

**A BIOLOGICAL INVENTORY AND EVALUATION
OF THE WHITE LAKE
STUDY AREA, EASTERN ONTARIO**



Vivian R. Brownell 2001

**A BIOLOGICAL INVENTORY AND
EVALUATION OF THE WHITE LAKE STUDY AREA,
EASTERN ONTARIO**

February 2001

**Vivian R. Brownell
RR3, Metcalfe, Ontario K0A 2P0**

Prepared on contract for:
Ontario Ministry of Natural Resources,
Kemptville District Office, Kemptville, Ontario

SUMMARY

The White Lake study area comprises 4415 hectares approximately 20 km southwest of Arnprior in Darling and Pakenham townships, Lanark County, and in adjacent McNab and Bagot and Blithfield townships, Renfrew County. The site is located in Site District 5E-11, a moderately rolling area of shallowly covered rock ridges with sand flats. Both the sand flats and the silty sands which cover the ridges are predominantly low-base materials, although granitic materials occur occasionally in larger areas (Hills, 1959). This area lies immediately west of the Madawaska Highlands planning area, a distinct part of Ontario covered by marble and granite hills and glacial moraines.

The objectives of this study were as follows: to complete a detailed life science inventory to the best extent possible given the timing of the field work (September-October); to assess life science features within Ontario Living legacy lands and throughout the study area; and to recommend further studies and management options. Field work consisted of a total of 9 days from 10 September to 15 October, 2000. Information on herbaceous flora, breeding birds and rare species was limited due to the lateness of the contract award.

The White Lake study area occurs on moderately broken ground moraine with shallow sandy till soils. The upland conditions vary from mesic to dry mesic. The terrain is only moderately rugged with <10% bedrock exposure. The site contains a high diversity of vegetation community associations with 32 in wetland habitat and 34 in upland habitat. About 25% of the White Lake study area is composed of wetland vegetation types which include lacustrine and palustrine systems and about 25% is unvegetated open water. Wetland vegetation types include lacustrine and palustrine systems. Open water aquatics, wet meadows, tall emergent marsh, floating lakeshore fen, open graminoid fen, thicket poor fen, tamarack dominated poor fen, thicket swamps and white cedar dominated swamps are found. Terrestrial upland includes the following: dry mesic, white pine-dominated rock barren (open forest or woodland); dry mesic red oak forest on shallow sandy till; mesic-wet mesic mixed and deciduous forests on moderately deep sandy till; mesic-dry mesic white pine forests on shallow sandy till over marble; and mesic-wet mesic white cedar and balsam fir forests on sandy till over marble. The site was probably heavily logged in the 1880s, however there has been only localized logging in the past 30 years. The average age of the white pine forests is 80 to 90 years.

A total of 427 vascular plant taxa (389 native), 28 mammal, 7 reptile and 10 amphibian species were recorded. These numbers should be regarded as preliminary. During the Ontario Breeding Bird Survey in the early 1980's, 110 bird species were reported from the 10 x 10 km square surrounding the study area.

The rarest species documented during this life science inventory is the Bog Buck Moth (*Hemileuca* sp.1). It is ranked by The Nature Conservancy as extremely rare globally (G1Q) and is considered extremely rare (S1) in every state and province in which it occurs (Schweitzer 1999). It is now known from two large graminoid fens within the White Lake ANSI, one of which is within the study area. Two provincially rare plants were discovered: Giant Bird's Nest (*Pterospora andromeda* Nutt) - S2 and Ram's-head Lady's Slipper (*Cypripedium arietinum* R. Br.) - G3, S3. Twenty-three plant taxa were found that are rare in Site Region 5E and 33 additional plant species are considered rare in Site District 5E-11 based on Crins (1995). The provincially rare, Red-shouldered Hawk has been reported to nest near the study area, but there was no potential for breeding evidence at this time of year.

The White Lake study area contains both provincially and regionally significant vegetation communities. Most of the wetland communities have been evaluated under the provincial wetland evaluation system and are considered provincially significant (Brownell 2000). A wide range of fen community types are found at White Lake which are rare within Site Region 5E and southern Ontario south of the Canadian Shield. The graminoid fens are some of the largest and highest quality in southern Ontario.

In a review of white cedar old-growth forests known to occur in Site District 5E-11 on a moderately broken ground moraine landform, the author concluded that the White Lake study area offers the best representation and are therefore provincially significant. The White Lake study area is a relatively large and diverse unit in which ecological functions can be maintained, and it presents a wide range of white pine stands from mixed to coniferous on sandy till over marble bedrock. The crown lands within the White Lake study area are an excellent candidate conservation reserve, parts of which will evolve into an old-growth pine forest within 30-40 years. This area offers great opportunities for benchmark and research studies since it is fairly extensive, diverse, relatively easy to access and is located only about 1.0 hour from Ottawa.

ACKNOWLEDGMENTS

Many thanks are extended to Paul Catling for providing assistance in the field. Linda Forsyth, Lanark Area forester provided access to information and assisted with interpretation of forest stand data within the Mazinaw-Lanark forest management unit. Bill Crins, Peterborough, reviewed the list of rare plant species. Shaun Thompson, Kemptville District Ecologist, provided useful discussions and comments on the draft report. Brad Case assisted in the production of the location map and the 1:10,000 maps using ArcView 3.0 and supervised the contract.

TABLE OF CONTENTS

SUMMARY	Page ii
ACKNOWLEDGMENTS	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES, TABLES AND MAPS	vi
CHAPTER 1. REGIONAL BACKGROUND	
(1) Location	1
(2) Status and Land use	1
(3) Physical and Historical Background	
a. Bedrock	4
b. Surface Geology	4
c. Physiography	7
d. Soils and Moisture Regime	7
e. Climate and Microclimate	9
f. History	9
CHAPTER 2. RESOURCE INVENTORY	
(1) Study Objectives	11
(2) Methodology	11
(3) Vegetation Community Descriptions	12
(4) Floristics	28
(5) Fauna	29
CHAPTER 3. SIGNIFICANT FEATURES	
(1) Significant Flora	30
(2) Significant Fauna	30
(3) Significant Areas	31
CHAPTER 4. EVALUATION AND PLANNING CONSIDERATIONS	
(1) Introduction	36
(2) Evaluation of Community Representation	36
A. Mature White Pine on sandy loam over marble	37
B. Fen	38
C. Oldgrowth White Cedar Forest	39
D. Stands with Butternut (<i>Juglans cinerea</i>)	40
(3) Diversity	40
(4) Special Features	41
(5) Site Condition	41
(6) Ecological Function	41

TABLE OF CONTENTS (cont'd)

Page

(7) ANSI Boundary Determination	41
(8) Management Considerations and Recommendations	41
a. Management Considerations	42
b. Future Studies	42
c. Recommendations	43

CITED REFERENCES	44
MAP REFERENCES	49

APPENDIX 1: Vascular Plants of the White Lake study area	51
APPENDIX 2: Amphibians and Reptiles of the White Lake study area	70
APPENDIX 3: Breeding Birds of the White Lake study area	72
APPENDIX 4: Mammals of the White Lake study area	78
APPENDIX 5: Distribution Maps of Selected Rare Species	80

LIST OF FIGURES, TABLES AND MAPS

FIGURES

Front Cover. Lowney Lake fen.

1. Location of the White Lake study area	2
2. Boundaries of the White Lake study area	3
3. Geology of the White Lake study area	5
4. Exposed marble along Lowney Lake road	6
5. The Site Districts of Southern Ontario	8
6. Vegetation Matrix for the White Lake study area	18
7. Wetland at Lowney Lake outlet	20
8. Mature White Pine forest over marble	27
8. Bog Buck Moth and large, open graminoid fen habitat	32

TABLE OF CONTENTS (cont'd)

TABLES

1. Partial Vegetation Classification of the White Lake study area	13
2. Significant Features of the White Lake study area	33

MAPS (in back pocket)

1. Vegetation of the White Lake study area	
2. Significant Life Science Features of the White Lake study area	
3. Boundaries of the White Lake study area	

CHAPTER 1. REGIONAL BACKGROUND

(1) Location

The White Lake study area is located in eastern Ontario, approximately 65 km west-southwest of Ottawa, 20 km southwest of Arnprior and 45 km northwest of Carleton Place at a latitude of 45°08'N and a longitude of 76°46'W (Figure 1). It encompasses approximately 4415 hectares of land and water in Darling and Pakenham townships, Lanark County and in adjacent McNab and Bagot and Blithfield townships, Renfrew County. The study area is accessed by taking paved roads north or south of Pakenham around the Pakenham Mountains, and then a complex series of smaller gravel roads within the study area.

(2) Status and Land use

The White Lake study area lies just east of the Madawaska Highlands planning area, a distinct part of Ontario covered by marble and granite hills and moraines deposited by glaciers (OMNR 1994c). In a review of life science features of Site District 5E-11, Brunton (1990) nominated the White Lake Wetlands as a provincially significant Area of Natural and Scientific Interest (ANSI). In 1999, 11 parcels of crown land totalling 606 hectares were identified for designation as the White Lake Wetlands Conservation Reserve C46 under Ontario's Living Legacy program (OMNR 1999). A mining claim was made on one of those parcels which is 55.4 ha in size, therefore it was subsequently removed from the conservation reserve and designated as forest reserve. Boundaries of the proposed ANSI, conservation reserve and study area are illustrated in Figure 2. As shown, the study area encompasses a much larger area extending southward, however it does not include the White Lake Fen to the north.

Approximately 188 ha of conservation reserve, 55.4 ha of forest reserve, 460 ha of other crown land and 320 ha of private land were investigated in the field. This represents about 23% of the study area. For the most part, it does not include wetlands which were inventoried under the OMNR wetland evaluation system (Brown and McNaughton 1985, Brown and L'arrivee 1986, Cuddy and Thompson 1998).

The large size of White Lake and its close proximity to Ottawa makes it an attractive site for recreational interests. Three resorts operate in the area: Pickerel Bay Lodge, Cedar Cove Resort and Bayview and an additional seven are found elsewhere on White Lake. There are hundreds of cottages flanking the shores of White Lake particularly in the vicinity of Three Mile Bay and Pickerel Bay. In 1995, 449 cottages and 5 permanent homes were found on White Lake (Mathers and Kerr 1998). Most of these were built in the 1960's when crown lands were released for public purchase. Within the past decade, additional severances and cottage development has occurred north of Pickerel Bay as a result of road development. The area was initially logged and subsequent improvement of the logging roads allowed for further development of the area. There are logging roads on both crown and private lands which enable ATV and four-wheel drive access to much of the study area. There are also occasional minor paths through the site. The area is highly favoured for deer and bear hunting, as evinced by numerous temporary camps, permanent camps and platforms throughout. Duck hunting is also popular in the marshes of White Lake.

Although the entire site would have been logged historically (see below), there has been no approved logging or silvicultural operations on crown lands in the past 12 years (Linda Forsyth 2001 pers. com). Localized fuelwood and shelterwood cuts occurred in the late 1970s and early 1980s as well as plantings of White and Red Pine. Conifer plantations became well established on crown land on the north side of Pickerel Bay, however south of Three Mile Bay, they were not successful. In 1999 the Lanark Management Team removed lands designated as part of the Ontario's Living Legacy (White Lake Wetlands Conservation Reserve C46) from eligibility for timber harvest. The draft management plan for the management of forests on crown lands

Figure 1: Location of the White Lake Study Area

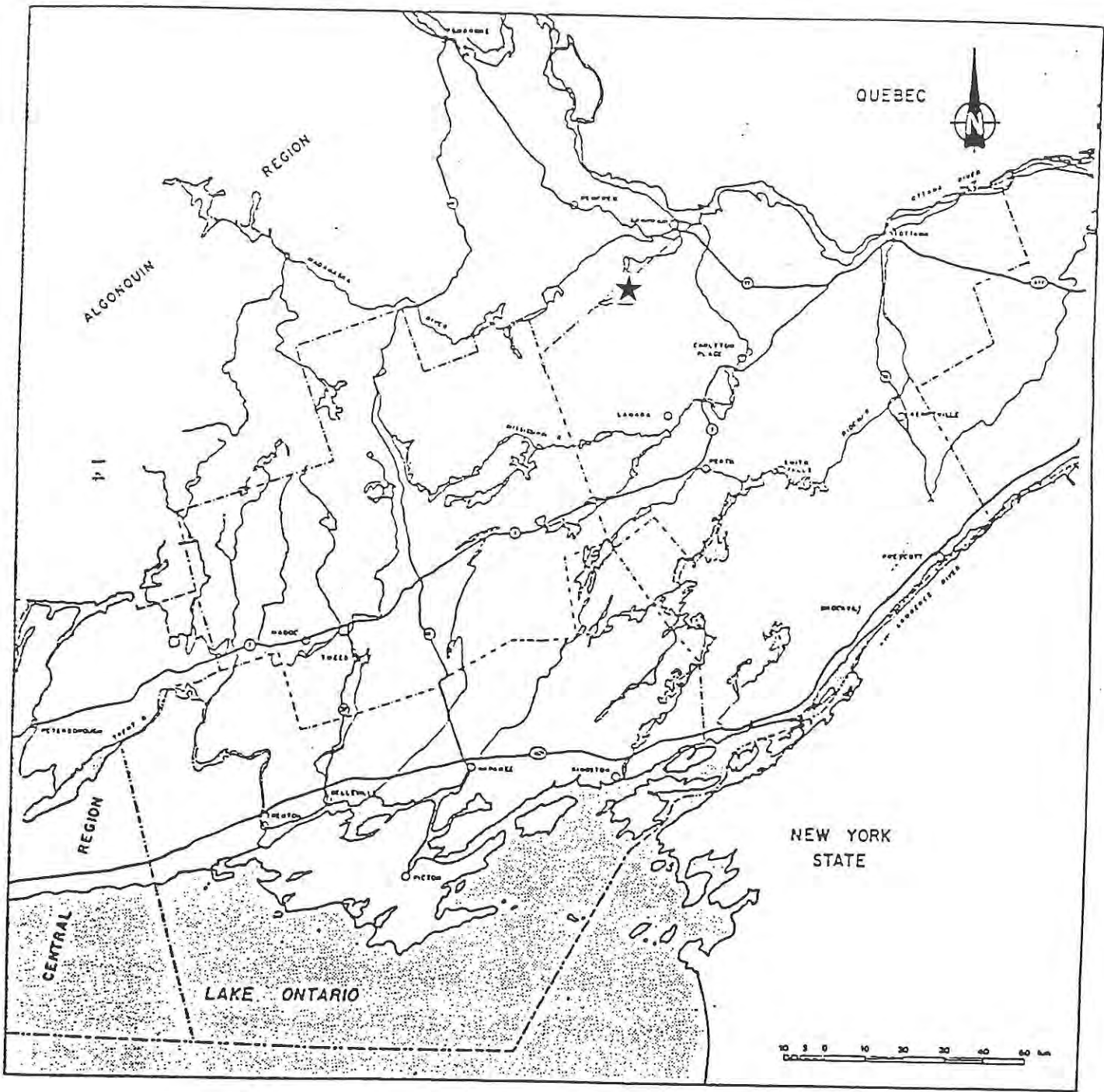
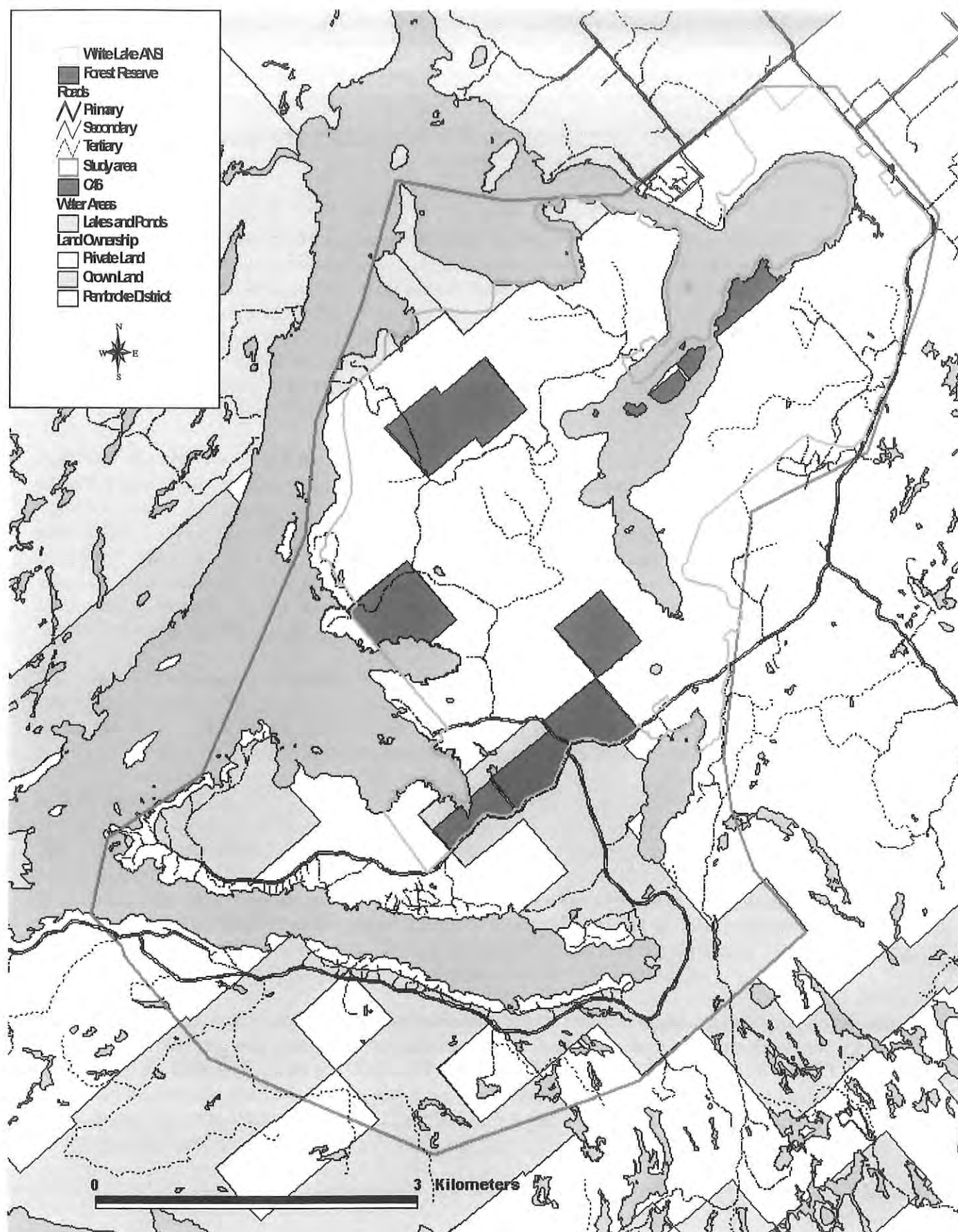


Figure 2. White Lake Study Area



from 2001-2021 identifies two areas within the White Lake study area that will be actively managed (OMNR 2001). These are located south of Three Mile Bay. One involves replanting of the area formerly planted with pine and the other involves a harvest. A large peninsular area on the north side of Three Mile Bay was initially identified by OMNR for harvesting, however it has been temporarily withdrawn due to public protest.

