
House Wren	<i>Troglodytes aedon</i>	Open	Po-S
Indigo Bunting	<i>Passerina cyanea</i>	Open	Pr
Least Flycatcher	<i>Empidonax minimus</i>	Wetland	Po-S
Mallard	<i>Anas platyrhynchos</i>	Wetland	Conf
Marsh Wren	<i>Cistothorus palustris</i>	Wetland	Po-S
Mourning Dove	<i>Zenaida macroura</i>	Open	Pr
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	Forest	Po-S
Northern Cardinal	<i>Cardinalis cardinalis</i>	Forest	Conf
Northern Flicker	<i>Colaptes auratus</i>	Open	Pr
Northern Goshawk	<i>Accipiter gentilis</i>	Forest	Po-H
Northern Harrier	<i>Circus cyaneus</i>	Wetland	Ob
Northern Parula	<i>Setophaga americana</i>	Forest	Po-S
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	Wetland	Pr
Northern Saw-Whet Owl	<i>Aegolius acadicus</i>	Forest	Po-S
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Wetland	Po-H
Ovenbird	<i>Sieurus aurocapilla</i>	Forest	Pr
Pileated Woodpecker	<i>Dryocopus pileatus</i>	Forest	Conf
Pine Warbler <sup>2</sup>	<i>Setophaga pinus</i>	Forest	Pr
Purple Finch	<i>Carpodacus purpureus</i>	Open	Po-S

Common Name	Scientific Name	General Habitat	Breeding Evidence
Red-bellied Woodpecker	<i>Melanerpes carolinus</i>	Forest	Po-H
Red-breasted Nuthatch	<i>Sitta canadensis</i>	Forest	Po-H
Red-eyed Vireo	<i>Vireo olivaceus</i>	Forest	Po-H
Red-shouldered Hawk <sup>1</sup>	<i>Buteo lineatus</i>	Forest	Ob
Red-tailed Hawk	<i>Buteo jamaicensis</i>	Open	Po-H
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	Wetland	Conf
Rock Dove	<i>Columbia livia</i>	Open	Ob
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	Forest	Pr
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	Open	Pr
Ruffed Grouse	<i>Bonasa umbellus</i>	Forest	Conf
Scarlet Tanager	<i>Pirango olivacea</i>	Forest	Po-H
Sharp-shinned Hawk	<i>Accipiter striatus</i>	Forest	Po-H
Song Sparrow	<i>Melospiza melodia</i>	Wetland	Po-S
Sora	<i>Porzana carolina</i>	Wetland	Po-S
Spotted Sandpiper	<i>Actitis macularia</i>	Wetland	Ob
Swainson's Thrush	<i>Catharus ustulatus</i>	Forest	Po-S
Swamp Sparrow	<i>Melospiza georgiana</i>	Wetland	Po-H
Tree Swallow	<i>Tachycineta bicolor</i>	Open	Conf
Tundra Swan	<i>Cygnus columbianus</i>	Wetland	Ob
Veery	<i>Catharus fuscescens</i>	Forest	Po-H
Virginia Rail	<i>Rallus limicola</i>	Wetland	Po-H
Warbling Vireo	<i>Vireo gilvus</i>	Forest	Po-S
White-breasted Nuthatch	<i>Sitta carolinensis</i>	Forest	Pr
White-throated Sparrow	<i>Zonotrichia albicollis</i>	Open	Pr
Wild Turkey	<i>Meleagris gallopavo</i>	Open	Conf
Winter Wren	<i>Troglodytes troglodytes</i>	Forest	Po-S
Wood Duck	<i>Aix sponsa</i>	Wetland	Conf
Wood Thrush	<i>Hylocichla mustelina</i>	Forest	Po-S
Yellow Rail	<i>Coturnicops noveboracensis</i>	Wetland	Po-S
Yellow Warbler	<i>Setophaga petechia</i>	Open	Po-H
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	Forest	Pr
Yellow-billed Cuckoo <sup>3</sup>	<i>Coccyzus americanus</i>	Open/woods	Ob
Yellow-rumped Warbler	<i>Setohpaga coronata</i>	Open	Po-S

<sup>1</sup>2011 observation by David Hawke, pers. comm. <sup>2</sup>observation by Margo Holt, pers. comm. 2011 <sup>3</sup>Bioblitz 2011.

**APPENDIX B:  
MAMMAL SPECIES OBSERVED AT COPELAND FOREST IN 2011**

No mammal species encountered are designated at risk either in Canada or in Ontario (COSEWIC 2012; OMNR 2012). All are ranked globally secure or G5 (NatureServe 2012). Provincial S ranks (NHIC 2012):

S4 = Apparently secure (uncommon)

S5 = Secure (common, widespread)

Common Name	Scientific Name	Ranking	
		Global	Prov.
Beaver	<i>Castor canadensis</i>	G5	S5
Big Brown Bat	<i>Eptesicus fuscus</i>	G5	S5
Black Bear	<i>Ursus americanus</i>	G5	S5
Coyote	<i>Canis latrans</i>	G5	S5
Deer Mouse	<i>Peromyscus maniculatus</i>	G5	S5
Eastern Chipmunk	<i>Tamias striatus</i>	G5	S5
Eastern Cottontail	<i>Sylvilagus floridanus</i>	G5	S5
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>	G5	S5
Fisher	<i>Martes pennanti</i>	G5	S5
Long-tailed Weasel	<i>Mustela frenata</i>	G5	S4
Mink	<i>Mustela vison</i>	G5	S4
Muskrat	<i>Ondatra zibethica</i>	G5	S5
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	G5	S5
Porcupine	<i>Erethizon dorsatum</i>	G5	S5
Raccoon	<i>Procyon lotor</i>	G5	S5
Red Fox	<i>Vulpes vulpes</i>	G5	S5
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	G5	S5
River Otter	<i>Lutra canadensis</i>	G5	S5
Snowshoe Hare	<i>Lepus americanus</i>	G5	S5
Star-nosed Mole	<i>Condylura cristata</i>	G5	S5
Striped Skunk	<i>Mephitis mephitis</i>	G5	S5
White-footed Mouse*	<i>Peromyscus leucopus</i>	G5	S5
White-tailed Deer*	<i>Odocoileus virginianus</i>	G5	S5
Woodchuck	<i>Marmota monax</i>	G5	S5