(3) Physical and Historical Background

a. Bedrock

Bedrock in the White Lake study area is of the Early and Middle Precambrian age and includes metasediments, Archean metavolcanics, and plutonic rocks (Peach, 1956; Ontario Geological Survey Map 2462, 1982) (Figure 3). The plutonic rocks are low base compared to the more basic amphibolite and marble. The majority of the site is underlain by greyish metasedimentary crystalline limestone (marble) or dolomite. The marble is very fine grained and dense with bands of light or dark grey. North of Pickerel Bay on lot 26, concession XI, small deposits of hematite have been formed in the dolomitic limestone closely associated with pegmatite or quartz dikes. The Fahey or Bell Mine was created in the early 1900s to access these deposits and consists of a shaft about 7 m deep and a few trenches. Samples from an ore pile show 35% iron.

Plutonic rocks (primarily migmatite) of the granite, granite gneiss and pegmatite group are found along the eastern border of the study area where they begin to form the Pakenham Mountains. A narrow east-west trending band of Darling type granite occurs south of Three Mile Bay where it is flanked by a relatively uncommon plutonic body of diorite and gabbro. Metavolcanics of the amphibolite group form a narrow strip between the plutonic rocks and areas of metasedimentary crystalline limestone just east of Lowney Lake and along the south shore of Three Mile Bay. The amphibolite is composed of hornblende-plagioclase schist and biotite schist. A small area of amphibolite also occurs at the north end of the study area on the peninsula beside The Canal and the islands of Hayes Bay.

The majority of the marble is overlain with glacial drift, however a small outcrop can be seen on the south side of Cove Road as it slopes down to Lowney Lake (Figure 4). It is also obvious in numerous test pits which have been dug along the east side of Lowney Lake and along the hydroline west of Lowney Lake. A large plutonic outcrop is found in the southeastern portion of the site on the south shore of Willis Lake.

b. Surface Geology

The unconsolidated surface deposits in Darling and Pakenham townships are of glacial origin and are the parent material from which the soils have developed. Surficial materials cover the bedrock in much of the White Lake study area; they are generally shallow on the hills and more deep in the valleys. This material consists of glacial till and ice-contact deposits such as eskers (Hoffman *et al.* 1967), deposited in conjunction with the Late Wisconsinan ice advance. The ice retreated from the area approximately 10,000 years ago. The White Lake study area is part of a ground moraine landform (Noble 1988).

The bottom substrates of White Lake are predominantly mud. Based on sediment core sampling conducted in 1973, much of the lake was found to have deposits of thick marl (deposits of calcium from biological and sedimentary processes) (Mathers and Kerr 1998). The pH of the lake water ranges from 7.0-8.5. There is no geological information available for the fens found in the study area, however the White Lake fen which is also located within the White Lake ANSI, has a pH of 6.9 and a peat depth of 3.4 m (Riley 1988).

Figure 3: Geology of the White Lake Study Area (Peach 1956)

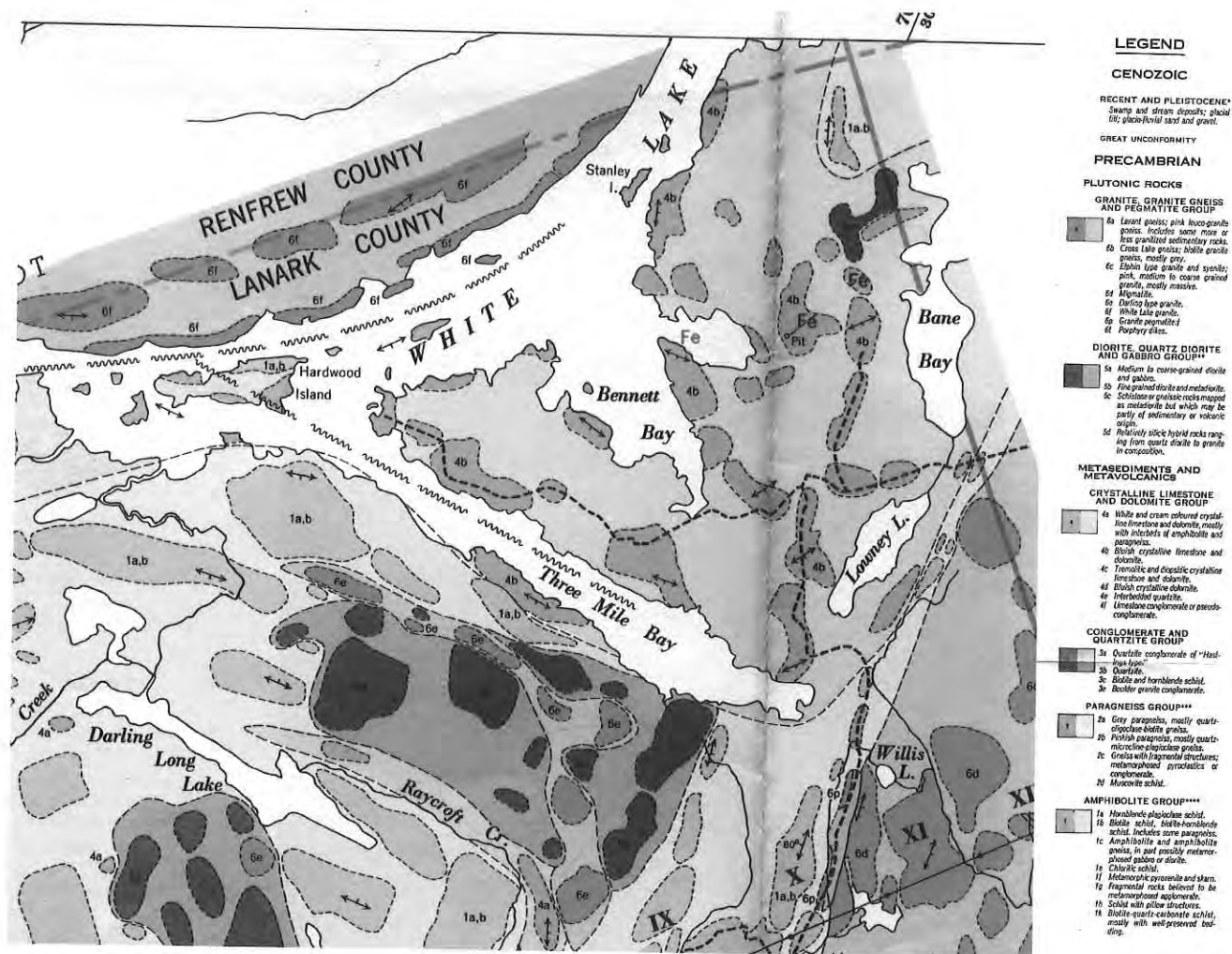


Figure 4. Exposed Marble along Lowney Lake Road



c. Physiography

As described in a report by Beechey (1980), life science systems planning for Ontario has followed Hills' classification of terrestrial ecosystems (Hills 1959, 1959b, 1966). This framework divided the province into thirteen distinct ecological regions based on physiographic features, such as ecoclimate, soil moisture, soil nutrients, and land type (relief, texture, petrography of materials, depth of bedrock and drainage conditions). The White Lake study area is contained within Site Region 5E (Georgian Bay), as defined by Hills (1959, 1964) and later modified by Crins and Uhlig (2000) (Figure 5). Site Region 5E is characterized by rolling uplands and bedrock outcrops covered to varying depths with sand and gravel of glacial origin, interspersed with lowlands of water-laid materials (Hills, 1959).

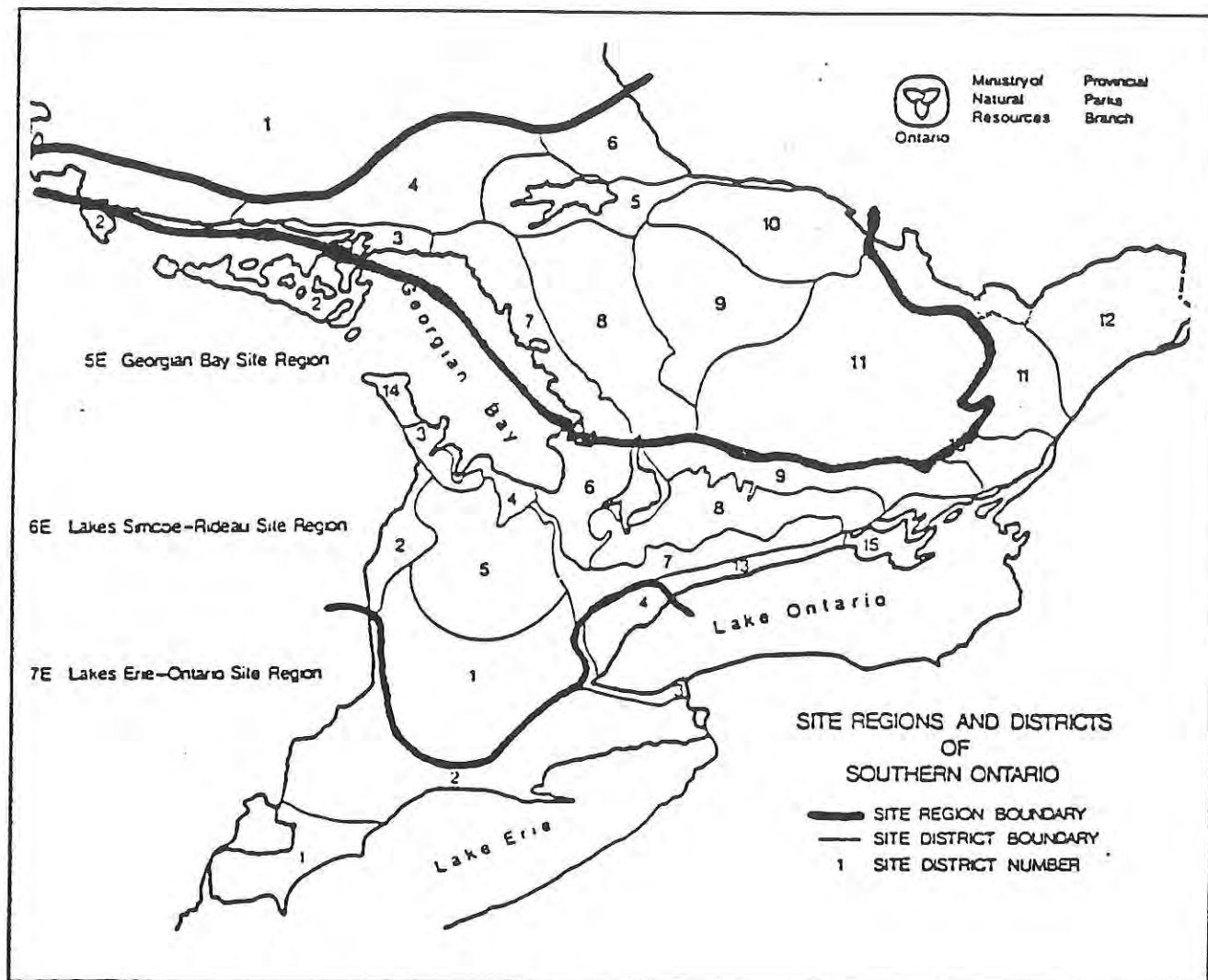
The regional unit is then divided into eleven site districts based primarily on the separation of major physiographic and/or geologic patterns. The White Lake study area lies within Site District 5E-11 (Bancroft), a moderately rolling area of shallowly covered rock ridges with sand flats. Both the sand flats and the silty sands which cover the ridges are predominantly low-base materials, although granitic materials occur occasionally in larger areas (Hills, 1959). Brunton (1990) further divides the site district into four subdistricts. The White Lake study area is located in the area delineated as the Madawaska Subdistrict and described as "an area of extensive marble bedrock and relatively deep till soil with typical Site Region 5E vegetation with some southern and Ottawa Valley floristic influence" (Brunton, 1990). In his study of biophysiographic regions in Site Region 5E, Noble (1988) placed this region within ground moraine unit 1a-37, which is characterized by moderately broken shallow sandy till uplands, with some bare bedrock. This is the most common landform in Site Region 5E-11.

Elevations in the White Lake study area range from 162 - 200 m above sea level with maximum height attained on the hilltops south of Three Mile Bay. The White Lake study area is part of the Madawaska River watershed, which drains northward into the Ottawa River. Internal drainage is slow and often impeded by beavers and there are no substantial creeks present.

d. Soils and Moisture Regime

The soils of the White Lake study area are primarily of the Tweed sandy loam - rock complex (Hoffman *et al.* 1967). This complex occurs throughout northeastern Lanark County and is the second most common soil type in Lanark County. The complex consists of about 50% bare rock, 20% shallow Tweed sandy loam, 20% deep Tweed sandy loam and 10% muck and other loams. To the south and east of Three Mile Bay, the soils change to the Monteagle sandy loam - rock complex which consists of Monteagle sandy loam, Monteagle sandy loam - shallow phase, bare rock, muck, Cristy sandy loam, Wemyss sandy loam and Tweed sandy loam. Monteagle soils are derived from granite and are acidic, whereas Tweed soils are derived from limestone and have large amounts of calcite in their horizons. In the White Lake study area, Tweed soils are associated with areas of amphibolite and crystalline limestone bedrock, whereas Monteagle soils are associated with the plutonic granitic bedrock. Tweed soils are brunisolic, stony, sandy loam till with a pH ranging from 6.8 at the surface to 7.8 in the lower horizon. The surface pH tends to be lower, due to rapid water percolation, especially on steep slopes and hill tops. Both Tweed and Monteagle soils have low fertility, low moisture holding capacity and extreme stoniness, and they tend to be found on slopes of 10-15%. The soils on the site have no capability for agriculture. Fairly large areas of organic soils are found in boggy and fen depressions underlain by marble in the vicinity of Hayes Bay and Bane Bay. Although there is no data for wetlands in the study area, the pH of the White Lake fen just to the north is 6.9 and peat depth averages 3.4m (Riley 1988).

Figure 5. The Site Districts of Southern Ontario



The moisture regime found in the White Lake study area is variable and is largely reflective of the angle and direction of the slopes. Due to their thin and permeable nature, the coarse, sandy soils on the site are mostly mesic to dry mesic. However, a wide range of aquatic habitats are present, ranging from open water to wet meadow, wet mesic shoreline and swamp.

e. Climate and Microclimate

Lanark County has a temperate climate with very cold, snowy winters and warm summers with adequate rainfall and little likelihood of drought (Hoffman *et al.* 1967). The White Lake study area would probably experience the more extreme conditions found in the County due to its moderately high elevation and northern location. Meteorological stations are located at Almonte and Dalhousie Lake (Environment Canada, 1980). Winters are cold with a mean temperature of -10°C (14°F) and summers are warm with a mean temperature of 18°C (66°F). The average growing season is 190 days. The frost free period is about 117 days. There is an average of 80 cm of rain and a mean annual snowfall of 187 cm.

Warmer than normal conditions exist on some of the high hills in the southern section of the White Lake study area as indicated by the presence of dry mesic, oak-dominated woodland and forest. Normal and warmer than normal conditions are also associated with the areas of glaciofluvial sands and gravels. Colder than normal conditions are found in wet organic depressions. West-facing slopes present warm site conditions.

f. History

The name White Lake (Wa-ba-lac to the local natives) is believed to be derived from the white marl covering large portions of the lake substrate (Kennedy 1970). White Lake was originally created in 1845 when a dam on Waba Creek was constructed resulting in the water levels increasing in three, previously small, interconnected water bodies. The dam was made to facilitate log movement to Stewart's mill downstream. The dam was rebuilt in 1948 and changed to a concrete structure in 1968. The lake is relatively shallow with a maximum depth of 9.1 m and a mean depth of 3.1 m (Mathers and Kerr 1998). Although the first public access road was not constructed by the Ontario Department of Lands and Forests until 1968, several lodges and numerous cottages existed even before that time.

Keddy (1994) used surveyor notes for 60 upland lots in Pakenham, Beckwith and Darling Townships to characterize the forest cover of pre-settlement forests in the Precambrian region of eastern Ontario. This analysis showed that white pine and sugar maple were equally frequent on upland sites (50% of lots), but slightly less common than hemlock (58% of lots). Although white pine was not considered the most abundant tree in any of these lots, it was the second most abundant in 48% of the cases where a secondary dominant was recorded. In addition, hemlock-white pine and sugar maple-white pine were the two most frequently recorded species combinations.

Algonquin and Iroquois Native Americans apparently had little impact on the forests of Lanark County (Keddy 1994 and references therein). Darling Township was generally too rocky and the soils were too infertile to support agriculture. However, early settlers in the region logged the valuable white pine or simply burned the forests for potash or to clear the land (Keddy 1994). By 1861, Darling Township was one of three townships (of about 59) in eastern Ontario which had less than 10% forest cover. Keddy (1994) has reviewed some of the effects of this deforestation on pine regeneration. Elimination of the vast historic pine forests made it less likely that widely spaced good seed years would coincide with desirable post-disturbance seedbeds. Furthermore, seedlings require about 25 years free from disturbance before contributing substantially to the seed supply. She estimated that dry areas with shallow soil over rock, like the White

Lake study area historically, burned naturally about once a century. Fire frequency likely increased as a result of logging, and pine regeneration was further reduced when stands were burned repeatedly (and the white pine blister rust was also introduced). The fire history of the region is difficult to piece together, but there was likely a fire in the White Lake study area in the late 1800's. In the 1920's, fire suppression became accepted practice, with long-term detrimental effects on white pine regeneration. Pine forests in the Great Lakes-St. Lawrence Forest Region generally have a natural fire interval return time ranging from 65 to 78 years. The estimated return interval in eastern Ontario is now 580 years because of the current practice of suppression (Keddy 1994 and pers. comm. with R. Frech therein).

CHAPTER 2. RESOURCE INVENTORY

(1) Study Objectives

The following objectives were outlined by the Ministry of Natural Resources in the Terms of Reference for this study:

- 1) To complete an inventory of the life science features of the White Lake study area, including landforms and associated vegetation types, flora and fauna, and special or critical features of habitat for significant species and community types;
- 2) To identify and assess the level of representation of ecosystems (landform/vegetation associations, etc.) And the level of significance of the ecological features and sites within the White Lake study area; and
- 3) To make recommendations regarding the ecological values of the White Lake study area that relate to its future land management.

The Terms of Reference also recognized that the fall timing of the field work placed constraints on the data collection phase of the White Lake study.

(2) Methodology

The consultant first conducted a preliminary review of 1991 aerial photographs of the site (1:10,000) and Forest Resource Inventory maps. Systematic field studies were conducted from September 10th until October 15th, 2000 for a total of 9 person days. The vegetation communities were subjectively evaluated for composition, structure, age and site conditions. Communities were identified according to the dominant species, based on the order of frequency. Tree composition was estimated out of a total of ten as in standard forestry practise i.e. sugar maple⁷-beech¹-white birch¹-large-toothed aspen¹ indicates a forest composed of roughly 70% sugar maple and 10% each of the other species. Saplings are defined as those trees whose stems are between 2.5 and 10 cm in diameter at breast height. The dominance and coverage of tree seedlings (stems less than 2.5 cm diameter at breast height), saplings, shrubs and herbs was recorded. Species lists were also compiled for all communities. The dbh of the larger trees in the stands were usually measured, as well as a tree of average size in the dominant canopy.

Forest communities were defined on the basis of field observations, but 1992 Forest Resource Inventory maps were also examined. The White Lake study area consists of a complex series of low hills, swamps and lakes, and the forest is influenced substantially by the steepness and aspect of the slopes and by proximity to White Lake. The FRI coverage tends to average out tree composition in a larger area, so it is somewhat inaccurate. In particular the shoreline of White Lake often contains a large component of white cedar which may not be indicated by the forest stand composition. Community boundaries and significant species and areas were mapped on mylar overlays on the aerial photographs. Notes on any features of interest, including faunal sightings, rare plant species, stand history, degree of disturbance etc., were recorded. Oldham (1999) served as the standard reference for designating rare plant species in Ontario.

(3) Vegetation Community Descriptions

A total of 71 plant communities were identified within the White Lake study area, including wetland, upland and anthropogenic classes. These communities are delineated on Map 1 at a scale of 1:10,000 from 1991 aerial photographs. Base maps at a scale of 1:10,000 were obtained from NERVIS utilizing ArcView 3.0. The relative size of each habitat is given in Table 1. The study area is almost equally divided into wetland and upland habitat. Upland constitutes approximately 50% of the site. About 26% is vegetated wetland and 24.0% is sparsely vegetated or unvegetated deep water in White Lake. Each complex is divided into vegetation groups based on the type of dominant cover (i.e. coniferous, deciduous or mixed forest), moisture regime and general substrate type. If coniferous (or deciduous) trees comprised 80% or more of the canopy, the stand was considered coniferous (or deciduous). If neither formed more than 70% of the canopy, the stand was considered mixed. These groups are subdivided further to indicate differences in stand composition, tree age classes, size and density etc. Most of the 71 community associations noted at the site represent minor variations on 22 major natural vegetation groupings. Table 2 summarizes the data available from FRI mapping and corresponding community numbers.

The site contains a high diversity of natural vegetation community associations with 32 in wetland habitat and 34 in upland habitat. Wetland vegetation types include lacustrine and palustrine systems. Open water aquatics, wet meadows, tall emergent marsh, floating lakeshore fen, open graminoid fen, thicket poor fen, tamarack dominated poor fen, thicket swamps and white cedar dominated swamps are found. Terrestrial upland includes the following: dry mesic, white pine-dominated rock barren (open forest or woodland); dry mesic red oak forest on shallow sandy till; mesic-wet mesic mixed and deciduous forests on moderately deep sandy till; mesic-dry mesic white pine forests on shallow sandy till over marble; and mesic-wet mesic white cedar and balsam fir forests on sandy till over marble.

Figure 6 is a vegetation matrix for the White Lake study area. Based on Hills' (1954) site regions, Dr. Paul Maycock, Erindale College, University of Toronto, developed this matrix format depicting a maximum of 150 theoretical vegetative habitats (site types). The plant communities are classified according to ten moisture regimes, three microclimate regimes and five broad substrate types. Maycock greatly modified Hills' work resulting in 8 broad site regions for the Province. The White Lake study area is contained in his Northern Deciduous-Evergreen Forest Region. Maycock recorded only 75 vegetative habitats in the region (Maycock, 1979), although additional vegetation/site complexes have been identified since his work. The White Lake study area contains 13 vegetative habitats or site types.

Table 1: Partial Vegetation Classification of the White Lake Study Area

Note: This vegetation classification primarily includes upland communities. Many of the wetland communities in the study area were previously documented in wetland inventories conducted during 1984-1989 and were not included in this work.

A. AQUATIC VEGETATION TYPES

LACUSTRINE SYSTEM - DEEP WATER (mostly unvegetated)

1. Wild Rice Tall Emergent Deep Aquatic Type:

Wild Rice (*Zizania palustris*) / Slender Najas (*Najas flexilis*)

2. Pondweed Submerged Deep Aquatic Type

Pondweed (*Potamogeton illinoensis*, *P. praelongus*)

LACUSTRINE SYSTEM - SHALLOW WATER

3. Water-meal Free-Floating Shallow Aquatic Type:

Water-meal (*Wolffia borealis*) - Greater Duckweed (*Spirodela polyrhiza*) / dead stumps, logs

4a. Bulhead Lily - sedge Shallow Aquatic Type:

Bullhead Lily (*Nuphar variegata*) / sedges (*Carex stricta*, *C. lasiocarpa*, *C. utriculata*), Common Cattail (*Typha latifolia*)

4b. Arrowhead Shallow Aquatic Type:

Broad-leaved Arrowhead (*Sagittaria latifolia*)

B. WETLAND VEGETATION TYPES

MARSH

MEADOW MARSH

5 Sedge Meadow Marsh Type:

5a. Slender Sedge (*Carex lasiocarpa*)

5b. Slender Sedge (*Carex lasiocarpa*), Beaked Sedge (*Carex utriculata*)

5c. Beaked Sedge (*Carex utriculata*), Hemlock Water-parsnip (*Sium suave*), Sensitive Fern (*Onoclea sensibilis*)

5d. Sedge (*Carex lacustris*), Canada Blue-joint (*Calamagrostis canadensis*) / dead cedar

5e. Sedge (*Carex lasiocarpa*) - Narrow-leaved Cattail (*Typha angustifolia*) / dead cedar

6 Rice Cut Grass Meadow Marsh Type:

Cut Grass (*Leersia oryzoides*), sedges (*Carex* spp.), Hemlock Water-parsnip (*Sium suave*) / dead white cedar

TALL EMERGENT MARSH

7. Cattail Marsh Type:

7a. Broad-leaved Cattail (*Typha latifolia*) - sedges (*Carex aquatilis*, *C. spp.*)

7b. Broad-leaved Cattail (*Typha latifolia*) - Canada Blue-joint (*Calamagrostis canadensis*)

7c. Narrow-leaved Cattail (*Typha angustifolia*) - sedges (*Carex* spp.)

FEN

FLOATING LAKESHORE FEN

8. Slender Sedge - Twig-rush Fen Type:

Slender Sedge (*Carex lasiocarpa*) - Twig-rush (*Cladium mariscoides*) - Common Cattail (*Typha latifolia*)

OPEN GRAMINOID FEN

9. Common Reed - Slender Sedge Fen Type:

Common Reed (*Phragmites australis*), Slender Sedge (*Carex lasiocarpa*)

10. Slender Sedge Fen Type: Slender Sedge (*Carex lasiocarpa*)

POOR FEN THICKET

11. Leather-leaf - Labrador-tea Poor Fen Type:

11a. Leather-leaf (*Chamaedaphne calyculata*), *Ledum groenlandicum*, *Rhamnus alnifolia*, *Salix* sp., *Potentilla fruticosa* / *Sphagnum* spp.

11b. *Ledum groenlandicum*, *Myrica gale*, *Salix* sp. / *Carex lasiocarpa*, *Typha latifolia* / *Sphagnum* spp.

CONIFEROUS TREED POOR FEN

12. Tamarack Poor Fen Type:

12a. Tamarack⁹ - White Cedar¹ stunted trees (50% cover) / *Carex trisperma*, *C. paupercula*, *Thelypteris palustris* / moss

12b. Tamarack⁹ - White Cedar¹ stunted trees (50% cover) / *Ledum groenlandicum*, *Myrica gale* / *Carex trisperma*, *C. paupercula*, *Thelypteris palustris* / moss

12c. Tamarack⁸ - White Cedar² stunted trees / Sweet Gale (*Myrica gale*) - Leather-leaf (*Chamaedaphne calyculata*) - Shrubby Cinquefoil (*Potentilla fruticosa*) / Slender Sedge (*Carex lasiocarpa*) - Twig-rush (*Cladium mariscoides*) / *Sphagnum* spp.

12d. Tamarack⁸ - White Cedar² stunted trees (35% cover) / *Salix* spp., *Ledum groenlandicum*, *Cornus stolonifera*, *Rubus pubescens* / moss

12e. Tamarack⁶ - White Cedar⁴ stunted trees (25% cover) / Leather-leaf (*Chamaedaphne calyculata*) - *Ledum groenlandicum*, *Vaccinium angustifolium*, *Rhamnus alnifolia*, *Salix* sp. / *Carex trisperma*, *C. intumescens*, *Thelypteris palustris* / *Sphagnum* spp.

SWAMP

THICKET OR SHRUB SWAMP

14. Speckled Alder Thicket Swamp Type:

Speckled Alder (*Alnus rugosa*), Meadowsweet (*Spirea alba*) / *Calamagrostis canadensis*, *Carex stricta*

15. Willow Thicket Swamp Type:

Willows (*Salix petiolaris*, *S. discolor*, *S. bebbiana*) / dead cedar / sedge (*Carex stricta*, *C. diandra*), Common Cattail (*Typha latifolia*)

CONIFEROUS TREED SWAMP

16. White Cedar Swamp Type:

16a. White Cedar⁹ - White Spruce¹ / *Carex trisperma*, *Coptis trifolia* / *Sphagnum* spp.

16b. White Cedar⁵ - White Spruce² - Tamarack² - Balsam Fir¹ / *Ledum groenlandicum*, *Vaccinium*

angustifolium / *Carex trisperma*, *C. intumescens*, *Coptis trifolia* / *Sphagnum* spp.

16c. White Cedar⁶ - Balsam Fir² - White Spruce¹ - White Elm¹ / Spotted Touch-me-not (*Impatiens capensis*), *Glyceria striata*, *Mitella nuda* / moss

C. TERRESTRIAL UPLAND VEGETATION

FORESTED UPLANDS

TREED ROCK BARREN OR WOODLAND (25-60% Treed Cover)

17. White Pine Mixed Treed Rock Barren Type:

17a. White Pine⁸ - White Cedar² (50% cover) / *Vaccinium angustifolium*, *Juniperus communis*, *Arctostaphylos uva-ursi* / moss, lichen

17b. White Pine⁷ - Red Oak³ (40% cover) / *Vaccinium angustifolium*, *Juniperus communis*, *Arctostaphylos uva-ursi* / moss, lichen

FORESTED UPLANDS (over 60% Treed Cover)

DECIDUOUS FOREST

DRY MESIC-MESIC, DECIDUOUS FOREST ON SHALLOW SOILS OVER ROCK

18. Dry Mesic-Mesic Red Oak Deciduous Forest Type:

Red Oak⁷ - Sugar Maple² - White Pine¹ / *Aster macrophyllus*, *Aralia nudicaulis*

WET MESIC-MESIC DECIDUOUS FOREST ON SHALLOW-MODERATELY DEEP, COARSE SANDY SOILS

19. Mesic Sugar Maple Deciduous Forest Type:

19a. Sugar Maple⁸ - (White Birch¹ Yellow Birch, White Pine, Red Oak, Ironwood, Basswood)² / sugar maple seedlings, *Carex pedunculata*

19b. Sugar Maple⁸ - Ironwood² (Red Oak, White Ash) / sugar maple seedlings, *Carex pensylvanica*, *C. pedunculata*, *Oryzopsis racemosa*

19c. Sugar Maple⁵ - White Birch² - White Pine² - (Red Oak, Ironwood, Basswood)¹ / *Viburnum acerifolium*, *Corylus cornuata*, *Cornus rugosa* / sugar maple seedlings, *Oryzopsis asperifolia*, *Aralia nudicaulis*, *Pteridium aquilinum*

19d. Sugar Maple⁵ - Basswood³ - White Birch¹ - Red Oak¹ (Ironwood, Balsam Fir, White Ash) / sugar maple seedlings, *Aralia nudicalis*

19e. Sugar Maple⁴ - White Birch² - Ironwood³ - (White Cedar, White Spruce)¹ / sugar maple saplings / sugar maple seedlings, *Oryzopsis asperifolia*

19f. Sugar Maple³ - Red Oak⁴ - Basswood¹ - White Pine¹ - Beech¹ / sugar maple saplings

19g. Sugar Maple⁹ - Basswood¹ (young, cut over)

19h. Sugar Maple³ - White Birch¹ - Trembling Aspen¹ - White Pine¹ - Red Oak¹ - Ironwood¹ - Basswood¹ - Butternut¹ (young)

19i. Sugar Maple² - Red Oak⁴ - Basswood² - White Pine¹ - Butternut¹

19j. Sugar Maple⁵ - Beech³ - Trembling Aspen¹ - Ironwood¹ (young)

19k. Sugar Maple² - White Birch² - Trembling Aspen² - White Pine¹ - Ironwood¹ - Basswood² (young)

MIXED FOREST

DRY MESIC, MIXED FOREST ON SHALLOW SANDY SOILS OVER ROCK

20. Dry Mesic White Pine Mixed Forest Type:

20a. White Pine⁷ - Red Oak¹ - White Birch¹ - Sugar Maple¹ / *Aster macrophyllus*, *Waldsteinia fragarioides* / moss

20b. White Pine⁵ - Trembling Aspen² - Sugar Maple¹ - White Birch¹ - Red Oak¹ / *Corylus cornuta*, *Cornus rugosa* / Sugar Maple saplings / *Aralia nudicaulis*, *Aster macrophyllus*, *Gaultheria procumbens*

20c. White Pine⁵ - Large-toothed Aspen² - Trembling Aspen¹ - (White Cedar, Balsam Fir)¹ / *Corylus cornuta*, *Cornus rugosa* / White Pine, Balsam Fir, Trembling Aspen saplings / *Aster macrophyllus*, *Pteridium aquilinum*, *Waldsteinia fragarioides*, *Aralia nudicaulis*

20d. White Pine⁴ - Sugar Maple⁴ - Balsam Fir¹ - (Trembling Aspen, White Birch)¹ / White Pine, White Birch saplings, *Cornus rugosa*

21. Mesic White Cedar-Balsam Fir Mixed Forest Type:

21a. White Cedar⁴ - White Birch³ - Balsam Fir³

21b. White Cedar³ - Trembling Aspen³ - Balsam Fir² - White Birch¹

21c. White Cedar³ - Trembling Aspen² - Large-toothed Aspen¹ - Balsam Fir¹ - Sugar Maple¹ - White Pine² / white cedar, balsam fir saplings, *Cornus rugosa*

21d. White Cedar⁶ - Balsam Fir³ - Red Maple¹

21e. White Cedar² - Trembling Aspen² - Balsam Fir³ - White Birch¹ - White Pine²

22. Mesic Hemlock Mixed Forest Type: Hemlock⁶ - Sugar Maple² - Basswood¹ - Ironwood¹ / *Aralia nudicaulis*, *Dryopteris marginalis*

23. Mesic Sugar Maple Mixed Forest Type:

23a. Sugar Maple⁴ - Basswood² - White Pine² - Balsam Fir¹ - White Cedar¹

23b. Sugar Maple⁴ - Hemlock³ - White Cedar² - White Birch¹ / *Aralia nudicaulis*

CONIFEROUS FOREST

25. Mesic-Dry Mesic Hemlock Conifer Forest Type:

25a. Hemlock⁷ - White Cedar² - White Birch¹

25b. Hemlock³ - Balsam Fir³ - White Cedar² - Trembling Aspen²

26. Mesic-Wet Mesic White Pine Conifer Forest Type:

26a. White Pine⁸ - Red Oak¹ - Sugar Maple¹ / Sugar Maple, Balsam Fir saplings / *Aster macrophyllus*, *Waldsteinia fragarioides*, *Aralia nudicaulis*

26b. White Pine⁶ - White Cedar¹ - Balsam Fir¹ - White Birch¹ - Sugar Maple¹ / White Cedar, Balsam Fir saplings / *Aster macrophyllus*, *Waldsteinia fragarioides*, *Pteridium aquilinum*, *Aralia nudicaulis*

26c. White Pine⁵ - White Cedar⁴ - Balsam Fir¹ / *Aralia nudicaulis*, *Aster macrophyllus*, *Pteridium aquilinum*

27. Dry Mesic White Pine Conifer Forest Type: White Pine⁸ - Red Maple¹ - White Birch¹ / *Pteridium aquilinum*, *Waldsteinia fragarioides*, *Oryzopsis asperifolia* / lichen, moss

28. Mesic-Wet Mesic White Cedar Conifer Forest Type:

28a. White Cedar⁸ - White Pine² - Balsam Fir² - Basswood² - Red Maple¹ / *Dryopteris marginalis*, *Maianthemum canadense*, *Aralia nudicaulis*

28b. White Cedar⁷ - Balsam Fir¹ - Basswood¹ - Sugar Maple¹ / Sugar Maple, Balsam Fir saplings (53)

28c. White Cedar⁵ - White Birch⁴ - White Spruce¹ / Sugar Maple saplings

29. Wet Mesic Balsam Fir Conifer Forest Type:

Balsam Fir⁶ - White Cedar² - White Spruce¹ - White Birch¹ - Trembling Aspen¹

D. SEMI-NATURAL VEGETATION

30. Hydroline and Clearings

White Pine - Sugar Maple - Trembling Aspen - White Ash / Common Juniper (*Juniperus communis*),
Staghorn Sumac (*Rhus typhina*), *Symphoricarpos alba*/ Poverty Oat Grass (*Danthonia spicata*), *Pteridium*
aquilinum

31. Abandoned Gravel Pit

31b. Red Pine-White Pine Plantation (40 years)

E. ANTHROPOGENIC VEGETATION

32. Gravel Road

33. Lots with Buildings

34. Municipal Dump

Figure 6: Vegetation Matrix for the White Lake Study Area

Temperature	Substrate	Moisture regime									
		Arid	Very Dry	Dry	Dry Mesic	Mesic	Wet Mesic	Wet	Very Wet	Saturated	Open Water
Colder	Rock										
	Sand										
	Loam										
	Clay							11-12	8-10		
	Organic						16				
Normal	Rock				20,27						
	Sand										
	Loam					19, 21-26 28-30					
	Clay								5		1,2
	Organic							14-15	6	7	3,4
Warmer	Rock				17						
	Sand				18						
	Loam										
	Clay										
	Organic										

WETLAND VEGETATION TYPES

1.0 OPEN WATER/AQUATIC

White Lake is one of the largest lakes in eastern Ontario. It is a shallow, eutrophic lake with a pH of 7-8.5, alkalinity of 104-114 mg l⁻¹, total dissolved solids level of 116-159 mg l⁻¹, dissolved oxygen of 5.0-10 mg l⁻¹, water clarity of 2.6-3 m (Secchi reading) and 13 °C bottom temperature and 25 °C top temperature (Mathers and Kerr 1998). Its water levels are controlled by a man-made dam first constructed in 1845. It reaches its maximum depth of 9.1 m in Pickerel Bay. The bottom substrates of White Lake are predominantly mud. Based on sediment core sampling conducted in 1973, much of the lake was found to have deposits of thick marl (deposits of calcium from biological and sedimentary processes) (Mathers and Kerr 1998). Most of the lake is sparsely vegetated. Aquatic plants occur sparsely in shallow water along its edge and include *Potamogeton* spp., *Utricularia vulgaris* and *Myriophyllum sibiricum*. Shallower open water is also found in a few small ponds within the study area. Approximately 1090 ha of the study area is open water aquatic habitat of White Lake.