\*Deer Mouse was observed by John Morton while sitting at an evening amphibian point count location, along the edge of wetland. The animal left track prints in the soft organic soil, and the tail was bicolored. White-footed Mouse was also observed by John Morton, mid-day in deciduous forest. The tail was distinctly shorter than the head/body. Based on observations, location of sightings, and one being after dark (a nocturnal species), it is the professional opinion of the authors that two separate species have been observed. The authors recognize that these species can be difficult to distinguish without capturing; however, John Morton an experienced observer who has seen both species numerous times at many different locations, in both capture and wild situations. Therefore, a high degree of confidence can be assumed for these identifications.

## APPENDIX C: AMPHIBIAN AND REPTILE SPECIES OBSERVED AT COPELAND FOREST IN 2011

National at-risk status from COSEWIC 2012; provincial status from OMNR 2012; global G rank from NatureServe 2012; provincial S rank from NHIC 2012; regional rarity is presumed from other designations.

G1 or S1 = Critically imperiled (extremely rare)

G2 or S2 = Imperiled (very rare)

G3 or S3 = Vulnerable (rare)

G4 or S4 = Apparently secure (uncommon)

G5 or S5 = Secure (common, widespread)

Common Name	Scientific Name	Ranking		Status		
		Global	Prov.	National	Prov.	Regional
<b>Amphibians</b>						
Red-spotted Newt	<i>Notophthalmus viridescens viridescens</i>	G5	S5	NAR	NAR	NAR
Eastern Red-backed Salamander	<i>Plethodon cinereus</i>	G5	S5	secure	NAR	NAR
American Toad	<i>Anaxyrus americanus</i>	G5	S5	NAR	NAR	NAR
Gray Treefrog	<i>Hyla versicolor</i>	G5	S5	NAR	NAR	NAR
Spring Peeper	<i>Pseudacris crucifer</i>	G5	S5	NAR	NAR	NAR
American Bullfrog	<i>Rana catesbeiana</i>	G5	S4	NAR	NAR	NAR
Green Frog	<i>Rana clamitans</i>	G5	S5	NAR	NAR	NAR
Pickerel Frog	<i>Rana palustris</i>	G5	S4	NAR	NAR	NAR
Northern Leopard Frog	<i>Rana pipiens</i>	G5	S5	NAR	NAR	NAR
Mink Frog	<i>Rana septentrionalis</i>	G5	S5	NAR	NAR	NAR
Wood Frog	<i>Rana sylvatica</i>	G5	S5	NAR	NAR	NAR
<b>Reptiles</b>						
Ring-necked Snake	<i>Diadophis punctatus</i>	G5	S4	NAR	NAR	NAR
<b>Milksnake</b>	<b><i>Lampropeltis triangulum</i></b>	<b>G5</b>	<b>S3</b>	<b>SC</b>	<b>SC</b>	<b>Rare</b>
Northern Watersnake	<i>Nerodia sipedon</i>	G5	S5	NAR	NAR	NAR
Smooth Greensnake	<i>Opheodrys vernalis</i>	G5	S4	NAR	NAR	NAR
DeKay's Brownsnake	<i>Storeria dekayi</i>	G5	S5	NAR	NAR	NAR
Red-bellied Snake	<i>Storeria occipitomaculata</i>	G5	S5	NAR	NAR	NAR
Eastern Gartersnake	<i>Thamnophis sirtalis sirtalis</i>	G5	S5	NAR	NAR	NAR
<b>Snapping Turtle</b>	<b><i>Chelydra serpentina</i></b>	<b>G5</b>	<b>S3</b>	<b>SC</b>	<b>SC</b>	<b>Rare</b>
Midland Painted Turtle	<i>Chrysemys picta marginata</i>	G5	S5	NAR	NAR	NAR

**APPENDIX D:  
FISH SPECIES AND BENTHIC TAXA OBSERVED AT COPELAND FOREST IN  
2011**

See Appendix C for an explanation of rankings and status. A sampling of benthic invertebrates is shown in Photo 32. Additional information for fisheries in the Sturgeon River, Coldwater River, and Marl Creek has been compiled that summarizes data from the 1950s to 2010. It is on file at OMNR, Midhurst.

Common Name	Scientific Name	Ranking		Status		
		Global	Prov.	National	Prov.	Regional
Fish:						
Brook Stickleback	<i>Culaea inconstans</i>	G5	S5	NAR	NAR	NAR
Pumpkinseed	<i>Lepomis gibbosus</i>	G5	S5	NAR	NAR	NAR
Common Shiner	<i>Luxilus cornutus</i>	G5	S5	NAR	NAR	NAR
Northern Redbelly Dace	<i>Phoxinus eos</i>	G5	S5	NAR	NAR	NAR
Blacknose Dace	<i>Rhinichthys atratulus</i>	G5	S5	NAR	NAR	NAR
Creek Chub	<i>Semotilus atromaculatus</i>	G5	S5	NAR	NAR	NAR
Others:						
Eastern Pondmussel	<i>Ligumia nasuta</i>	G4	S1	Endangered	Endangered	Rare
Northern Clearwater Crayfish	<i>Orconectes propinquus</i>	G5	S5	NAR	NAR	NAR