Significant Species: *Potamogeton illinoensis* (Illinois Pondweed), *Potamogeton praelongus* (White-stemmed Pondweed)

MARSH

There are extensive cattail marsh communities associated with White Lake and a variety of other meadow marshes occupying small depressions throughout the study area. In some locations, there are broad ecotones between these communities and thicket and treed swamps. Water levels may fluctuate seasonally and from year to year, depending on beaver activity and precipitation, so the communities are generally transient in nature. Graminoids and sedges dominate; herbaceous cover is usually greater than 75%, and is often nearly complete. Shrubs are usually sparse (5-10% cover) and dead trees may be present. These communities occur in normal microclimates and on both mineral and organic substrates. Sedge meadow communities a-c and community 7c occur on mineral soils. Figure 7 shows a marsh community at the outlet of Lowney Lake.

MEADOW MARSH

Sedge Meadow Marsh Type:

- a. Slender Sedge (*Carex lasiocarpa*)
- b. Slender Sedge (*Carex lasiocarpa*), Beaked Sedge (*Carex utriculata*)
- c. Beaked Sedge (*Carex utriculata*), Hemlock Water-parsnip (*Sium suave*), Sensitive Fern (*Onoclea sensibilis*)
- d. Sedge (*Carex lacustris*), Canada Blue-joint (*Calamagrostis canadensis*) / dead cedar
- e. Sedge (*Carex lasiocarpa*) - Narrow-leaved Cattail (*Typha angustifolia*) / dead cedar

Rice Cut Grass Meadow Marsh Type:

Cut Grass (*Leersia oryzoides*), sedges (*Carex* spp.), Hemlock Water-parsnip (*Sium suave*) / dead white cedar

TALL EMERGENT MARSH

Cattail Marsh Type:

- a. Broad-leaved Cattail (*Typha latifolia*) - sedges (*Carex aquatilis*, *C. spp.*)
- b. Broad-leaved Cattail (*Typha latifolia*) - Canada Blue-joint (*Calamagrostis canadensis*)

Figure 7: Wetland at Lowney Lake Outlet



- c. Narrow-leaved Cattail (*Typha angustifolia*) - sedges (*Carex* spp.)

Significant Species: *Cardamine pratensis* ssp. *pratensis* (Cuckoo-flower), *Carex aquatilis* (Aquatic Sedge), *Carex lurida* (Sallow Sedge), *Galium tinctorium* (Stiff Marsh Bedstraw), *Cistothorus palustris* (Marsh Wren), *Thamnophis sauritus septentrionalis* (Northern Ribbon Snake).

FEN

Fens are hydrologically connected to ground water systems. They have vegetational similarities to bogs, however fens are more nutrient rich than bogs because of contact with or source in marl substrates or calcareous uplands. Fens are highly variable in the nutrient content of their waters and peats. Some are highly alkaline, with high Ca, Mg and pH values, while other fens, commonly referred to as "poor fens" are almost as nutrient-poor as bogs (Riley 1989). The average pH of fens in southern Ontario is 6.2.

Lowland areas dominated by white cedar and tamarack found in the White Lake study area are both extensive and highly variable in composition. The combination of a gently sloping terrain underlain by marble and an intermittent water flow towards White Lake has contributed to the development of an incredible variety of treed wetlands. Some of these areas are referred to as "treed fen" within this report and also by Riley (1988) and Brunton (1990), although all of the treed areas would be considered "swamp" if the provincial ecological land classification system was utilized because they support greater than 10% tree cover (see Lee et al. 1999). They are identified as treed fen by the author since they have the hydrological and soil properties of a fen and contain many species that are fen indicators. Riley (1989) correctly characterized treed fen as having mineral soils (marl) and sparse tree cover (10-35%), and swamps as having hydric, organic soils and greater than 35% tree cover. An open graminoid fen at Hayes Bay is flanked by an extensive treed fen community and several other treed fens exist in the study area.

The White Lake study area contains a wide diversity of fen community types. Fen communities are discussed further under the Significant Features section of this report.

FLOATING LAKESHORE FEN

8. Slender Sedge - Twig-rush Fen Type:

Slender Sedge (*Carex lasiocarpa*) - Twig-rush (*Cladium mariscoides*) - Common Cattail (*Typha latifolia*)

OPEN GRAMINOID FEN

9. Common Reed - Slender Sedge Fen Type:

Common Reed (*Phragmites australis*), Slender Sedge (*Carex lasiocarpa*)

10. Slender Sedge Fen Type: Slender Sedge (*Carex lasiocarpa*)

POOR FEN THICKET

11. Leather-leaf - Labrador-tea Poor Fen Type:

11a. Leather-leaf (*Chamaedaphne calyculata*), *Ledum groenlandicum*, *Rhamnus alnifolia*, *Salix* sp., *Potentilla fruticosa* / *Sphagnum* spp.

11b. *Ledum groenlandicum*, *Myrica gale*, *Salix* sp. / *Carex lasiocarpa*, *Typha latifolia* / *Sphagnum* spp.

CONIFEROUS TREED POOR FEN

12. Tamarack Poor Treed Fen Type:

12a. Tamarack⁹ - White Cedar¹ stunted trees (50% cover) / *Carex trisperma*, *C. paupercula*, *Thelypteris palustris* / moss

12b. Tamarack⁹ - White Cedar¹ stunted trees (50% cover) / *Ledum groenlandicum*, *Myrica gale* / *Carex trisperma*, *C. paupercula*, *Thelypteris palustris* / moss

12c. Tamarack⁸ - White Cedar² stunted trees / Sweet Gale (*Myrica gale*) - Leather-leaf (*Chamaedaphne calyculata*) - Shrubby Cinquefoil (*Potentilla fruticosa*) / Slender Sedge (*Carex lasiocarpa*) - Twig-rush (*Cladium mariscoides*) / *Sphagnum* spp.

12d. Tamarack⁸ - White Cedar² stunted trees (35% cover) / *Salix* spp., *Ledum groenlandicum*, *Cornus stolonifera*, *Rubus pubescens* / moss

12e. Tamarack⁶ - White Cedar⁴ stunted trees (25% cover) / Leather-leaf (*Chamaedaphne calyculata*) - *Ledum groenlandicum*, *Vaccinium angustifolium*, *Rhamnus alnifolia*, *Salix* sp. / *Carex trisperma*, *C. intumescens*, *Thelypteris palustris* / *Sphagnum* spp.

Significant Species: *Aster borealis* (Rush Aster), *Calamagrostis stricta* ssp. *inexpansa* (Narrow Reed Grass), *Carex livida* (Livid Sedge), *Epilobium strictum* (Soft Willow-herb), *Galium labradoricum* (Labrador Marsh Bedstraw), *Galium tinctorium* (Stiff Marsh Bedstraw), *Triglochin maritimum* (Seaside Arrow-grass), *Carex limosa* (Mud Sedge), *Liparis loeselii* (Fen Twayblade), *Malaxis monophyllos* ssp. *brachypoda* (White Adder's-mouth), *Ophioglossum pusillum* (Northern Adder's-tongue), *Platanthera dilatata* (Tall White Bog Orchis), *Potentilla fruticosa* ssp. *floribunda* (Shrubby Cinquefoil), *Pyrola chlorantha* (Green-flowered Pyrola), *Scirpus hudsonianus* (Hudson Bay Bulrush), *Sparganium natans* L. (Small Bur-reed), *Utricularia gibba* (Humped Bladderwort), *Utricularia minor* (Lesser Bladderwort), *Hemileuca* sp. 1 (Bogbean Buckmoth).

THICKET SWAMP

Thicket swamp is poorly represented within the study area, however the communities that do exist are interesting due to underlying calcareous deposits. Both of these communities have normal to slightly cool microclimates and some standing water.

Speckled Alder Thicket Swamp Type:

Speckled Alder (*Alnus rugosa*), Meadowsweet (*Spirea alba*) / *Calamagrostis canadensis*, *Carex stricta*

Willow Thicket Swamp Type:

Willows (*Salix petiolaris*, *S. discolor*, *S. bebbiana*) / dead cedar / sedge (*Carex stricta*, *C. diandra*), Common Cattail (*Typha latifolia*)

Significant Species: *Hypericum boreale* (St. John's-wort), *Cirsium muticum* (Swamp Thistle), *Galium tinctorium* (Stiff Marsh Bedstraw).

16. CONIFEROUS TREED SWAMP

The three treed swamp communities in the White Lake study area differ in age, composition and structure. Tree cover is about 75%, and white cedar saplings and seedlings are quite dense. Although the average tree

diameter in these communities is only about 15 cm, there are scattered large emergents with a 30 cm dbh. In all three communities shrubs and herbs are sparse, with only 5-15% cover by herbs such as Goldthread (*Coptis trifolia*) and Marsh Fern (*Thelypteris palustris*), and Naked Mitrewort (*Mitella nuda*). However, mosses typically make up an additional 50% of the ground. The flooding of these communities would vary seasonally, but there was still some standing water during the survey. The substrate is organic duff over mineral soils, and the microclimate is slightly colder than normal.

16. White Cedar Swamp Type:

16a. White Cedar⁹ - White Spruce¹ / *Carex trisperma*, *Coptis trifolia* / *Sphagnum* spp.

16b. White Cedar⁵ - White Spruce² - Tamarack² - Balsam Fir¹ / *Ledum groenlandicum*, *Vaccinium angustifolium* / *Carex trisperma*, *C. intumescens*, *Coptis trifolia* / *Sphagnum* spp.

16c. White Cedar⁶ - Balsam Fir² - White Spruce¹ - White Elm¹ / Spotted Touch-me-not (*Impatiens capensis*), *Glyceria striata*, *Mitella nuda* / moss

Significant Species: *Cypripedium arietinum* (Ram's-head Lady's Slipper), *Cystopteris bulbifera* (Bulblet Bladder Fern), *Pyrola asarifolia* (Pink Pyrola).

B. UPLAND VEGETATION

17. TREED ROCK BARREN OR WOODLAND (25-60% Treed Cover)

Bedrock is 20-30% exposed in these communities and microclimate is warmer than normal. Tree cover is ranges from 40-50%. Common Juniper (*Juniperus communis*) and Lowbush Blueberry (*Vaccinium angustifolium*) are the primary shrubs which make up about 40% cover. *Danthonia spicata* and *Deschampsia flexuosa* are the most prevalent species in the sparse herb layer. In some of the exposed communities, various mosses and *Cladonia* lichens are abundant. Community 17a is on a small island in Hayes Bay and community 17b is on the south side of Willis Lake. These communities are dry-mesic to dry.

17. White Pine Mixed Treed Rock Barren Type:

17a. White Pine⁸ - White Cedar² (50% cover) / *Vaccinium angustifolium*, *Juniperus communis*, *Arctostaphylos uva-ursi* / moss, lichen

17b. White Pine⁷ - Red Oak³ (40% cover) / *Vaccinium angustifolium*, *Juniperus communis*, *Arctostaphylos uva-ursi* / moss, lichen

Significant Species: *Arabis drummondii* (Drummond's Rock-cress), *Hieracium canadense* (Canada Hawkweed), *Polygonum scandens* (Climbing False Buckwheat).

FORESTED UPLAND

7. DRY MESIC-WET MESIC DECIDUOUS FOREST ON MODERATELY DEEP SANDY TILL

The deciduous stands in the White Lake study area are characterized by a heterogeneous assemblage of tree species but are dominated by Sugar Maple to varying degrees with the exception of one dry-mesic site which is dominated by Red Oak. The majority of the communities are young to intermediate in age, however a few small, mature examples exist. Community 19a is the most mature with one site along the California Road

estimated at 90-100 years. The sugar maples average 45 cm dbh with a maximum of 80 cm and a red oak was measured at 110 cm. The understorey components are atypical and indicate richer than normal conditions. They include species such as *Oryzopsis racemosa*, *Viola conspersa*, *Adiantum pedatum*, *Carex plantaginea*, *Viola canadensis*, *Caulophyllum thalictroides* and *Cypripedium calceolus*. Small caves are located with the California Road stand. The Forest Resource Inventory map indicates a stand on the northeast side of Lowney Lake that is 130 years old and composed of 70% sugar maple, 10% basswood, 10% white oak and 10% poplar (FRI stand 4649). The stand is privately-owned and was not surveyed, however it does appear to contain oldgrowth trees. These may be open grown, and it is most likely that the oaks are red oak. Another small but good quality example is found adjacent to the Hayes Bay fen (community 19b). *Carex pedunculata* is usually a dominant ground cover in these communities. Communities 19e-i have been subjected to cutting at various times, however most of them were virtually clear-cut within the past 50-70 years.

DRY MESIC-MESIC, DECIDUOUS FOREST ON SHALLOW SOILS OVER ROCK

18. Dry Mesic-Mesic Red Oak Deciduous Forest Type:

Red Oak⁷ - Sugar Maple² - White Pine¹ / *Aster macrophyllus*, *Aralia nudicaulis*

WET MESIC-MESIC DECIDUOUS FOREST ON SHALLOW-MODERATELY DEEP, COARSE SANDY SOILS

19. Mesic Sugar Maple Deciduous Forest Type:

19a. Sugar Maple⁸ - (White Birch¹ Yellow Birch, White Pine, Red Oak, Ironwood, Basswood)² / sugar maple seedlings, *Carex pedunculata*

19b. Sugar Maple⁸ - Ironwood² (Red Oak, White Ash) / sugar maple seedlings, *Carex pensylvanica*, *C. pedunculata*, *Oryzopsis racemosa*

19c. Sugar Maple⁵ - White Birch² - White Pine² - (Red Oak, Ironwood, Basswood)¹ / *Viburnum acerifolium*, *Corylus cornuata*, *Cornus rugosa* / sugar maple seedlings, *Oryzopsis asperifolia*, *Aralia nudicaulis*, *Pteridium aquilinum*

19d. Sugar Maple⁵ - Basswood³ - White Birch¹ - Red Oak¹ (Ironwood, Balsam Fir, White Ash) / sugar maple seedlings, *Aralia nudicalis*

19e. Sugar Maple⁴ - White Birch² - Ironwood³ - (White Cedar, White Spruce)¹ / sugar maple saplings / sugar maple seedlings, *Oryzopsis asperifolia*

19f. Sugar Maple³ - Red Oak⁴ - Basswood¹ - White Pine¹ - Beech¹ / sugar maple saplings

19g. Sugar Maple⁹ - Basswood¹ (young, cut over)

19h. Sugar Maple³ - White Birch¹ - Trembling Aspen¹ - White Pine¹ - Red Oak¹ - Ironwood¹ - Basswood¹ - Butternut¹ (young)

19i. Sugar Maple² - Red Oak⁴ - Basswood² - White Pine¹ - Butternut¹

19j. Sugar Maple⁵ - Beech³ - Trembling Aspen¹ - Ironwood¹ (young)

19k. Sugar Maple² - White Birch² - Trembling Aspen² - White Pine¹ - Ironwood¹ - Basswood² (young)

Significant Species: *Adlumia fungosa* (Climbing Fumitory), *Asarum canadense* (Wild Ginger), *Carex peckii* (Peck's Sedge), *Clematis occidentalis* (Purple Clematis), *Dennstaedtia punctilobula* (Hay-scented Fern), *Desmodium glutinosum* (Pointed-leaved Tick-trefoil), *Diphasiastrum complanatum* (Northern Running-pine), *Galium circaezans* (White Wild Licorice), *Juglans cinerea* (Butternut), *Lonicera hirsuta* (Hairy Honeysuckle), *Pyrola grandiflora* (Arctic Pyrola), *Viola canadensis* (Canada Violet).

DRY MESIC-MESIC, MIXED FOREST ON SHALLOW SANDY TILL

Mixed forests in the White Lake study area are predominantly dominated by white pine. Most of these communities had a greater component of white pine originally, but were selectively logged about 50-70 years ago. Scattered remnant conifers exist amongst younger hardwoods. Communities in the dry mesic white pine mixed forest type are quite similar in composition with varying proportions of Trembling Aspen, Paper Birch, Red Oak and Sugar Maple as associates. The association of White Pine with semi-tolerant hardwoods such as Red Oak and Sugar maple and intolerant species such as aspen and birch usually reflects historical fire or cutting. Community 20a nearly qualifies as coniferous. Tree cover ranges from 60-90%. Although there are scattered large emergent White Pine with a dbh of up to 60 cm, the sugar maple and red oak average 20-25 cm dbh. There is moderate growth of Balsam Fir and White Pine saplings and seedlings, and Dogwood (*Cornus rugosa*), with scattered Barren-Strawberry (*Waldsteinia fragarioides*), Large-leaved Aster (*Aster macrophyllus*) and Bracken Fern (*Pteridium aquilinum*) on the forest floor. Seedling cover is normally only about 10%, but sometimes much less; Balsam Fir or White Pine, and occasionally Sugar Maple are prevalent as seedlings. Round-leaved Dogwood and Beaked Hazel are the predominant shrubs in these communities, and they provide a variable amount of cover. The substrate is generally sandy loam over shallow bedrock. The microclimate is normal, except in south-facing communities, where it is slightly warmer than normal.

The mesic white cedar-balsam fir mixed forest type is primarily intermediate in age (40-60 years). Conditions range from mesic to wet mesic. Dominant herbs include *Aralia nudicaulis* and *Aster macrophyllus* although herb cover is usually less than 15%.

Communities 22-23 tend to be quite small and variable in composition. They occur adjacent to wetland communities and are difficult to characterize because of their gradation into wetland and upland communities along an ecotonal gradient. Communities 22 and 23b have a significant component of hemlock and are slightly cooler than normal since they occupy steep north facing slopes.

20. Dry Mesic White Pine Mixed Forest Type:

- 20a. White Pine⁷ - Red Oak¹ - White Birch¹ - Sugar Maple¹ / *Aster macrophyllus*, *Waldsteinia fragarioides* / moss
- 20b. White Pine⁵ - Trembling Aspen² - Sugar Maple¹ - White Birch¹ - Red Oak¹ / *Corylus cornuta*, *Cornus rugosa* / Sugar Maple saplings / *Aralia nudicaulis*, *Aster macrophyllus*, *Gaultheria procumbens*
- 20c. White Pine⁵ - Large-toothed Aspen² - Trembling Aspen¹ - (White Cedar, Balsam Fir)¹ / *Corylus cornuta*, *Cornus rugosa* / White Pine, Balsam Fir, Trembling Aspen saplings / *Aster macrophyllus*, *Pteridium aquilinum*, *Waldsteinia fragarioides*, *Aralia nudicaulis*
- 20d. White Pine⁴ - Sugar Maple⁴ - Balsam Fir¹ - (Trembling Aspen, White Birch)¹ / White Pine, White Birch saplings, *Cornus rugosa*

21. Mesic White Cedar-Balsam Fir Mixed Forest Type:

- 21a. White Cedar⁴ - White Birch³ - Balsam Fir³
- 21b. White Cedar³ - Trembling Aspen³ - Balsam Fir² - White Birch¹
- 21c. White Cedar³ - Trembling Aspen² - Large-toothed Aspen¹ - Balsam Fir¹ - Sugar Maple¹ - White Pine² / white cedar, balsam fir saplings, *Cornus rugosa*
- 21d. White Cedar⁶ - Balsam Fir³ - Red Maple¹
- 21e. White Cedar² - Trembling Aspen² - Balsam Fir³ - White Birch¹ - White Pine²

22. Mesic Hemlock Mixed Forest Type: Hemlock⁶ - Sugar Maple² - Basswood¹ - Ironwood¹ / *Aralia nudicaulis*, *Dryopteris marginalis*

23. Mesic Sugar Maple Mixed Forest Type:

23a. Sugar Maple⁴ - Basswood² - White Pine² - Balsam Fir¹ - White Cedar¹

23b. Sugar Maple⁴ - Hemlock³ - White Cedar² - White Birch¹ / *Aralia nudicaulis*

Significant Species: *Pyrola asarifolia* (Pink Pyrola)

MESIC-DRY MESIC CONIFEROUS FOREST ON SHALLOW TO MODERATELY DEEP SANDY TILL

These communities are dominated by white pine, typically with a minor deciduous component of Red Oak, Sugar Maple, and Paper Birch. Red Pine is rarely present. There are many parallels between these communities and the mixed forests on-site, however these communities tend to more mature and higher quality particularly 26a-b (Figure 8). The canopy is usually 80% complete. The trees average 40 cm in diameter, but large (60-70 cm) emergent White Pine typically add an element to the physiognomy of these stands. Sapling cover is about twice that of seedlings, at 20%. Balsam Fir is often the most dense in these layers, but White Pine has locally profuse regeneration. Beaked Hazel and Round-leaved Dogwood are again the dominant shrubs, but Maple-leaved Viburnum, Common Juniper, Snowberry and Lowbush Blueberry are sometimes an important element; shrub cover is patchy and locally dense, ranging from 10-30%. Herbs provide about 30-40 % cover with Barren-Strawberry (*Waldsteinia fragarioides*), Wintergreen (*Gaultheria procumbens*), Bracken Fern (*Pteridium aquilinum*), and Mountain Rice (*Oryzopsis asperifolia*). Associates include *Dryopteris marginalis*, *Dryopteris intermedia*, *Mitchella repens*, and *Polypodium virginianum*. Community 27 occurs on exposed granitic bedrock and is dry mesic. As a result its canopy is more open (about 70%), the shrubs and herbs are similar to those found on rock barrens and there is about 20% lichen and moss cover.

The condition of communities 26a-b was considered to be relatively good by the authors. There was no obvious sign of past logging and human disturbances appeared to be limited to localized trail developments. The stands are generally uneven aged. Gaps in the canopy were noted particularly on drier sites. Woody debris was moderate. White pine regeneration was considered good.

Other coniferous stands in the White Lake study area are dominated by hemlock, white cedar or balsam fir. These tend to be mesic to wet mesic. The Forest Resource Inventory map indicates a 2.7 ha, 150 year old hemlock stand (no. 2577) in the northern section of the study area. It was not surveyed due to difficult access, but is mapped as community 25a. A stand with similar composition, but much younger was found on the steep northwest slope of Barber Island.

An old growth white cedar stand (community 28b) with many trees reaching 65 cm dbh and estimated at up to 250 years is found north of Three Mile Bay. The substrate is sandy loam and is mesic to wet mesic. Average dbh of white cedar is 40 cm. Sugar maple and balsam fir sapling provide 10-20% cover. There is a very sparse (1%) shrub layer with *Dirca palustris*, *Lonicera canadensis*, *Acer pensylvanica* and *Sambucus pubens* and a sparse herb layer dominated by *Aralia nudicaulis*, *Clintonia borealis* and *Carex pedunculata*. Associates are *Dryopteris marginalis*, *D. intermedia*, *Lycopodium obscurum*, *Carex arctata*, *Polygala*

Figure 8. Mature White Pine Stand (community 26b)



pauciflora, *Athyrium filix-femina*, *Mitchella repens*, *Botrychium virginianum*, and *Gymnocarpium dryopteris*. This stand is discussed further under section 4. This stand is remarkable for its apparent lack of human disturbance with the exception of very recent unauthorized trail construction.

25. Mesic-Dry Mesic Hemlock Conifer Forest Type:

25a. Hemlock⁷ - White Cedar² - White Birch¹

25b. Hemlock³ - Balsam Fir³ - White Cedar² - Trembling Aspen²

26. Mesic-Wet Mesic White Pine Conifer Forest Type:

26a. White Pine⁸ - Red Oak¹ - Sugar Maple¹ / Sugar Maple, Balsam Fir saplings / *Aster macrophyllus*, *Waldstenia fragarioides*, *Aralia nudicaulis*

26b. White Pine⁶ - White Cedar¹ - Balsam Fir¹ - White Birch¹ - Sugar Maple¹ / White Cedar, Balsam Fir saplings / *Aster macrophyllus*, *Waldstenia fragarioides*, *Pteridium aquilinum*, *Aralia nudicaulis*

26c. White Pine⁵ - White Cedar⁴ - Balsam Fir¹ / *Aralia nudicaulis*, *Aster macrophyllus*, *Pteridium aquilinum*

27. Dry Mesic White Pine Conifer Forest Type: White Pine⁸ - Red Maple¹ - White Birch¹ / *Pteridium aquilinum*, *Waldsteinia fragarioides*, *Oryzopsis asperifolia* / lichen, moss

28. Mesic-Wet Mesic White Cedar Conifer Forest Type:

28a. White Cedar⁸ - White Pine² - Balsam Fir² - Basswood² - Red Maple¹ / *Dryopteris marginalis*, *Maianthemum canadense*, *Aralia nudicaulis*

28b. White Cedar⁷ - Balsam Fir¹ - Basswood¹ - Sugar Maple¹ / Sugar Maple, Balsam Fir saplings (53)

28c. White Cedar⁵ - White Birch⁴ - White Spruce¹ / Sugar Maple saplings

29. Wet Mesic Balsam Fir Conifer Forest Type:

Balsam Fir⁶ - White Cedar² - White Spruce¹ - White Birch¹ - Trembling Aspen¹

Significant Species: *Pterospora andromeda* (Giant Bird's Nest), *Anemone acutiloba* (Sharp-lobed Hepatica), *Anemone cylindrica* (Thimbleweed), *Solanum nigrum* (Black Nightshade), *Goodyera tessellata* (Checkered Rattlesnake-plantain).

(4) Floristics

According to Rowe's (1977) treatment of the Forest Regions of Canada, the White Lake study area is within the Middle Ottawa section of the Great Lakes-St. Lawrence Forest Region. This area contains upland forests of sugar maple, yellow birch, and eastern hemlock on normal sites and White and Red Pine, Trembling Aspen, White Birch and Red Oak on drier, warmer sites (Brunton 1990). Uncharacteristic southerly species, such as butternut, bitternut hickory, bur oak, white ash and black cherry, are scattered here and there (Rowe, 1977). The study area has a heterogeneous assemblage of plant species whose affinities are Southern, Boreal, Atlantic, and Alleghenian. There is an unusually rich assemblage of disjuncts from the south. These species are encouraged and maintained by highly basic substrates, warmer than normal microclimates, and a wealth of rugged habitats. Although many of the species are more frequent in the southern portion of Eastern Ontario, some probably reach the northern limit of their range near the White Lake study area.

Four hundred and twenty-seven species of vascular plants (389 native) were recorded within the site (Appendix 1). The vascular plant list compiled for the White Lake study area can only be considered preliminary, because of the timing of the study (September-October). In particular, spring flowers are not listed, and it is likely that a closer investigation of the wetlands would uncover many additional species.

(5) Fauna

Appendices 2-4 are preliminary lists of the breeding birds, mammals and herptiles of the White Lake study area. Since this study was conducted during the fall, the list of 110 breeding birds is based completely on the rather out-of-date Breeding Bird Atlas data (Cadman et al., 1987). A total of 17 amphibians and reptiles were sighted. Small mammal trapping was not conducted, but would probably yield several additions to the list of 28 mammal species (refer to range maps in Peterson, 1966). The White Lake study area is within the white-tailed deer winter concentration area located in northwestern Lanark County and winter cover is considered significant (OMNR, 1983). The moderate-high density populations are considered to be significant within the Carleton Place Area.

White Lake was stocked intensively with walleye between 1930 to the mid 1960s (Mathers and Kerr 1998). Since that time largemouth and smallmouth bass and pike have been the prime game fish with walleye only rarely caught. Fisheries management activities by OMNR includes stocking, creel surveys, fish community assessment using trapnets, aerial boating activity surveys, fish habitat protection and restoration and enforcement. Water level management and eutrophication are major issues. The lake also contains American eel, bluegill, brown bullhead, channel catfish, golden shiner, pumpkinseed, rock bass, yellow perch, and white sucker (Mathers and Kerr 1998). The amount of angling that occurs is considerably greater than the recommended allowable angling pressure (Mathers and Kerr 1998).

CHAPTER 3. SIGNIFICANT FEATURES

(1) Significant Flora

Two provincially rare plants were discovered in the White Lake study area: Giant Bird's Nest or Pine-drops (*Pterospora andromeda* Nutt) - S2 and Ram's-head Lady's Slipper (*Cypripedium arietinum* R. Br.) -G3, S3. Status was based on Oldham (1999). A map compiled by Haber and Keddy (1984) for *Pterospora andromeda* shows only 10 Ontario locations reported since 1950. This species is found in very low numbers (less than 10) wherever it occurs and populations are believed to be declining in Ontario. It lacks chlorophyll and depends on mycorrhizal fungi for nutrition (Bakshi 1959). Distribution maps for these plant species as well as some other rare species are provided in Appendix 3.

Twenty-three plant species found at the White Lake study area are considered to be rare within Site Region 5E based on status designation by Crins (1995) (Table 3). The criteria utilized by Crins (1995) was the presence in 5 or fewer stations. In previous biological inventories, regionally rare species were defined as native plants that were reported as rare or that were not listed for all four physiographic regions in Eastern Ontario by Cuddy (1991), however it is preferable to utilize Site Region boundaries if possible. One disadvantage of using Crins (1995), however is that it is difficult to determine if a species is a new record for the region since a complete flora was not prepared. The list of plant species was therefore sent to W. Crins, OMNR, Peterborough, for review. Another potential problem with the list of rare plants is that it does not include current information on the flora of Lanark County. A Lanark County flora has been in preparation for about 10 years (White 1999), therefore the list of rare plant species was sent to D. White, Lanark for review. Finally it should be noted that the rarity criteria established by Crins (presence in 5 or fewer stations) is more strict than what is normally employed by botanists in Ontario and therefore fewer plants may be listed than what should be.

Thirty-three taxa, considered to be rare within Site District 5E-11 according to Crins (1995), were recorded in the White Lake study area. In former biological inventory reports involving sites in the Lanark County portion of Site District 5E-11, species considered rare within Site District 5E-11 were those listed as rare in the "northern" physiographic region by Cuddy (1991) or that were not listed. Cuddy's (1991) draft report covers approximately half of Site District 5E-11. This excludes a portion of Renfrew County and much of the western half of Site District. Species with 10 populations or less within each of 4 physiographic areas in the former OMNR, Eastern Region were considered to be rare.

Where available Ontario distribution maps have been referred to in order to verify regional status. Cody and Britton (1989) (ferns and fern allies) and Whiting and Catling (1986) (orchids) were checked, but such distribution maps are based primarily or entirely on plant specimens deposited in recognized herbaria.

(2) Significant Fauna

Status designations for birds, mammals, insects, reptiles and amphibians provided in OMNR (2000) were referred to in determining rarity. The rarest species documented during this life science inventory is the Bog Buck Moth (*Hemileuca* sp.1). It is ranked by The Nature Conservancy as extremely rare globally (G1Q) and is considered extremely rare (S1) in every state and province in which it occurs (Schweitzer 1999).

Other common names applied to this species are Bogbean Buckmoth (Schweitzer 1999) and Cryan's Buckmoth (Legge et al. 1996). This undescribed taxon of the Giant Silkmoth Family (Saturniidae) occurs in three other fens in eastern Ontario (1 near White Lake and 2 near Richmond), two fen complexes in Oswego County near the shore of Lake Ontario in New York State, and two fens in Wisconsin. All populations are considered to be threatened by a variety of factors including land development, water level fluctuations that range from drought to flooding, community succession, invasive aliens, Gypsy Moth and mosquito spray programs) (Lafontaine 1999, Schweitzer 1999).

The Bog Buck Moth was observed in the White Lake study area on 1 October 2000 by Paul Catling and Vivian Brownell (Figure 9). This is a rather late sighting since most records for this species are in the last three weeks of September. Approximately 35 males and females were seen flying on an unseasonably warm, sunny day with temperatures reaching 22C at mid-day. Several heavy frosts had already occurred in previous weeks. Based on the extensive nature of the fen and lateness of the discovery, it is expected that the population may be significantly larger, but further investigations in September 2001 are required to confirm this. The best time to check may be during the third week in September. On the 23 September 1984, R. Layberry noted "tens or hundreds of thousands of moths in flight" at the Richmond fen, although numbers were considerably less on the 16th of September (Layberry 1984). The nearby Lowney Lake fen was also checked for this species, but none were found. The closest known population occurs near the town of White Lake, approximately 4 km to the northwest. The two populations near Richmond are separated by about 3 km of coniferous swamp.

Only one provincially significant bird species, Red-shouldered Hawk, was recorded in the vicinity of the White Lake study area during the Ontario breeding bird atlas program. It is known to breed in approximately 65 sites in Eastern Ontario (Cuddy, 1989). Although two breeding records exist, they are slightly outside of the study area (about 3 km). It is probable, however that the species utilizes the site for feeding and roosting purposes. Marsh Wren is reported as breeding in the study area during the breeding bird survey and is considered rare in Site Region 5E (OMNR 1994).

Mathers and Kerr (1998) report sightings of large black snakes in the mid-1940's which they believed may be provincially rare black rat snakes (*Elaphe obsoleta obsoleta*), however this appears to be highly unlikely based on personal communications with S. Thompson of OMNR, Kemptville. A report of the provincially rare Wood Turtle has also been discounted. None of the reptile and amphibian species reported for the study area are provincially rare or rare in Eastern Ontario or in the Northwest subregion of Eastern Ontario according to Norris (1992), however maps compiled by Oldham and Weller (2000) indicate that Ribbon Snake is rare within Site District 5E-11 and Site Region 5E.

(3) Significant Areas

Five areas (communities 8b, 9c and 8d) were mapped as provincially significant and four communities (9b, 6a) are mapped as regionally significant (Map 2). A community is considered provincially significant if it is the best representation of a community type on a distinct landform type (in this case 1a-37) known in the Site District. Regionally significant stands have characteristics that are also found elsewhere in the Site District, but they are one of the best examples known. Comparison is made in the following chapter with other candidate areas in Site District 5-11.

Figure 9: Bog Buck Moth and Graminoid Fen Habitat (from Lafontaine 1999)



Table 3: Significant Features of the White Lake Study Area

FLORA

Provincially Rare Plants (Based on Oldham 1999)

<i>Cypripedium arietinum</i> R. Br.	Ram's-head Lady's Slipper	G3, S3
<i>Pterospora andromeda</i> Nutt.	Giant Bird's Nest	S2

Plants that are Rare in Site Region 5E

(Based on Crins 1995 and Crins pers. com.)