General Benthic Macro Invertebrates:		Taxa Group
Order: Plecoptera	Stonefly	I
Order: Trichoptera	Caddisfly	I
Order: Coleoptera	Riffle Beetle	I
Order: Ephemeroptera	Mayfly	I
Family: Corydalidae	Dobsonfly/Hellgrammite	I
Order: Decapoda	Crayfish	II
Suborder: Zygoptera	Damselfly	II
Suborder: Anisoptera	Dragon Fly	II
Class: Bivalvia	Clam	II
Class: Oligochaeta	Aquatic Worm	III
Suborder: Nematocera	Midge Fly Larva	III
Family: Simuliidae	Blackfly Larva	III
Class: Gastropoda	Pouch and Other Snails	III

Group I Taxa defined as: Pollution sensitive organisms found in good water quality

Group II Taxa defined as: Somewhat pollution tolerant organisms found in good to fair quality water

Group III Taxa defined as: Pollution tolerant organisms found in any quality of water

**APPENDIX E:**

**INCIDENTAL FAUNA OBSERVED AT COPELAND FOREST IN 2011**

See Appendix B for an explanation of rankings and status.

Common Name	Scientific Name	Ranking		Status		
		Global	Prov.	National	Prov.	Regional
<b>Butterflies (Adult Stage):</b>						
Least Skipper	<i>Ancyloxypha numitor</i>	G5	S5	NAR	NAR	NAR
Common Wood-Nymph	<i>Caerxyonis pegala</i>	G5	S5	NAR	NAR	NAR
Summer Azure	<i>Calastrina neglecta</i>	G5	S5	NAR	NAR	NAR
Clouded Sulphur	<i>Colias philodice</i>	G5	S5	NAR	NAR	NAR
<b>Monarch</b>	<b><i>Danaus plexippus</i></b>	<b>G5</b>	<b>S2 ,S4</b>	<b>SC</b>	<b>SC</b>	<b>rare</b>
Dun Skipper	<i>Euphyes vestris</i>	G5	S5	NAR	NAR	NAR
Silvery Blue	<i>Glaucoopsyche lygdames</i>	G5	S5	NAR	NAR	NAR
White Admiral	<i>Limenitis arthemis arthemis</i>	G5	S5	NAR	NAR	NAR
Tiger Swallowtail	<i>Papilio canadensis</i>	G5	S5	NAR	NAR	NAR
Cabbage White	<i>Pieris rapae</i>	G5	SNA	NAR	NAR	NAR
Northern Crescent	<i>Phyciodes cocyta</i>	G5	S5	NAR	NAR	NAR
Red Admiral	<i>Vanessa atalanta</i>	G5	S5	NAR	NAR	NAR
<b>Dragonflies (Adult Stage):</b>						
Common Green Darner	<i>Anax junius</i>	G5	S5	NAR	NAR	NAR
Springtime Darner	<i>Basiaschna janata</i>	G5	S5	NAR	NAR	NAR
Eastern Pondhawk	<i>Erythemis simplicicollis</i>	G5	S5	NAR	NAR	NAR
Twelve-spotted Skimmer	<i>Libellula pulchella</i>	G5	S5	NAR	NAR	NAR
Blue Dasher	<i>Pachydiplax longipennis</i>	G5	S5	NAR	NAR	NAR
Common Whitetail	<i>Plathemis lydia</i>	G5	S5	NAR	NAR	NAR
<b>Damselflies (Adult Stage):</b>						
Ebony Jewelwing	<i>Calopteryx maculata</i>	G5	S5	NAR	NAR	NAR
Hagen's Bluet	<i>Enallagma hageni</i>	G5	S5	NAR	NAR	NAR
Emerald Spreadwing	<i>Lestes dryas</i>	G5	S5	NAR	NAR	NAR
<b>Other Species:</b>						
Bumblebee	<i>Bombus</i> sp.	G5	Some species may be at risk in Ontario. Ranking is currently under consideration.			
Millipede	<i>Narceus</i> sp.	G5	No species are listed at risk			

**APPENDIX F:  
VASCULAR PLANT SPECIES OBSERVED AT COPELAND FOREST IN 2011**

Bold type indicates a species of conservation concern (with further details given in Table 3 in the main body of this document). See Appendix B for an explanation of rankings and status used in conservation concern information column.