<i>Adlumia fungosa</i> (Aiton) Greene ex B.S.P.	Climbing Fumitory
<i>Agalinis tenuifolia</i> (Vahl) Raf. var. <i>tenuifolia</i>	Slender-leaved Agalinis
<i>Anemone acutiloba</i> (DC.) G. Lawson	Sharp-lobed Hepatica
<i>Anemone cylindrica</i> A. Gray	Thimbleweed
<i>Arabis drummondii</i> A. Gray	Drummond's Rock-cress
<i>Asarum canadense</i> L.	Wild Ginger
<i>Aster borealis</i> (Torr. & A. Gray) Prov.	Rush Aster
<i>Calamagrostis stricta</i> (Timm) Koeler	
ssp. <i>inexpansa</i> (A. Gray) C.W. Greene	Narrow Reed Grass
<i>Cardamine pratensis</i> L. ssp. <i>pratensis</i>	Cuckoo-flower
<i>Carex livida</i> (Wahlenb.) Willd.	Livid Sedge
<i>Cystopteris bulbifera</i> (L.) Bernh.	Bulblet Bladder Fern
<i>Epilobium strictum</i> Muhlenb. ex Spreng.	Soft Willow-herb
<i>Galium labradoricum</i> (Wiegand) Wiegand	Labrador Marsh Bedstraw
<i>Myriophyllum verticillatum</i> L.	Whorled Water-milfoil
<i>Pilea pumila</i> (L.) A. Gray	Dwarf Clearweed
<i>Polygonum scandens</i> L.	Climbing False Buckwheat
<i>Potamogeton illinoensis</i> Morong	Illinois Pondweed
<i>Rumex verticillatus</i> L.	Swamp Dock
<i>Solanum nigrum</i> L.	Black Nightshade
<i>Triglochin maritimum</i> L.	Seaside Arrow-grass
<i>Veronica americana</i> (Raf.) Schwein. ex Benth.	American Speedwell
<i>Wolffia columbiana</i> Karst.	Water-meal

Plants that are Rare in Site District 5E-11

(Based on Crins 1995 and Crins pers. com.)

<i>Carex aquatilis</i> Wahlenb.	Aquatic Sedge
<i>Carex limosa</i> L.	Mud Sedge
<i>Carex lurida</i> Wahlenb.	Sallow Sedge
<i>Carex peckii</i> Howe	Peck's Sedge
<i>Cirsium muticum</i> Michx.	Swamp Thistle
<i>Clematis occidentalis</i> (Hornem.) DC.	Purple Clematis
<i>Dennstaedtia punctilobula</i> (Michx.) T. Moore	Hay-scented Fern

<i>Desmodium glutinosum</i> (Muhlenb. ex Willd.) Alph. Wood	Pointed-leaved Tick-trefoil
<i>Diphysastrum complanatum</i> (L.) Holub	Northern Running-pine
<i>Equisetum variegatum</i> Schleich. ex Fried., Weber & Mohr ssp. <i>variegatum</i>	Variegated Horsetail
<i>Galium circaezans</i> Michx.	White Wild Licorice
<i>Galium tinctorium</i> L.	Stiff Marsh Bedstraw
<i>Goodyera tessellata</i> Lodd.	Checkered Rattlesnake-plantain
<i>Hieracium canadense</i> Michx.	Canada Hawkweed
<i>Hypericum mutilum</i> L. ssp. <i>boreale</i> (Britton) J.M. Gillett	Northern St. John's-wort
<i>Juglans cinerea</i> L.	Butternut
<i>Liparis loeselii</i> (L.) Rich. ex Lindl.	Fen Twayblade
<i>Lonicera hirsuta</i> Eaton	Hairy Honeysuckle
<i>Malaxis monophyllos</i> (L.) Sw. ssp. <i>brachypoda</i> (A. Gray) A. & D. Löve	White Adder's-mouth
<i>Malaxis unifolia</i> Michx.	Green Adder's-mouth
<i>Ophioglossum pusillum</i> Raf.	Northern Adder's-tongue
<i>Platanthera dilatata</i> (Pursh) Lindl. ex Beck	Tall White Bog Orchis
<i>Platanthera orbiculata</i> (Pursh) Lindl.	Small Round-leaved Orchid
<i>Potamogeton praelongus</i> Wulfen	White-stemmed Pondweed
<i>Potentilla fruticosa</i> L. ssp. <i>floribunda</i> (Pursh) Elkington	Shrubby Cinquefoil
<i>Pyrola asarifolia</i> Michx.	Pink Pyrola
<i>Pyrola chlorantha</i> Sw.	Green-flowered Pyrola
<i>Pyrola grandiflora</i> Radius	Arctic Pyrola
<i>Scirpus hudsonianus</i> (Michx.) Fern.	Hudson Bay Bulrush
<i>Sparganium natans</i> L.	Small Bur-reed
<i>Spiranthes casei</i> Catling & Cruise var. <i>casei</i>	Case's Ladies' Tresses
<i>Utricularia gibba</i> L.	Humped Bladderwort
<i>Utricularia minor</i> L.	Lesser Bladderwort
<i>Viola canadensis</i> L.	Canada Violet

FAUNA

Provincially Rare Insects (Based on Holder and Sutherland 1998, Oldham et al. 2000)

<i>Aeshna clepsydra</i>	Mottled Darner	S3
<i>Hemileuca</i> sp. 1	Bogbean Buckmoth	G1Q, S1

Provincially Significant Birds (Based on OMNR 2000)

<i>Buteo lineatus</i>	Red-shouldered Hawk	VUL, S3S4
-----------------------	---------------------	-----------

Breeding Birds Rare in Site Region 5

<i>Cistothorus palustris</i>	Marsh Wren
------------------------------	------------

Reptiles Rare in Site Region 5

Thamnophis sauritus septentrionalis

Northern Ribbon Snake

SIGNIFICANT PLANT COMMUNITIES

Provincially Significant Plant Communities

White Cedar Oldgrowth Forest

Slender Sedge-Twig-rush-Bogbean Fen

Regionally Significant Plant Communities

Tamarack-Cedar Poor Fen

Mature White Pine Mixed Forest on mesic, sandy loam underlain by marble bedrock

Mature White Pine Coniferous Forest on mesic, sandy loam underlain by marble bedrock

Intermediate-aged Sugar Maple Deciduous Forest with Butternut on mesic loam

CHAPTER 4. EVALUATION AND PLANNING CONSIDERATIONS

(1) Introduction

The primary objective of this study was to evaluate the life science components of the White Lake study area with main consideration being given to features representative of the Province and of Site District 5E-11. The northern section of the study area in addition to the White Lake fen was initially recommended by Brunton (1990) as a provincially significant ANSI based on it being the best example of marble-based fen in the Ottawa Valley and having several rare species. Most of the wetland communities have been evaluated under the provincial wetland evaluation system and are considered provincially significant (see Brown and Mcnaughton 1985, Brown and L'arrivee 1986, Brownell 2000). The study area was evaluated using five criteria as recommended by Crins and Kor (1999) and numerous other natural heritage planning documents for Ontario: representation, diversity, special features, site condition, and ecological function.

(2) Evaluation of Representation

The White Lake Study Area was analyzed for representation of both characteristic and rare landform-vegetation features of Site District 5E-11. It was noted that the boundaries of Site District 5E-11 were expanded substantially southward in a recent revision by OMNR making it the second largest site district in southern and central Ontario (see Jalava et al. 1997, Crins and Uhlig 2000). These changes were made primarily on the basis of the extent of the Precambrian Shield, despite the fact that historically site region boundaries were primarily determined by climatic features. Recent studies have shown that vegetation patterns within Site Region 5E are more strongly related to gradients in precipitation than temperature, whereas in Site Region 4E the reverse is true (Chambers et al. 1997). It is expected that further revision will occur to the southern boundaries of this Site District which may affect future analyses of representation.

Landform representation following Chapman and Putnam (1984) within the new boundaries of Site Regions 6 and 7 were outlined by Jalava et al. (1997), however an analysis of Site Region 5 was not conducted. Chapman and Putnam (1984) map the entire White Lake study area as "shallow till and rock ridges" which appears to be the predominant landform type in the site district. Noble (1988) produced a biophysical analysis of Site Region 5E which was generally followed by Brunton (1990). The general landform units found within the former boundaries of Site District 5-11 were described by Brunton (1990) as follows: ground moraine (58%), bedrock outcrop (27%), outwash and lacustrine (7%), ice contact (4%), organics (3+ %), and marine deposit (<1%).

Ground moraine features are the most characteristic of Site District 5E-11 and support deciduous, mixed and coniferous forests and swamps. The predominant landform in the White Lake study area is ground moraine with a minor component of organic deposits. Ground moraine underlain by calcitic metasedimentary bedrock is one of the most interesting features found in the site district since distinctive plant communities and many rare plant species are often associated with it. The calcareous till soils derived from these substrates are more nutrient-rich than soils associated with granites and gneisses within the site district. Site District 5E-11 contains the most extensive area of calcitic bedrock found in southern and central Ontario. The White Lake Wetlands Conservation Reserve has been identified as a regionally significant earth science site based on representation of this supracrustal (metasedimentary) carbonate component of the Sharbot Lake Terrane, Grenville Province (Duba and Frey 2000). Outcrops of the grey calcitic marble are rare due to the moderately undulating nature of the terrain, however several upland areas exist where the bedrock is only

very shallowly covered by sandy loam and is easily exposed.

A. Mature White Pine on sandy loam over marble

The White Lake study area supports extensive mature white pine dominated mixed and coniferous forests on sandy loam over marble. Marble-based upland forests also exist on general use crown lands (Schooner-Fortune Lakes, Centennial Lake, Evergreen Mountain, Black Donald Island), and forest reserves, conservation reserves and provincial parks (Petroglyphs Provincial Park, Silent Lake Provincial Park, Constant Creek Swamp and Fen CR, Centennial Lake Provincial Nature Reserve and Matawatchan Provincial Nature Reserve). It is probable that an adequate amount of land exists in public ownership to satisfy representation targets of marble-based forests, however the existing condition of the forests and their future management is questionable. The white pine and also sugar maple forests over marble are particularly impacted by logging since the terrain is usually less rugged than granitic substrates. The quality of some of the upland forest stands within the White Lake study area is exceptional since they are both relatively extensive and mature. OMNR (1987) reports that in 1986, only 4.6% of southern Ontario's productive forest was classified as > 80 years old. Former OMNR ecologist, Don Cuddy, considered the upland mixed forest west of Lowney Lake to be in good condition and representative (Cuddy 1998). The White Lake study area was probably logged in the 1880s, and a post-log fire may have led to the present pine-dominated forest. None of the stands completely fulfil the definition of "old-growth" as outlined by OMNR (1994), but some which have been identified are approaching that category and may be classified as old-growth in 30-40 years.

Information has been compiled on the amount of mature forest for each of the dominant stand groups in the Mazinaw-Lanark crown land forest area (OMNR 2001). An analysis of FRI data for Site Region 5 or Site District 5E-11 is still beyond the capability of OMNR, but may be possibly in the next few years as work on NERVIS progresses. Information is available on potential old-growth stands in Site District 5E-11 based on investigations by Brownell and Larson (1995), however this information may now be out-of-date and the stands may no longer exist. Brownell and Larson (1995) document the occurrence of a 2 ha white pine stand in North Canonto (no. 159 and 271) occurring on landform 1a-45 (strongly broken ground moraine) with very low density white pine. It was mostly harvested about 45 years ago, but the few remaining trees were 120 years or more. Bill Crins, who visited the Fortune-Schooner Lake ANSI, has no recollection of any old stands there (W. Crins, OMNR, Peterborough -formerly at Huntsville, 1995 pers. comm.).

Taylor (1991) in a review of forest stands in Carleton Place District, considered stand 605 at Billa Lake to be the best old growth candidate seen during her work. This stand is primarily sugar maple with a minor white pine component, although white pine is locally abundant near the lake. The stand is about 110-120 years, but only a few hectares in extent. White (1990) identified 13 old-growth candidates in Eastern Ontario of which 2 contain white pine. These stands are located along the St. Lawrence River in Site Region 6E (Fernbank and Weston Island) and are very different from the White Lake study area. Fernbank is a mixed white pine-sugar maple-white ash stand and Weston Island is a red oak-white pine-sugar maple stand. They are each less than 10 ha in size. The pines occur as scattered emergents and are a maximum of 60 cm dbh at Weston Island and 90 cm dbh at Fernbank. Their age is estimated as 115 years and 100 years respectively based on FRI data.

In the Perch Lake Pine Forest report, Brownell and Larson (1995) conclude that only one other site in Site District 5E-11 on a moderately broken ground moraine landform, may offered comparable representation of white pine old-growth features. Stand no. 236, located in Brougham Township, Renfrew Co. is 55 hectares in size and is 83-125 years old. However the stand is within an approved and allocated area of the current

Madawaska Timber Management Plan and has been licensed and marked for harvest. One older stand is known, but it is only 2 hectares in size. After reviewing a draft version of this report, Bill Crins, Ecologist, OMNR, Huntsville, also concluded that "the Perch Lake Forest is the best available representative of White Pine/intolerant hardwoods and White Pine/Red Oak communities in Site District 5E-11, on landform Ia-37". The pine stands at White Lake are not old-growth, however they are quite mature, extensive and occur on an metasedimentary bedrock type (marble). The Perch Lake Pine Forest occurs on ground moraine, however it is primarily underlain by plutonic substrates. Representation of high quality white pine stands is very important since the white pine-aspen-red oak ecosite (ES14) is the most common (25%) and characteristic ecosite type within the Mazinaw-Lanark Forest management Unit (which roughly corresponds to Site District 5E-11) (OMNR 2001). It is felt that the mature white pine stands in the White Lake study area are significant within Site Region 5E and their protection is warranted, although the stands do not meet the criteria for an old-growth forest. Since it is a relatively large and diverse unit in which ecological functions can be maintained and it presents a wide range of white pine stands from mixed to coniferous, the White Lake study area is an excellent candidate which will evolve into an old-growth forest within 20-40 years.

B. Fen

Fen is a rare wetland habitat type within southern Ontario occupying only 0.48% (3074 ha) of the total wetland area off the Canadian Shield (Riley 1989). It appears from data presented by Riley (1989) that only 2,106 ha of fen occur in Site District 5E most of which was probably documented from Manitoulin Island. There are only 11 fens more than 75 ha in size in southern Ontario. Reddoch (1983) states that fewer than two dozen high-quality calcareous fens have been identified in southern Ontario all of which except the fens at White Lake, are south of the Canadian Shield. The White Lake study area supports a wide variety of fen community types and offers excellent opportunity to study variation in this wetland habitat type.

The rarest type of fen within southern and central Ontario is open graminoid fen. Bakowsky (1997) lists two types as provincially rare: Twig-rush graminoid fen (G3Q, S3) and Bog Buckbean graminoid fen (G3G4, S3S4). The White Lake Wetlands Conservation Reserve supports three graminoid fens dominated by *Carex lasiocarpa* that have significant components of both twig-rush and bog buckbean. In August 1999, Don Cuddy and Shawn Thompson of OMNR discovered a 3.6 ha high-quality graminoid fen on the shore of Lowney Lake, and a very extensive (22.5 ha) community was discovered at Hayes Bay in October 2000 by the author. This was not surprising, however, since a large graminoid fen (White Lake Fen), just east of the town of White Lake, has been known for several decades (see Reddoch 1984). The White Lake Fen is part of the White Lake Wetlands Conservation Reserve, but since it is relatively well known, it was not included in the terms of reference for this study. Of the three fens, two of them are exceptionally large therefore representation of this feature is considered exceptional. Other sites within Site District 5-11 which support open fen communities include Ashdad Fens and Constant Creek Swamp and Fens, however they are much less extensive, more shrubby and contain fewer rare species.

Comparison of treed fen features is difficult due to lack of information and problems in classification. Extensive black spruce, white cedar and tamarack swamp is found in the provincially significant, 348 ha Silver Creek Peatland CR, however its composition, particularly in the ground layer, maybe substantially different due to a more acidic substrate. The site is also more northern and may lack some of the southern species found at White Lake. Other comparable examples within the Site District include Plevna Cedar Swamp and Palmerston Lake, however they are privately owned. The Sharpe Bay Fen, part of the Peterborough Crown Game Preserve, was described by Brunton (1990) as a thicket and forest complex, however detailed information on species composition is not available for comparison.

C. Oldgrowth White Cedar Forest

Two parcels of crown land within the study area support provincially significant stands of old-growth white cedar. A 5.3 ha old-growth white cedar stand is located north of Three Mile Bay near Centennial Lane and the other 7.0 ha stand is found just west of Lowney Lake. The Centennial Lane site supports numerous white cedar trees greater than 200 years old (maximum about 350 years old) and with trees reaching 72 cm in diameter. This site is remarkable for its large number of old trees, diverse range of age classes and apparent lack of human disturbance. The oldest trees exhibit deformation (a twisting) that is typical in old-growth white cedar. The Centennial Lane stand is identified incorrectly in the 1992 FRI as being 90 years old (FRI 39). The Lowney Lake stand is identified in the FRI as 165 year old, protection forest. It is a wetter site that appears to contain far fewer old-growth trees than the Centennial Lane stand although a thorough investigation was not conducted.

OMNR (1987) reports that only 0.07% of the southern Ontario landbase was in forest stands older than 120 years. In the mid 1980s they covered little more than 6000 hectares and today there is certainly even less than that (Larson et al. 1999). OMNR (2001) indicates that only 1.3 % of the productive stands on crown land in Mazinaw-Lanark are over 120 years and they are predominantly hemlock or white pine stands. White cedar coniferous stands on lowland sites are relatively rare in the unit (less than 1% of crown lands). The Mazinaw-Lanark forest management area roughly corresponds to the boundaries of Site District 5E-11.

The conservation strategy for old growth forest ecosystems in Ontario requires that core areas are protected within each distinct landform in a Site District. This is consistent with the recommendations of the Old Growth Policy Advisory Committee and acknowledged by OMNR's Review and Response Team. The White Lake study area occurs within the OMNR, Southern Region, which has not implemented an old-growth white cedar conservation strategy despite the fact that the majority of Ontario's white cedar forest occurs there.

In order to assess representation, the author compiled a list of old-growth white cedar stands within the Mazinaw-Lanark forest management area since it roughly corresponds to Site District 5E-11. The list was compiled from available FRI mapping and includes only forests classed as 121 years or more. Priority was to be given to all working stands containing white cedar and non-working group stands containing more than 60% white cedar that occurred on public lands (federal, provincial, conservation authority etc). It was discovered that 25 stands fit those criteria and when the criteria of greater than 5 ha was applied, only 9 stands were listed including the one at Lowney Lake. It was felt that ecological function cannot be maintained if the stand size is less than 5 ha. It is unknown if any of these stands have been cut over since the FRI mapping or if the stand age and composition has been accurately determined. The 9 stands consist of a total of 86.8 ha and represent 0.02% of all publically owned lands in Mazinaw-Lanark. The largest stand (no. 1790) is 24 ha in size and is 121 years old.

While old-growth stands of any type are considered provincially significant, old-growth white cedar stands on moist mesic or fresh sites are extremely rare. In a study of 37 old upland forest stands in southern Ontario, Larson et al. (1999) documented only one site dominated by white cedar, Walker's Woods in Site District 6E-2. The 3 ha woodland is approximately the same age as the White Lake stand (200-350 years), but differs substantially in having hemlock as a co-dominant and red maple and white birch present.