COMMON NAME	LATIN NAME	Conservation concern info
Balsam Fir	<i>Abies balsamea</i>	
Striped Maple	<i>Acer pensylvanicum</i>	
Red Maple	<i>Acer rubrum</i>	
Sugar Maple	<i>Acer saccharum</i>	
Mountain Maple	<i>Acer spicatum</i>	
Yarrow	<i>Achillea millefolium</i>	
Wild Basil	<i>Acinos arvensis</i>	
Sweet Flag	<i>Acorus americanus</i>	
Doll's Eyes	<i>Actaea pachypoda</i>	
Red Baneberry	<i>Actaea rubra</i>	
Maidenhair Fern	<i>Adiantum pedatum</i>	
Agrimony	<i>Agrimonia gyrosepala</i>	
Red Top Grass	<i>Agrostis gigantea</i>	
Water Plantain	<i>Alisma plantago-aquatica</i>	
Garlic Mustard	<i>Alliaria petiolata</i>	
Wild Leek	<i>Allium tricoccum</i>	
Speckled Alder	<i>Alnus rugosa</i>	
Ragweed	<i>Ambrosia artemisiifolia</i>	
Smooth Serviceberry	<i>Amelanchier laevis</i>	
Hepatica	<i>Anemone acutiloba</i>	
Canada Anemone	<i>Anemone canadensis</i>	
Thimbleweed	<i>Anemone virginiana</i>	
Spreading Dogbane	<i>Apocynum androsaemifolium</i>	
Columbine	<i>Aquilegia canadensis</i>	
Tower Mustard	<i>Arabis glabra</i>	
Sarsaparilla	<i>Aralia nudicaulis</i>	
Burdock	<i>Arctium minus</i>	
Jack-in-the-pulpit	<i>Arisaema triphyllum</i>	
Wild Ginger	<i>Asarum canadensis</i>	
Swamp Milkweed	<i>Asclepias incarnata</i>	
Common Milkweed	<i>Asclepias syriaca</i>	
<b>Ebony Spleenwort</b>	<b><i>Asplenium platyneuron</i></b>	<b>Ontario—S4; Simcoe—rare</b>
Lady Fern	<i>Athyrium filix-femina</i>	
Yellow Birch	<i>Betula alleghaniensis</i>	
Paper Birch	<i>Betula papyrifera</i>	
Beggar's Ticks	<i>Bidens comosa</i>	
Beggar's Ticks	<i>Bidens sp.</i>	
Cut-leaf Grape Fern	<i>Botrychium dissectum</i>	
Daisy-leaf Moonwort	<i>Botrychium matricariifolium</i>	
Rattlesnake Fern	<i>Botrychium virginianum</i>	
Bearded Short Husk	<i>Brachyelytrum erectum</i>	
Water Shield	<i>Brasenia schreberi</i>	
Fringed Brome Grass	<i>Bromus ciliatus</i>	
Smooth Brome	<i>Bromus inermis</i>	
Bluejoint Grass	<i>Calamagrostis canadensis</i>	
Marsh Marigold	<i>Caltha palustris</i>	
Hedge Bindweed	<i>Calystegia sepium</i>	

<b>Rough Bell Flower</b>	<b><i>Campanula aparinoides</i></b>	<b>Simcoe—rare</b>
Toothwort	<i>Cardamine diphylla</i>	
White Bear Sedge	<i>Carex albursina</i>	
Drooping Wood Sedge	<i>Carex arctata</i>	
Bebb's Sedge	<i>Carex bebbii</i>	
Brownish Sedge	<i>Carex brunnescens</i>	
Chestnut Sedge	<i>Carex castanea</i>	
Distant-flowered Sedge	<i>Carex cf. laxiflora</i>	
Sedge	<i>Carex cf. young blanda</i>	
Bearded Sedge	<i>Carex comosa</i>	
Fringed Sedge	<i>Carex crinita</i>	
<b>Hidden Scale Sedge</b>	<b><i>Carex cryptolepis</i></b>	<b>Ontario—S4; Simcoe—rare</b>
Dewey's Sedge	<i>Carex deweyana</i>	
Lesser Panicked Sedge	<i>Carex diandra</i>	
Softleaf Sedge	<i>Carex disperma</i>	
Yellowish Sedge	<i>Carex flava</i>	
Graceful Sedge	<i>Carex gracillima</i>	
Meadow Sedge	<i>Carex granulares</i>	
<b>Sedge</b>	<b><i>Carex gynandra</i></b>	<b>Simcoe—rare</b>
Porcupine Sedge	<i>Carex hystericina</i>	
Inland Sedge	<i>Carex interior</i>	
Bladder Sedge	<i>Carex intumescens</i>	
Lake Sedge	<i>Carex lacustris</i>	
Slender Sedge	<i>Carex lasiocarpa</i>	
Bristly-stalked Sedge	<i>Carex leptalea</i>	
Fine-nerved Sedge	<i>Carex leptonervia</i>	
Mud Sedge	<i>Carex limosa</i>	
Hop-like Sedge	<i>Carex lupulina</i>	
Quaking Sedge	<i>Carex magellanica</i>	
<b>Few-flowered Sedge</b>	<b><i>Carex pauciflora</i></b>	<b>Simcoe—rare</b>
Long-stalked Sedge	<i>Carex pedunculata</i>	
Pennsylvania Sedge	<i>Carex pennsylvanica</i>	
Plantain-leaved Sedge	<i>Carex plantaginea</i>	
Cyperus-like Sedge	<i>Carex pseudo-cyperus</i>	
Retorse Sedge	<i>Carex restrorsa</i>	
Stellate Sedge	<i>Carex rosea</i>	
Rough Sedge	<i>Carex scabrata</i>	
<b>Schweinitz's Sedge</b>	<b><i>Carex schweinitzii</i></b>	<b>Global—G3G4; Ontario—S3; Simcoe—rare</b>
Stipitate Sedge	<i>Carex stipata</i>	
Tussock Sedge	<i>Carex stricta</i>	
Three-Fruited Sedge	<i>Carex trisperma</i>	
Greenish Sedge	<i>Carex viridula</i>	
Fox Sedge	<i>Carex vulpinoidea</i>	
Blue Cohosh	<i>Caulophyllum thalictroides</i>	
Spotted Knapweed	<i>Centaurea maculosa</i>	
Mouse-ear Chickweed	<i>Cerastium fontanum</i>	
Coon Tail	<i>Ceratophyllum demersum</i>	
Turtle Head	<i>Chelone glabra</i>	
Strawberry Blight	<i>Chenopodium capitatum</i>	
Ox-Eye Daisy	<i>Chrysanthemum leucanthemum</i>	
Chicory	<i>Cichorium intybus</i>	
Bulbous Water Hemlock	<i>Cicuta bulbifera</i>	
Water Hemlock	<i>Cicuta maculata</i>	
Drooping Wood Reed	<i>Cinna latifolia</i>	
Enchanter's Nightshade	<i>Circaea alpina</i>	