Functionally, old-growth may be considered an "equilibrium" or "climax" community whose species are in a relatively stable successional balance with its site (Larson et al. 1999). Structurally, old-growth woodlands often have old trees, relatively large logs and snags, an uneven-aged canopy with regeneration in gaps,

undisturbed soils and pit-mound topography (Tyrell and Crow 1994, Keddy and Drummond 1996, Runkle 1996, White and White 1996). Old-growth, however, must be defined in relation to regional context and particular forest types (Hunter 1989). The Old Growth Forests Policy Advisory Committee (1994) established 120 years of age as a minimum for old-growth in Ontario, although some municipalities in southern Ontario recognize stands greater than 100 years (e.g. City of Ottawa - former Regional Municipality of Ottawa-Carleton).

Larson et al. (1999) distinguished four types of old-growth forest in southern Ontario based on cutting, grazing, isolation and other disturbance effects: old-growth, older-growth, old pioneer and working woodlands. The rarest type, old-growth, is characterized by an absence of any major disturbance for a long period of time. The uncommon older-growth forest shows the effects of some human influences, but was never cleared. Old pioneer forests have been subject to several thinnings, but not on a regular basis like working woodlands.

Larson et al. (1999) have documented the occurrence of presettlement white cedar stands on the exposed dolomitic cliffs of the Niagara Escarpment. Cliff-face trees are slow growing and deformed. Cores of dead trees have shown that they can reach up to 1,653 years of age before dying. Populations of white cedar on cliffs are uneven aged and living individuals are as old as 700 years. They had a pulse recruitment pattern.

The two old-growth white cedar stands at White Lake require immediate recognition and appropriate management considerations. Both stands should be investigated further using criteria suggested by Keddy and Drummond (1996), but with consideration of recommended modifications by Brownell and Larson (1995), White (1996) and Larson et al. (1999).

D. Stands with Butternut (*Juglans cinerea*)

Within sugar maple dominated deciduous stands at White Lake on sandy loam over marble, a minor component of Butternut (*Juglans cinerea*) is present. This species is more characteristically associated with limestone outcrops in southern Ontario and approaches its northern range limit in Ontario near White Lake (Hosie 1969). It is commonly found as a scattered tree or in small groups. Butternut produces edible nuts and is a valuable tree for wildlife and has agricultural resource potential. It was recently listed as an "endangered forest species" by the United States Department of Agriculture, Forest Service (Ostry 1997). Populations have suffered a severe dieback in the southern parts of the species range and the cause, a canker-inducing fungus, entered Canada as recently as the early 1990s. Recently patterns of variation within declining tree species have been investigated to provide a basis for adequate preservation of tree genetic resources. White Pine (*Pinus strobus*) and Butternut (*Juglans cinerea*) were among the species studied (Rajora et al. 1998 and Morin et al. 2000 respectively). The low differentiation observed among Canadian populations lead to the suggestion that the protection of genotypes should focus on within-population components of genetic diversity rather than sampling many locations. The value of Canadian populations in containing adaptation to relatively harsh and extreme climate conditions was noted.

(3) Diversity

The diversity of vascular plant species at White Lake (427 spp.) appears to be relatively high compared to other sites within Site District 5E-11, and it is expected that if a additional surveys were conducted during the spring, many more species would be added. 466 species of vascular plants have been recorded from the

Darling Township ANSI (Brownell 1992) and 234 species were found in the Perch Lake Pine Forest (Brownell and Larson 1995). These sites are located about 30 km to the west. The Matawatchan Provincial Nature Reserve has 125 recorded taxa, the Summit Lake candidate ANSI has a known flora of 225 taxa (White, 1991), and 147 taxa have been recorded at Silent Lake Provincial Park (Dickson, 1979). The diversity of reptiles, amphibians, mammals and breeding birds is comparable to other sites within the site district.

(4) Special Features

The White Lake study area supports 4 provincially rare species, one of which is globally endangered. A relatively large number of regionally and locally rare plant species were discovered and even more are likely to be found if additional field investigations are conducted during the spring and early summer (see section 3.0). Since the lists used to establish regional and local rarity have changed over the years, a direct comparison with other ANSIs in Site District 5E-11 cannot be made.

(5) Site Condition

The White Lake study area is highly variable in the condition of its vegetation communities. The wetland communities which comprise about 25% of the study area are in excellent condition. White Lake is eutrophic and has problems associated with pollution and relatively heavy recreational use (Mathers and Kerr 1998). The majority of uplands in the northern section of the study area are in poor condition. Crown lands in the vicinity of Lowney Lake and south of there are in fair to excellent condition. Generally upland forests south of Three Mile Bay have been disturbed in the past 50-70 years and are considered to be in fair-good condition. The study area has many secondary gravel roads and utility lines which service several hundred cottages which line the shoreline. Overall the condition of the study area is considered fair, however when boundary revisions are applied to the existing ANSI boundaries, the overall condition of the White Lake Wetlands ANSI would be good.

(6) Ecological Function

The White Lake study area is bordered to the south and east by relatively wild tracts of land much of which is publically-owned. The Pakenham Mountains occur about 4 km to the east and Big Mud Lake, Darling Long Lake and Raycroft Lake with their associated wetlands, are found about 1.5 km to the south. White Lake itself forms the western boundary. The eastern boundary of the extensive wilderness of the Madawaska Highlands is less than 10 km to the west. Ecological function is considered to be excellent.

The maintenance of the white pine forests at White Lake require a clear understanding of the ecological processes that are involved in the establishment and succession of these communities. A review of some of the pertinent literature on this topic is presented by Brownell and Larson (1995).

(7) ANSI Boundary Determination

Boundary determination followed guidelines outlined in OMNR (1994b) and principles detailed in publications such as Riley and Mohr (1993). These are as follows:

- entire landscape, stand or habitat features are encompassed where possible;
- where ecological function is known, or can be inferred, an attempt is made, if possible, to maintain stand integrity by inclusion of features supporting that function (e.g. micro-watershed, wildlife corridor);
- populations of rare, threatened, or endangered species occurring in the immediate vicinity are incorporated;
- the amount of human disturbance in areas contiguous with selected stands is considered; and features that are recognizable in the field are used to "tie in" boundaries (e.g., tops of slopes adjacent to wetland, forest stand boundaries, edges of cut-overs, roads, clearings, edges of burns, lakeshore, bases of hills).

The original boundaries shown in Brunton (1990), boundaries subsequently established by OMNR after a public consultation process and proposed final boundaries of the White Lake ANSI are shown on Map 3. The original ANSI boundary included approximately 1400 ha. A large amount of land was added south of the original boundary in order to incorporate high quality, mature white pine forest on marble and fen habitat. A minimum 200 m buffer around the core sections was believed to be necessary to allow for buffering from windthrow, invasion of weedy species and increased shrub cover due to higher light levels.

Another problem faced during boundary delimitation was the extensive cottage development along the shorelines and the presence of extensive poor quality upland habitat which fragments the area. Studies by Steve Hounsell, Ontario Hydro, have shown that reserves should be at least 500 m wide in order to minimize edge effect (S. Hounsell, pers. comm.). This is a particularly important consideration for an old-growth forest.

(8) Recommendations and Management Considerations

a. Management Considerations

Management of the White Lake Conservation Reserve and other crown lands within the study area is a complex issue given the relatively high number of cottages, residences and lodges that are nearby. Passive management of the significant forest stands, including letting natural fires burn uncontrolled, is not an option. Education of local residents is a high priority in order to control the establishment of trails and removal of trees on crown lands.

The protection of representative white pine stands in southern Ontario cannot be properly addressed without a clear understanding of the ecological processes that are involved in the establishment, succession and maintenance of these communities. It will also be important to achieve a good understanding of the historical background of candidate sites especially with regard to fire history and human disturbance. Quinby (1991) suggests that selection logging, particularly group selection, may make better use of the variety of mechanisms of natural white pine regeneration than clear cutting. The old-growth condition, however cannot be maintained or enhanced under any cutting regime (Society of American Foresters 1994).

b. Future Studies

Since field studies for this report were conducted in the fall, some of the data is very preliminary. The following studies are suggested in order to make a more complete assessment of the White Lake study area.

- spring and early summer inventory of breeding birds, reptiles, amphibians and flora (late May to early July) with particular emphasis on locating rare species;
- complete an evaluation of all wetlands found within the study area under the provincial wetland evaluation system and update the existing wetland evaluation data file;
- investigate further the significance of the mature white pine stands found in the study area;
- development of a data base on characteristics of the old-growth white cedar stands at White Lake based on field investigations;
- inventory of several outgrowth white cedar stands and surrounding areas in Site District 5E-11 in order to enable a more accurate comparison with the white cedar old-growth stands in the White Lake study area;
- inform major universities in Ontario of the existence of this site and invite research activities. This area offers great opportunities for benchmark and research studies since it is extensive, diverse, relatively easy to access and is located only about one hour from Ottawa.
- examined old-growth white cedar stands and potential old-growth white pine stands on the ground and/or from the air that are similar to those at White Lake in order to determine if the stands still exist and if they are of the same composition, age and size as indicated on the FRI mapping. This exercise is very important since many stands may have been clear cut and major discrepancies with the FRIs can exist. In addition some stands may be eliminated (not considered representative) if there is evidence of human disturbance (logging) within the past 30-40 years. The occurrence of marble under the stands should also be verified.
- Complete land owner contact for private lands within the study area particularly for properties that were identified as potentially containing significant features.
- Initiate a landowner contact program that will educate local citizens of the significance of the crown lands and discourage creation of trails and removal of trees on crown lands.

c. Recommendations

- modify the boundaries of the White Lake ANSI to correspond to Map 3 of this report;
- modify the boundaries of the proposed White Lake conservation reserve as shown on Map 3 of this report in order to incorporate significant features found on crown lands during this study and to omit crown lands that were found to be in poor condition;
- immediately remove from timber allocation the old-growth white cedar stands and a surrounding buffer area at Centennial Lane; and
- remove all of the mature white pine stands over marble in the White Lake study area from timber allocation, or at least until a better quality candidate is secured in Site District 5E-11 on moderately broken ground moraine landform.

CITED REFERENCES

- Argus, G.W., K.M. Pryer, D.J. White and C.J. Keddy eds. 1982-1987. Atlas of the Rare Vascular Plants of Ontario, Parts 1-4. Botany Division, National Museum of Natural Sciences, Ottawa.
- Bakowsky, W.D. 1997. (2nd edition) Natural Heritage Resources of Ontario: Southern Ontario Vegetation Communities. Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough. 21 pp. Updated version found at www.mnr.gov.on.ca/MNR/nhic/
- Bakshi, T.S. 1959. Ecology and morphology of *Pterospora andromedea*. Botanical Gazette 120: 203-217.
- Beechey, T.J. 1980. A Framework for the Conservation of Ontario's Biological Heritage. Parks Planning Branch, Ontario Ministry of Natural Resources, Toronto.
- Brown, B. and L. L'arrivee. 1986. Wetland evaluation record for Lowney Lake. Ontario Ministry of Natural Resources, Carleton Place, Ontario.
- Brown, B. and J. McNaughton. 1985. Wetland evaluation record for White Lake 1. Ontario Ministry of Natural Resources, Carleton Place, Ontario.
- Brownell, V.R. 1978. A Brief Life Science Overview of the Centennial Lake Park Reserve Ontario Ministry of Natural Resources, Algonquin Region, Huntsville. 70 pp.
- Brownell, V.R. 1992. A Biological Inventory and Evaluation of the Darling Township Area of Natural and Scientific Interest. Parks and Recreational Areas Section, Ontario Ministry of Natural Resources Open File Ecological Report, Eastern Region, Kemptville, Ontario. vii + 80 pages + 4 folded maps.
- Brownell, V.R. 2000. Desktop Wetland Evaluation of White Lake Wetland Complex. Prepared for Ontario Ministry of Natural Resources, Kemptville, Ontario.
- Brownell, V.R. and B.M.H. Larson. 1995. A Biological Inventory and Evaluation of the Old-growth Features of the Perch Lake Pine Forest. Parks and Recreational Areas Section, Ontario Ministry of Natural Resources Open File Ecological Report, Kemptville, Ontario. vii + 55 pages + 3 folded maps.
- Brunton, D.F. 1973. Evaluation of Silent Lake Nature Reserves. Division of Parks, Ontario Ministry of Natural Resources, Huntsville.
- Brunton, D.F. 1990. Life Science Areas of Natural and Scientific Interest in Site District 5-11. Prepared for the Ontario Ministry of Natural Resources, Eastern Region, Parks and Recreational Areas Section, Kemptville. 164pp.
- Cadman, M.D. et al. 1987. Atlas of the Breeding Birds of Ontario. University of Waterloo Press, Waterloo.

- Chambers, B.A., B.J. Naylor, J. Nieppola, B. Merchant and P. Uhlig. 1997. Field Guide to Forest Ecosystems of Central Ontario. Ontario Ministry of Natural Resources, Peterborough. 200 pp.
- Cody, W.J. and D.M. Britton. 1989. Fern and Fern Allies of Canada. Publication 1829/E, Research Branch, Agriculture Canada, Ottawa.
- Cook, F.R. 1981. Amphibians and Reptiles of the Ottawa District. Trail and Landscape 15(2): 75-109.
- Crins, W.J. and P. Kor. 2000. (Draft). Natural heritage gap analysis methodologies used by the OMNR. Ontario Ministry of Natural Resources, Peterborough.
- Crins, W.J. and P.W.C. Uhlig. 2000. Ecoregions of Ontario: Modifications to Angus Hills' Site Regions and Districts. Revisions and rationale. Ontario Ministry of Natural Resources, Peterborough. 7 pp.
- Cuddy, D.G. 1989. Rare, threatened and endangered species of wildlife which occur in eastern Ontario. Draft. Ontario Ministry of Natural Resources, Eastern Region, Kemptville. 4pp.
- Cuddy, D.G. 1991a. Vascular Plants of Eastern Ontario. Draft 2. Ontario Ministry of Natural Resources, Eastern Region, Kemptville. 80pp.
- Cuddy, D.G. 1998. White Lake ANSI - Report on site visit August 28, 1998. Ontario Ministry of Natural Resources, Kemptville. 2pp.
- Cuddy, D.G. and S. Thompson. 1999. Lowney Lake wetland species lists. Ontario Ministry of Natural Resources, Kemptville. 11 pp.
- Day, J.H. ed. 1983. The Canada Soil Information System (CanSIS) Manual for describing soils in the field. Expert Committee on Soil Survey, Research Branch, Agriculture Canada, Ottawa. 97pp.
- Dickson, H.L. 1977. Proposed Lowrie Lakes Nature Reserve. Ontario Ministry of Natural Resources, Division of Parks, Algonquin Region, Huntsville. 10pp.
- Dickson, H.L. 1979. A Reconnaissance Life Science Inventory of Silent Lake Provincial Park. Ontario Ministry of Natural Resources, Division of Parks, Algonquin Region, Huntsville. 70pp.
- Duba, D. and E. Frey. 2000. C46 White Lake Wetlands Conservation Reserve. Prepared for Ontario Ministry of Natural Resources, Kemptville. 4 pp.
- Environment Canada. 1980. Canadian Climate Normals. 1951-1980. Environment Canada, Canadian Climate Program, Atmospheric Environment Service, Toronto, Ontario. 254pp.
- Haber, E. and C.J. Keddy. 1984. *Pterospora andromedea* Nutt. 1 page in G.W. Argus and C.J. Keddy (eds.) Atlas of the rare vascular plants of Ontario. Part 3. National Museum of Natural sciences, Ottawa.
- Hills, G.A. 1959. A Ready Reference to the Description of the Land of Ontario and its Productivity. Maple Division of Research, Ontario Department of Lands and Forests.

- Pp. 362-374. In R.C. Anderson, J.S. Fralish and J.M. Baskin (eds.). *Savannas, Barrens, and Rock Outcrop Plant Communities of North America*. Cambridge University Press, New York. 470 pp.
- Legge, J.T., R. Roush, R. Desalle, A.P. Vogler, and B. May. 1996. Genetic criteria for establishing evolutionarily significant units in Cryan's Buckmoth. *Conservation Biology* 10(1): 85- 98.
- Mathers, A. and S.J. Kerr. 1998. The fishery of White Lake. Ontario Ministry of Natural Resources, Southcentral Sciences Section Technical Report TR-107, Kemptville, Ontario. 42 pp.
- Maycock, P.M. 1979. A Preliminary Survey of the Vegetation of Ontario as a basis for the Establishment of a Comprehensive Nature Reserve System. Provincial Parks Branch, Ontario Ministry of Natural Resources, Toronto. 2 volumes.
- Morin, R., J. Beaulieu, M. Deslauriers, G. Daoust, and J. Bousquet. 2000. Low genetic diversity at allozyme loci in *Juglans cinerea*. *Canadian Journal of Botany* 78: 1238-1243.
- Morton, J.K. and J.M. Venn. 1990. A Checklist of the Flora of Ontario Vascular Plants. University of Waterloo Biology Series No. 34. 218pp.
- Newmaster, S.G., A. Lehela, P.W.C. Uhlig, S. McMurray, M.J. Oldham. 1998. Ontario Plant List. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, Forest Research Information Paper No. 123. 550 pp. + appendices.
- Noble, T. 1988. Biophysical analysis, Site Region 5E, Northeastern Region. Phase 1: Prefield. Prepared for the Ontario Ministry of Natural Resources, Sudbury.
- Norris, T.A. 1992. Status of the amphibians and reptiles of eastern Ontario. Ontario Ministry of Natural Resources, Kemptville. 9 pp.
- Old Growth Forests Policy Advisory Committee. 1994, Conserving Ontario's old growth forest ecosystems. Ontario Ministry of Natural Resources, Toronto. 90 pp.
- Oldham, M.J. and W.F. Weller. 2000. Ontario Herpetofaunal Atlas. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. <http://www.mnr.gov.on.ca/MNR/nhic/herps/ohs.html> (updated 15-01-2001).
- Ontario Geological Survey. 1988. Open File report 5693. Geology of the Darling Township Area, Lanark and Renfrew Counties. Map P3113. scale 1:15,840.
- Ontario Ministry of Natural Resources. 1968. Fish and wildlife data forms. OMNR, Carleton Place District, Carleton Place.
- Ontario Ministry of Natural Resources. 1983. Carleton Place District Land Use Guidelines. OMNR, Carleton Place District, Carleton Place. 54pp.
- Ontario Ministry of Natural Resources. 1987. Implementation Strategy: Areas of Natural and Scientific Interest. OMNR, Parks and Recreational Areas Branch, Toronto. 19pp.