Swamp Thistle	<i>Cirsium muticum</i>	
Twigrush	<i>Cladium mariscoides</i>	
Spring Beauty	<i>Claytonia caroliniana</i>	
Virgin's Bower	<i>Clematis virginiana</i>	
Blue Bead Lily	<i>Clintonia borealis</i>	
Gold Thread	<i>Coptis trifolia</i>	
Alternate-leaved Dogwood	<i>Cornus alternifolia</i>	
Bunchberry	<i>Cornus canadensis</i>	
Grey Dogwood	<i>Cornus foemina</i>	
Rough Dogwood	<i>Cornus rugosa</i>	
Red Osier Dogwood	<i>Cornus stolonifera</i>	
Beaked Hazel	<i>Corylus cornuta</i>	
English Hawthorn	<i>Crataegus monogyna</i>	
Dotted Hawthorn	<i>Crataegus punctata</i>	
Moccasin Flower	<i>Cypripedium acaule</i>	
Showy Lady Slipper	<i>Cypripedium reginae</i>	
Bulblet Fern	<i>Cystopteris bulbifera</i>	
Orchard Grass	<i>Dactylis glomerata</i>	
Dew Drop	<i>Dalibarda repens</i>	
Poverty Grass	<i>Danthonia spicata</i>	
Wild Carrot	<i>Daucus carota</i>	
Hay-scented Fern	<i>Dennstaedtia punctilobula</i>	
Silvery Spleenwort	<i>Deparia acrostichoides</i>	
Stick-tights	<i>Desmodium canadense</i>	
Sweet William	<i>Dianthus barbatus</i>	
Squirrel Corn	<i>Dicentra canadensis</i>	
Bush Honeysuckle	<i>Diervilla lonicera</i>	
Leatherwood	<i>Dirca palustris</i>	
Flat-topped White Aster	<i>Doellingeria umbellata</i>	
Spinulose Wood Fern	<i>Dryopteris carthusiana</i>	
Clinton's Fern	<i>Dryopteris clintoniana</i>	
Canadian Tick-Trefoil	<i>Dryopteris cristata</i>	
Northern Wood Fern	<i>Dryopteris expansa</i>	
<b>Male Fern</b>	<b><i>Dryopteris felix-mas</i></b>	<b>Ontario—S4; Simcoe—rare</b>
Goldie's Fern	<i>Dryopteris goldiana</i>	
Intermediate Woodfern	<i>Dryopteris intermedia</i>	
Evergreen Woodfern	<i>Dryopteris marginalis</i>	
Three-way Sedge	<i>Dulichium arundinaceum</i>	
Bugloss	<i>Echium vulgare</i>	
Elliptic Spikerush	<i>Eleocharis elliptica</i>	
Small's Spikerush	<i>Eleocharis smallii</i>	
Canada Waterweed	<i>Elodea canadensis</i>	
Bottle Brush Grass	<i>Elymus hystrix</i>	
Quack Grass	<i>Elymus repens</i>	
Beech Drops	<i>Epifagus virginiana</i>	
Trailing Arbutus	<i>Epigaea repens</i>	
Northern Willow Herb	<i>Epilobium ciliatum</i>	
Hairy Willow Herb	<i>Epilobium hirsutum</i>	
Downy Willow Herb	<i>Epilobium parviflorum</i>	
Helleborine	<i>Epipactis helleborine</i>	
Field Horsetail	<i>Equisetum arvense</i>	
Water Horsetail	<i>Equisetum fluviatile</i>	
Scouring Rush	<i>Equisetum hyemale</i>	
Water Horehound	<i>Equisetum palustre</i>	
Dwarf Scouring Rush	<i>Equisetum scirpoides</i>	
Wood Horsetail	<i>Equisetum sylvaticum</i>	

Philadelphia Fleabane	<i>Erigeron philadelphicus</i>	
Rough Fleabane	<i>Erigeron strigosus</i>	
Trout Lily	<i>Erythronium americanum</i>	
<b>Running Strawberry Vine</b>	<b><i>Euonymus obovatus</i></b>	<b>Simcoe—rare</b>
Joe-Pye-Weed	<i>Eupatorium maculatum</i>	
Boneset	<i>Eupatorium perfoliatum</i>	
White Snake Root	<i>Eupatorium rugosum</i>	
Big-leaf Aster	<i>Eurybia macrophylla</i>	
Grass-leaved Goldenrod	<i>Euthamia graminifolia</i>	
Beech	<i>Fagus grandifolia</i>	
Wild Strawberry	<i>Fragaria virginiana</i>	
White Ash	<i>Fraxinus americana</i>	
Black Ash	<i>Fraxinus nigra</i>	
Green Ash	<i>Fraxinus pensylvanica</i>	
Rough Bedstraw	<i>Galium asprellum</i>	
Wild Licorice	<i>Galium circaezans</i>	
Labrador Bedstraw	<i>Galium labradoricum</i>	
Marsh Bedstraw	<i>Galium palustre</i>	
Fragrant Bedstraw	<i>Galium triflorum</i>	
Creeping Snowberry	<i>Gaultheria hispidula</i>	
Wintergreen	<i>Gaultheria procumbens</i>	
Herb Robert	<i>Geranium robertianum</i>	
Yellow Avens	<i>Geum aleppicum</i>	
White Avens	<i>Geum canadense</i>	
Purple Avens	<i>Geum rivale</i>	
Northern Manna Grass	<i>Glyceria boreale</i>	
Rattlesnake Grass	<i>Glyceria canadensis</i>	
Fowl Manna Grass	<i>Glyceria striata</i>	
Oak Fern	<i>Gymnocarpium dryopteris</i>	
Virginia Stickseed	<i>Hackelia virginiana</i>	
Orange Hawkweed	<i>Hieracium aurantiacum</i>	
Mouse-ear Hawkweed	<i>Hieracium pilosella</i>	
Yellow Hawkweed	<i>Hieracium piloselloides</i>	
Sweet Grass	<i>Hierchloe odorata</i>	
Foxtail Barley	<i>Hordeum jubatum</i>	
Virginia Waterleaf	<i>Hydrophyllum virginianum</i>	
Northern St. John's Wort	<i>Hypericum boreale</i>	
Common St. John's Wort	<i>Hypericum perforatum</i>	
Winterberry	<i>Ilex verticellata</i>	
Touch-me-not	<i>Impatiens capensis</i>	
Pale Touch-me-not	<i>Impatiens pallida</i>	
Blue Flag	<i>Iris versicolor</i>	
<b>Butternut</b>	<b><i>Juglans cinerea</i></b>	<b>Canada—endangered; Ontario—endangered; Global—G4; Provincial—S1; Simcoe—rare</b>
Black Walnut	<i>Juglans nigra</i>	
Alpine Rush	<i>Juncus alpino-articulatus</i>	
Jointed Rush	<i>Juncus articulatus</i>	
Dudley's Rush	<i>Juncus dudley</i>	
Soft Rush	<i>Juncus effusus</i>	
Path Rush	<i>Juncus tenuis</i>	
Common Juniper	<i>Juniperus communis</i>	
Tall Blue Lettuce	<i>Lactuca biennis</i>	
Wild Lettuce	<i>Lactuca canadensis</i>	
Wood Nettle	<i>Laportea canadensis</i>	
Tamarack	<i>Larix laricina</i>	

Labrador Tea	<i>Ledum groenlandicum</i>	
Rice Cut Grass	<i>Leersia oryzoides</i>	
Lesser Duckweed	<i>Lemna minor</i>	
Star Duckweed	<i>Lemna trisulca</i>	
Motherwort	<i>Leonuris cardiaca</i>	
Wood Lily	<i>Lilium philadelphicum</i>	
Twinflower	<i>Linnæa borealis</i>	
Indian Tobacco	<i>Lobelia inflata</i>	
Kalm's Lobelia	<i>Lobelia kalmii</i>	
Great Lobelia	<i>Lobelia siphilitica</i>	
Canada Honeysuckle	<i>Lonicera canadensis</i>	
Twining Honeysuckle	<i>Lonicera dioica</i>	
Hairy Honeysuckle	<i>Lonicera hirsuta</i>	
<b>Swamp Fly Honeysuckle</b>	<b><i>Lonicera oblongifolia</i></b>	<b>Global—G4; Simcoe—rare</b>
Tick Trefoil	<i>Lotus corniculatus</i>	
Water Primrose	<i>Ludwigia palustris</i>	
Bristly Clubmoss	<i>Lycopodium annotinum</i>	
Common Clubmoss	<i>Lycopodium clavatum</i>	
Ground Pine	<i>Lycopodium complanatum</i>	
Crow-foot Clubmoss	<i>Lycopodium digitatum</i>	
Flat Branched Clubmoss	<i>Lycopodium obscurum</i>	
Water Horehound	<i>Lycopus americanus</i>	
Water Horehound	<i>Lycopus uniflorus</i>	
Fringed Loosestrife	<i>Lysimachia ciliata</i>	
Swamp Candles	<i>Lysimachia thyrsoiflora</i>	
Purple Loosestrife	<i>Lythrum salicaria</i>	
Mayflower	<i>Maianthemum canadense</i>	
Spikenard	<i>Maianthemum racemosum</i>	
Starry False Solomon's Seal	<i>Maianthemum stellatum</i>	
Three-leaved Solomon Seal	<i>Maianthemum trifolia</i>	
Apple	<i>Malus pumila</i>	
Ostrich Fern	<i>Matteuccia struthiopteris</i>	
Alfalfa	<i>Medicago sativa</i>	
Cucumber Root	<i>Mediola virginiana</i>	
White Sweet Clover	<i>Melilotus alba</i>	
Moon Seed Vine	<i>Menispermum canadense</i>	
Field Mint	<i>Mentha arvensis</i>	
Peppermint	<i>Mentha x piperita</i>	
Blue Monkey Flower	<i>Mimulus ringens</i>	
Partridge Berry	<i>Mitchella repens</i>	
Mitrewort	<i>Mitella diphylla</i>	
Mitrewort	<i>Mitella nuda</i>	
Wild Bergamot	<i>Monarda fistulosa</i>	
One-flowered Pyrola	<i>Moneses uniflora</i>	
Indian Pipe	<i>Monotropa uniflora</i>	
Slender Naiad	<i>Najas flexilis</i>	
Water Cress	<i>Nasturtium officinale</i>	
Mountain Holly	<i>Nemopanthus mucronata</i>	
Yellow Pond Lily	<i>Nuphar variegatum</i>	
Evening Primrose	<i>Oenothera biennis</i>	
Sensitive Fern	<i>Onoclea sensibilis</i>	
False Rice Grass	<i>Oryzopsis asperifolia</i>	
Sweet Cicely	<i>Osmorhiza claytonii</i>	
Sweet Cicely	<i>Osmorhiza longistylus</i>	
Cinnamon Fern	<i>Osmunda cinnamomea</i>	
Interrupted Fern	<i>Osmunda claytonii</i>	

Royal Fern	<i>Osmunda regalis</i>	
Ironwood	<i>Ostrya virginiana</i>	
Wood Sorrel	<i>Oxalis acetosella</i>	
Yellow Sorrel	<i>Oxalis stricta</i>	
Panic Grass	<i>Panicum acuminatum var. acuminatum</i>	
Grass of Parnassia	<i>Parnassia glauca</i>	
Virginia Creeper	<i>Parthenocissus inserta</i>	
Parsnip	<i>Pastinaca sativa</i>	
Sweet Coltsfoot	<i>Petasites frigidus</i>	
Reed Canary Grass	<i>Phalaris arundinacea</i>	
Northern Beech Fern	<i>Phegopteris connectilis</i>	
Timothy	<i>Phleum pratense</i>	
Common Reed	<i>Phragmites australis</i>	
<b>Ground Cherry</b>	<b><i>Physalis heterophylla</i></b>	<b>Ontario—S4; Simcoe—rare</b>
Pokeweed	<i>Phytolacca americana</i>	
White Spruce	<i>Picea glauca</i>	
Black Spruce	<i>Picea mariana</i>	
<b>Marsh Clearweed</b>	<b><i>Pilea fontana</i></b>	<b>Ontario—S4; Simcoe—rare</b>
Clear Weed	<i>Pilea pumila</i>	
Red Pine	<i>Pinus resinosa</i>	
White Pine	<i>Pinus strobus</i>	
Scotch Pine	<i>Pinus sylvestris</i>	
English Plantain	<i>Plantago lanceolata</i>	
Common Plantain	<i>Plantago major</i>	
Club-spur Orchid	<i>Platanthera clavellata</i>	
Northern Green Orchid	<i>Platanthera hyperborea</i>	
Blunt-leaved Orchid	<i>Platanthera obtusata</i>	
Purple Fringed Orchid	<i>Platanthera psychodes</i>	
Canada Bluegrass	<i>Poa compressa</i>	
Marsh Bluegrass	<i>Poa palustris</i>	
Rock Polypody	<i>Polypodium virginianum</i>	
Fringed Polygala	<i>Polygala paucifolia</i>	
Solomon's Seal	<i>Polygonatum pubescens</i>	
Water Smartweed	<i>Polygonum amphibium</i>	
Douglas's Smartweed	<i>Polygonum douglasii</i>	
Mild Water Pepper	<i>Polygonum hydropiperoides</i>	
Christmas Fern	<i>Polystichum acrosticoides</i>	
Balsam Poplar	<i>Populus balsamifera</i>	
Big-toothed Aspen	<i>Populus grandidentata</i>	
Trembling Aspen	<i>Populus tremuloides</i>	
Ribbonleaf Pondweed	<i>Potamogeton epihydrus</i>	
Floating Pond Weed	<i>Potamogeton natans</i>	
Flat-stemmed Pond Weed	<i>Potamogeton zosteriformis</i>	
Rough Cinquefoil	<i>Potentilla norvegica</i>	
Sulphur Cinquefoil	<i>Potentilla recta</i>	
White Lettuce	<i>Prenanthes alba</i>	
Mermaid Weed	<i>Proserpinaca palustris</i>	
Heal-all	<i>Prunella vulgaris</i>	
Black Cherry	<i>Prunus serotina</i>	
Pin Cherry	<i>Prunus pennsylvanica</i>	
Chokecherry	<i>Prunus virginiana</i>	
Bracken Fern	<i>Pteridium aquilinum</i>	
Pink Pyrola	<i>Pyrola asarifolia</i>	
Shin Leaf	<i>Pyrola elliptica</i>	
One-sided Pyrola	<i>Pyrola secunda</i>	
White Oak	<i>Quercus alba</i>	

Bur Oak	<i>Quercus macrocarpa</i>	
Red Oak	<i>Quercus rubra</i>	
Dwarf Buttercup	<i>Ranunculus abortivus</i>	
Common Buttercup	<i>Ranunculus acris</i>	
Hooked Buttercup	<i>Ranunculus recurvatis</i>	
Celery-leaved Buttercup	<i>Ranunculus sceleratus</i>	
Alder-leaved Buckthorn	<i>Rhamnus alnifolium</i>	
Poison Ivy	<i>Rhus radicans</i>	
Staghorn Sumac	<i>Rhus typhina</i>	
Gooseberry	<i>Ribes cynosbati</i>	
Gooseberry	<i>Ribes hirtellum</i>	
Swamp Red Currant	<i>Ribes triste</i>	
Smooth Rose	<i>Rosa blanda</i>	
Blackberry	<i>Rubus alleghaniensis</i>	
Swamp Dewberry	<i>Rubus hispidus</i>	
Black Raspberry	<i>Rubus occidentalis</i>	
Dwarf Raspberry	<i>Rubus pubescens</i>	
Red Raspberry	<i>Rubus strigosus</i>	
Black-eyed Susan	<i>Rudbeckia hirta</i>	
Green-headed Coneflower	<i>Rudbeckia laciniata</i>	
Sour Dock	<i>Rumex acetosella</i>	
Curly Dock	<i>Rumex crispus</i>	
Great Water Dock	<i>Rumex orbiculatus</i>	
Arrow Head	<i>Sagittaria latifolia</i>	
Bebb's Willow	<i>Salix bebbiana</i>	
Pussy Willow	<i>Salix discolor</i>	
Shining Willow	<i>Salix lucida</i>	
Meadow Willow	<i>Salix petiolaris</i>	
Common Elder	<i>Sambucus canadensis</i>	
Red Elderberry	<i>Sambucus racemosa</i>	
Black Snakeroot	<i>Sanicula marilandica</i>	
Yellow Snakeroot	<i>Sanicula odorata</i>	
Soapwort	<i>Saponaria officinalis</i>	
Pitcher Plant	<i>Sarracenia purpurea</i>	
Purple Melic Grass	<i>Schizachne purpurascens</i>	
Hard-stem Bulrush	<i>Scirpus acutus</i>	
Dark Green Bulrush	<i>Scirpus atrovirens</i>	
Wool-grass	<i>Scirpus cyperinus</i>	
Red-sheathed Bulrush	<i>Scirpus microcarpus</i>	
Soft-stemmed Bulrush	<i>Scirpus validus</i>	
Marsh Skullcap	<i>Scutellaria galericulata</i>	
Mad Dog Skullcap	<i>Scutellaria lateriflorus</i>	
Live Forever	<i>Sedum purpureum</i>	
Golden Ragwort	<i>Senecio aureus</i>	
Bladder Champion	<i>Silene vulgaris</i>	
Blue-eyed Grass	<i>Sisyrinchium montanum</i>	
Water Parsnip	<i>Sium suave</i>	
Green Briar	<i>Smilax herbacea</i>	
Black Nightshade	<i>Solanum dulcamara</i>	
Tall Goldenrod	<i>Solidago altissima</i>	
Canada Goldenrod	<i>Solidago canadensis</i>	
Late Goldenrod	<i>Solidago gigantea</i>	
Grey-stemmed Goldenrod	<i>Solidago nemoralis</i>	
Rough Dogwood	<i>Solidago rugosa</i>	
Bog Goldenrod	<i>Solidago uliginosa</i>	
European Mountain Ash	<i>Sorbus aucuparia</i>	

<b>Showy Mountain Ash</b>	<b><i>Sorbus decora</i></b>	<b>Global—G4G5; Simcoe—rare</b>
Nuttall's Bur Reed	<i>Sparganium americanum</i>	
Common Bur Reed	<i>Sparganium emersum</i>	
Slender Wedge Grass	<i>Sphenopholis intermedia</i>	
Meadow Sweet	<i>Spiraea alba</i>	
Greater Duckweed	<i>Spirodela polyrhiza</i>	
Lamb's Ears	<i>Stachys byzantina</i>	
<b>Northern Stitchwort</b>	<b><i>Stellaria borealis</i></b>	<b>Simcoe—rare</b>
Rosy Twisted Stalk	<i>Streptopus roseus</i>	
Fringed Blue Aster	<i>Symphyotrichum ciliolatum</i>	
Heart-leaved Aster	<i>Symphyotrichum cordifolium</i>	
<b>Heath Aster</b>	<b><i>Symphyotrichum ericoides</i></b>	<b>Simcoe—rare</b>
Panicled Aster	<i>Symphyotrichum lanceolatum</i>	
Calico Aster	<i>Symphyotrichum lateriflorum</i>	
Purple-stemmed Aster	<i>Symphyotrichum puniceum</i>	
Dandelion	<i>Taraxicum officinale</i>	
Canada Yew	<i>Taxus canadensis</i>	
Early Meadow Rue	<i>Thalictrum dioicum</i>	
Meadow Rue	<i>Thalictrum pubescens</i>	
New York Fern	<i>Thelypteris noveboracensis</i>	
Marsh Fern	<i>Thelypteris palustris</i>	
White Cedar	<i>Thuja occidentalis</i>	
Foam Flower	<i>Tiarella cordifolia</i>	
Basswood	<i>Tilia americana</i>	
Goat's Beard	<i>Tragopodon dubius</i>	
Goat's Beard	<i>Tragopogon pratensis</i>	
Marsh St. John's Wort	<i>Triadenum fraseri</i>	
Star Flower	<i>Trientalis borealis</i>	
Red Clover	<i>Trifolium pratense</i>	
White Clover	<i>Trifolium repens</i>	
Red Trillium	<i>Trillium erectum</i>	
Large-flowered Trillium	<i>Trillium grandiflorum</i>	
Painted Trillium	<i>Trillium undulatum</i>	
Horse Gentian	<i>Triosteum aurantiacum</i>	
Hemlock	<i>Tsuga canadensis</i>	
Colt's Foot	<i>Tusselago farfara</i>	
Narrow-leaved Cattail	<i>Typha angustifolia</i>	
Cattail	<i>Typha latifolia</i>	
American Elm	<i>Ulmus americana</i>	
Red Elm	<i>Ulmus rubra</i>	
Nettles	<i>Urtica dioica</i>	
Flat-leaved Bladderwort	<i>Utricularia intermedia</i>	
<b>Purple Bladderwort</b>	<b><i>Utricularia purpurea</i></b>	<b>Ontario—S4; Simcoe—rare</b>
Common Bladderwort	<i>Utricularia vulgaris</i>	
Large-flowered Bellwort	<i>Uvularia grandiflora</i>	
Large Cranberry	<i>Vaccinium macrocarpa</i>	
Velvet Leaf Blueberry	<i>Vaccinium myrtilloides</i>	
<b>Swamp Valerian</b>	<b><i>Valeriana uliginosa</i></b>	<b>Ontario—S2; Simcoe—rare</b>
Mullein	<i>Verbascum thapsis</i>	
Blue Vervain	<i>Verbena hastata</i>	
White Vervain	<i>Verbena urticifolia</i>	
Water Speedwell	<i>Veronica anagalis-aquatica</i>	
Speedwell	<i>Veronica officinalis</i>	
Wild Raisin	<i>Viburnum casinoides</i>	
Hobblebush	<i>Viburnum lantanoides</i>	
High-Bush Cranberry	<i>Viburnum trilobum</i>	

Vetch	<i>Vicia cracca</i>	
<b>Blue Marsh Violet</b>	<b><i>Viola affinis</i></b>	<b>Ontario—S4?; Simcoe—rare</b>
Sweet White Violet	<i>Viola blanda</i>	
Canada Violet	<i>Viola canadensis</i>	
Dog Violet	<i>Viola conspersa</i>	
Marsh Blue Violet	<i>Viola cucullata</i>	
Small White Violet	<i>Viola mackloskeyi</i>	
Yellow Violet	<i>Viola pubescens</i>	
Great Spurred Violet	<i>Viola selkirkii</i>	
Wild Grape	<i>Vitis riparia</i>	
Water Meal	<i>Wolffia sp.</i>	
<b>Camas Lily</b>	<b><i>Zigadenus elegans</i></b>	<b>Ontario—S4; Simcoe—rare</b>