- Ontario Ministry of Natural Resources. 1993. Northern Region Growth and Yield Field Manual. OMNR, Cochrane, Ontario. 106 pp.
- Ontario Ministry of Natural Resources. 1994. Ontario Wetland Evaluation System Northern Manual. OMNR, Toronto.
- Ontario Ministry of Natural Resources. 1994. Conserving Ontario's Old Growth Forest Ecosystems. Final Report of the Old Growth Forests Policy Advisory Committee. OMNR, Toronto. 90 pp.
- Ontario Ministry of Natural Resources. 1994b. Old growth pine conservation strategy protection - site selection methodology. OMNR, Huntsville, Ontario. 7 pp.
- Ontario Ministry of Natural Resources. 1994c. Madawaska Highlands Planning for the Future. Special Edition 3. OMNR, 8 pp.
- Ontario Ministry of Natural Resources. 1999. Ontario's Living Legacy Land Use Strategy. OMNR, Peterborough. 136 pp.
- Peach, P.A. 1956. Geology of Darling Township and part of Lavant Township, Lanark County. In the Annual Report 65, part 7, Ontario Department of Mines, Toronto. Map 1956-4.
- Peterson, R.L. 1966. The Mammals of Eastern Canada. Oxford University Press, Toronto. 465pp.
- Pryor, G.S. 1998. Life history of the Bog Buck Moth (Saturniidae: *Hemileuca*) in New York State. Journal of the Lepidopterists' Society 52(2): 125-138.
- Reddoch, J.M. 1983. Southern Ontario fens. Plant Press 1: 76-78.
- Reddoch, J.M. 1984. White Lake fen. Trail and Landscape 18: 134-144.
- Riley, J.L. 1988. Peat and peatland resources of southeastern Ontario. Ontario Geological Survey Open File Report 5633, Ministry of Northern Development and Mines, Toronto.
- Riley, J.L. 1989. Southern Ontario bogs and fens off the Canadian Shield. pp. 355-368. IN M. Bardecki and N. Patterson (eds.). Wetlands: Inertia or Momentum. Federation of Ontario Naturalists, Don Mills, Ontario. 426 pp.
- Riley, J.L. and P. Mohr. 1993. Biodiversity and natural heritage values on Southern Ontario's settled landscapes: a discussion paper on concepts in conservation biology and natural heritage strategies in land use planning. OMNR, Southern Region, Aurora, Ontario.
- Rowe, J.S. 1977. Forest Regions of Canada. Canadian Forestry Service, Department of Fisheries and the Environment, Ottawa. 172 pp. + map.
- Scholtens, B.G. and W.H. Wagner Jr. 1994. Biology of the genus *Hemileuca* (Lepidoptera: Saturniidae) in Michigan. The Great Lakes Entomologist 27(4): 197-207.

- Schweitzer, D.F. 1999. Comprehensive report - *Hemileuca* sp. 1. <http://www.natureserv.com>
- Simpson, H. 1978. Matawatchan Nature Reserve. Ontario Ministry of Natural Resources, Algonquin Region, Huntsville, Ontario. 5pp.
- Society of American Foresters. 1984. Scheduling the harvest of old-growth. SAF. Washington, D.C. 44 pp.
- Soper, J.H. and M.L. Heimbürger. 1985. Shrubs of Ontario. 2nd edition. Royal Ontario Museum, Toronto, Ontario. 495pp.
- Taylor, K. 1991. Life Science Report. Ontario Ministry of Natural Resources, Carleton Place District, Carleton Place.
- White, D.J. 1990. Preliminary Definitions and Evaluation of Old-growth Forest in Eastern Ontario. Prepared under contract for the Ontario Ministry of Natural Resources, Eastern Region, Kemptville, Ontario. 63pp.
- White, D.J. 1991. An Assessment of Representative and Special Life Science Resource Features of the Fortune-Schooner-Centennial Lakes ANSI Complex. Prepared under contract for the Ontario Ministry of Natural Resources, Eastern Region, Kemptville, and Algonquin Region, Huntsville, Ontario. 233pp.
- White, D.J. 1999. A preliminary annotated checklist of the vascular plants of Lanark County, Ontario. Draft 4.2. Lanark, Ontario. 40 pp.
- Whiting, R.E. and P.M. Catling. 1986. Orchids of Ontario. The CanaColl Foundation, Ottawa, Ontario. 169pp.

MAP REFERENCES

Canada Department of Energy, Mines and Resources, Surveys and Mapping Branch. National Topographic Series. 1987. 1:50 000, Renfrew (31 F/7), Arnprior (31 F/8), Clyde Forks (31F/2).

Ontario Basic Mapping 18 3800 50100, 18 3750 50100.

Ontario Geological Survey. 1982. Precambrian Geology, Renfrew County. Map 2462. Ontario Geological Survey. Scale 1:100,000.

Ontario Ministry of Natural Resources, Ontario Forest Resource Inventory Mapping, 1992. Lanark (688) 1: 10 000.

Ontario Ministry of Natural Resources, Surveys and Mapping Branch. 1991. Aerial photography of the study area.

Flight line 4516,	Roll 30,	Photo No. 43-48.
4517,	12,	216-221.
4518,	11,	10-15.
4519,	12,	153-158.
4520,	12,	181-187.
4521,	12,	102-104.

APPENDIX 1: VASCULAR PLANTS OF THE WHITE LAKE STUDY AREA

The White Lake study area is located in eastern Ontario, approximately 20 km southwest of Arnprior in Darling and Pakenham townships, Lanark County, and in adjacent McNab and Bagot and Blithfield townships, Renfrew County. The site is located in Site District 5E-11. A total of 427 taxa of vascular plants were recorded from the 4415 hectare area from 15 September to 15 October 2000. Taxonomic nomenclature and family arrangement generally follows Newmaster et al. (1998) and Morton & Venn (1990). Species followed by an asterisk are supported by specimens which have been donated to the herbarium of the Biological Resources Division, Agriculture Canada, Ottawa (DAO). Some difficult specimens were verified by Dr. Paul M. Catling. Nine percent (39 species) of the total flora are regarded as introduced/non-native taxa which is a relatively low percentage. These are preceded by a "+" symbol before the scientific name. Refer to the section on community descriptions and Map 1 for community numbers and location. A "C" preceding a community number indicates that the sighting was made by D. Cuddy and S. Thompson on 18 August 1999.

Under the status column, provincial rarity is indicated by the Srank (S1 = extremely rare; S2 = very rare; S3 = rare to uncommon) taken from Oldham (1999). Species indicated by a "R" in the status column are rare or absent in Site Region 5 (Crins 1998a) and are considered regionally rare. A "D" denotes rarity in Site District 5E-11 (see Crins 1998b).

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	LYCOPODIACEAE	CLUBMOSS FAMILY	
D	<i>Diphasiastrum complanatum</i> (L.) Holub	Northern Running-pine	23a
	<i>Huperzia lucidula</i> (Michx.) Trevis.	Shining Fir-moss	C16d,26a
	<i>Lycopodium annotinum</i> L.	Bristly Club-moss	23a,28b
	<i>Lycopodium clavatum</i> L.	Running Club-moss	23a
	<i>Lycopodium obscurum</i> L.*	Ground-pine	23a,28b
	EQUISETACEAE	HORSETAIL FAMILY	
	<i>Equisetum arvense</i> L.	Field Horsetail	11a,C12a,16c,23a
	<i>Equisetum fluviatile</i> L.	Water Horsetail	5a,5c,7b,
	<i>Equisetum hyemale</i> L. ssp. <i>affine</i> (Engelm.) Calder & Roy	Scouring-rush	7c,C12a,14
	<i>Equisetum scirpoides</i> Michx.	Dwarf Scouring-rush	15,16a,C16d,21c,23a
D	<i>Equisetum variegatum</i> Schleich. ex Fried., Weber & Mohr ssp. <i>variegatum</i>	Variegated Horsetail	31
	OPHIOGLOSSACEAE	ADDER'S-TONGUE FAMILY	
	<i>Botrychium virginianum</i> (L.) Swartz	Rattlesnake Fern	19a,19e,23a,28b
D	<i>Ophioglossum pusillum</i> Raf.*	Northern Adder's-tongue	15
	OSMUNDACEAE	ROYAL FERN FAMILY	
	<i>Osmunda cinnamomea</i> L.	Cinnamon Fern	C12a,C16d
	<i>Osmunda regalis</i> L. var. <i>spectabilis</i> (Willd.) A. Gray	Royal Fern	C12a,16b,16f

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	PTERIDACEAE (ADIANTACEAE)	MAIDENHAIR FERN FAMILY	
	<i>Adiantum pedatum</i> L.	Northern Maidenhair Fern	18,19a
	DENNSTAEDTIACEAE	BRACKEN FAMILY	
D	<i>Dennstaedtia punctilobula</i> (Michx.) T. Moore*	Hay-scented Fern	19e
	<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>latiusculum</i> (Desv.) L. Underw. ex A. Heller	Eastern Bracken-fern	19c,20b,20c,20d,21a,21c,23a,25b,26 b,26c,27,30
	THELYPTERIDACEAE	BEECH FERN FAMILY	
	<i>Thelypteris palustris</i> Schott var. <i>pubescens</i> (Lawson) Fern.	Marsh Fern	5a,5b,5c,5e,6,7a,7b,11b,12a,12b,12c, 12d,12e,15,16a,16c,16d,16f
	DRYOPTERIDACEAE (ASPLENIACEAE)	SPLEENWORT FAMILY	
	<i>Athyrium filix-femina</i> (L.) Roth ex Mert. var. <i>angustum</i> (Willd.) G. Lawson	Northern Lady Fern	18,19a,19e,21a,28b
R	<i>Cystopteris bulbifera</i> (L.) Bernh.	Bulbet Bladder Fern	11a,16c,16e,18,19a,23b
	<i>Dryopteris carthusiana</i> (Vill.) H.P. Fuchs	Spinulose Wood Fern	16c
	<i>Dryopteris cristata</i> (L.) A. Gray	Crested Wood Fern	C16d,23a
	<i>Dryopteris intermedia</i> (Muhlenb. ex Willd.) A. Gray	Evergreen Wood Fern	C16d,19f,20c,23b,26c,28b
	<i>Dryopteris marginalis</i> (L.) A. Gray	Marginal Wood Fern	17a,17b,18,19a,19c,19d,19e,19f,20a, 21a,21c,22,23a,25a
	<i>Gymnocarpium dryopteris</i> (L.) Newman	Oak Fern	28b
	<i>Matteuccia struthiopteris</i> (L.) Tod. var. <i>pennsylvanica</i> (Willd.) C.V. Morton	Ostrich Fern	12e
	<i>Onoclea sensibilis</i> L.	Sensitive Fern	4b,5b,5c,5d,6,C12a,16c,16d,16f
	POLYPODIACEAE	POLYPODY FAMILY	
	<i>Polypodium virginianum</i> L.	Rock Polypody Fern	18,20a,22,25a,26b
	PINACEAE	PINE FAMILY	
	<i>Abies balsamea</i> (L.) Miller	Balsam Fir	11a,15,16b,16c,16e,16f,17a,19c,19d, 20c,20d,21a,21b,21c,21e,23a,25b,26 a,26b,26c,28a,28b,29
	<i>Larix laricina</i> (Du Roi) K. Koch	Tamarack	5a,11b,12a,12b,12d,12e,16b,16d,16f
	<i>Picea glauca</i> (Moench) Voss	White Spruce	16a,16b,16c,20c,21a,21c,26a,26c,29
	<i>Picea mariana</i> (Miller) B.S.P.	Black Spruce	12d,16d,16f
	<i>Pinus resinosa</i> Sol. ex Aiton	Red Pine	20c,26b

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Pinus strobus</i> L.	Eastern White Pine	16d, 16f, 17a, 17b, 18, 19a, 19c, 19d, 19f, 20a, 20b, 20c, 20d, 21b, 21c, 21e, 23a, 26a, 26b, 26c, 27, 28a, 30
	<i>Tsuga canadensis</i> (L.) Carrière	Eastern Hemlock	19b, 20d, 22, 23b, 25a, 25b, 26c
	CUPRESSACEAE	CYPRESS FAMILY	
	<i>Juniperus communis</i> L.	Common Juniper	17a, 17b, 27, 30
	<i>Thuja occidentalis</i> L.	Eastern White Cedar	5d, 5e, 6, 7a, 5a, 11a, 11b, 12a, 12b, 12d, 12e, 15, 16a, 16b, 16c, 16d, 16e, 16f, 17a, 19e, 20c, 21a, 21b, 21c, 21e, 23a, 23b, 25a, 25b, 26b, 26c, 28a, 28b, 29
	TAXACEAE	YEW FAMILY	
	<i>Taxus canadensis</i> Marshall	American Yew	21a
R	<i>Asarum canadense</i> L.	Wild Ginger	19b
	NYMPHAEACEAE	WATER-LILY FAMILY	
	<i>Nuphar variegata</i> Durand in Clinton	Bulhead Pond-lily	4a, 7c
	<i>Nymphaea odorata</i> Aiton	Fragrant Water-lily	LL
	CERATOPHYLLACEAE	HORNWORT FAMILY	
	<i>Ceratophyllum demersum</i> L.	Common Coontail	6
	RANUNCULACEAE	CROWFOOT FAMILY	
	<i>Actaea pachypoda</i> Elliott	White Baneberry	18, 19c, 23a
	<i>Actaea rubra</i> (Aiton) Willd.	Red Baneberry	19c, 20c, 21a, 23a, 26c
R	<i>Anemone acutiloba</i> (DC.) G. Lawson	Sharp-lobed Hepatica	19a, 19b, 19c, 20c, 25b, 26c
	<i>Anemone americana</i> (DC.) H. Hara	Round-lobed Hepatica	19d, 19f, 20c, 20d, 21c, 26b
R	<i>Anemone cylindrica</i> A. Gray *	Thimbleweed	18, 20a, 20c
	<i>Anemone virginiana</i> L. var. <i>virginiana</i>	Thimbleweed	3
	<i>Aquilegia canadensis</i> L.	Wild Columbine	18, 20b, 20c, 22, 26c
	<i>Caltha palustris</i> L.	Marsh-marigold	X
D	<i>Clematis occidentalis</i> (Hornem.) DC. var. <i>occidentalis</i> *	Purple Clematis	19b
	<i>Coptis trifolia</i> (L.) Salisb.	Goldthread	C12a, 12e, 16a, 16c, 16d, 16f
	<i>Ranunculus sceleratus</i> L. var. <i>sceleratus</i>	Cursed Buttercup	7a
	<i>Thalictrum dioicum</i> L.	Early Meadow-rue	18
	<i>Thalictrum pubescens</i> Pursh	Tall Meadow-rue	11b, C12a
	BERBERIDACEAE	BARBERRY FAMILY	

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Caulophyllum thalictroides</i> (L.) Michx.	Blue Cohosh	18,19a
	FUMARIACEAE	FUMITORY FAMILY	
R	<i>Adlumia fungosa</i> (Aiton) Greene ex B.S.P.*	Climbing Fumitory	19e,19f,20b,22
	<i>Corydalis sempervirens</i> (L.) Pers.	Pale Corydalis	17b
	ULMACEAE	ELM FAMILY	
	<i>Ulmus americana</i> L.	White Elm	11a,16c,16e,C16d,16f
	URTICACEAE	NETTLE FAMILY	
	<i>Boehmeria cylindrica</i> (L.) Sw.	False Nettle	C12a
R	<i>Pilea pumila</i> (L.) A. Gray *	Dwarf Clearweed	5b,15
	JUGLANDACEAE	WALNUT FAMILY	
D	<i>Juglans cinerea</i> L.	Butternut	19h,19i
	MYRICACEAE	BAYBERRY FAMILY	
	<i>Comptonia peregrina</i> (L.) J.M. Coult.	Sweetfern	17b,20a
	<i>Myrica gale</i> L.	Sweet Gale	5e,8,9,10,11b,C12a,12b,12c
	FAGACEAE	BEECH FAMILY	
	<i>Fagus grandifolia</i> Ehrh.	American Beech	19e,19f,20d
	<i>Quercus macrocarpa</i> Michx.	Bur Oak	19d,19e,20a,25b
	<i>Quercus rubra</i> L.	Red Oak	17b,18,19a,19b,19c,19d,19f,20a,20b,26a,27
	BETULACEAE	BIRCH FAMILY	
	<i>Alnus incana</i> (L.) Moench ssp. <i>rugosa</i> (Du Roi) Clausen	Speckled Alder	11b,12a,12e,14,16c
	<i>Betula alleghaniensis</i> Britton	Yellow Birch	19a
	<i>Betula papyrifera</i> Marshall	White Birch	15,18,19a,19c,19d,19e,20a,20b,20c,20d,21a,21b,21c,21e,23a,23b,25a,26b,26c,27,28a,28b,29
	<i>Carpinus caroliniana</i> Walter ssp. <i>virginiana</i> (Marshall) Furlow	Blue Beech	19a
	<i>Corylus cornuta</i> Marshall ssp. <i>cornuta</i>	Beaked Hazel	18,19c,20b,20c,26a,27
	<i>Ostrya virginiana</i> (Miller) K. Koch	Hop Hornbeam	18,19a,19b,19c,19d,19e,19f,20c,21c,22,23a,23b,28b
	CARYOPHYLLACEAE	PINK FAMILY	
+	<i>Saponaria officinalis</i> L.	Bouncing-bet	32
+	<i>Silene latifolia</i> Poir.	Bladder Champion	32

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	POLYGONACEAE	BUCKWHEAT FAMILY	
	<i>Polygonum amphibium</i> L.	Water Smartweed	5a,5b,5c,5e,6,7a,7c,15,16f
	<i>Polygonum hydropiperoides</i> Michx.	Mild Water-pepper	5d
	<i>Polygonum sagittatum</i> L.	Arrow-leaved Tearthumb	5d
R	<i>Polygonum scandens</i> L.	Climbing False Buckwheat	17b
+	<i>Rumex acetosa</i> L. ssp. <i>thyrsoflorus</i> (Fingerh.) Hayek	Sour Dock	17b,30
+	<i>Rumex crispus</i> L.	Curly-leaf Dock	6,7a,12c,12e
+	<i>Rumex obtusifolius</i> L. ssp. <i>obtusifolius</i>	Bitter Dock	C12a
R	<i>Rumex verticillatus</i> L.	Swamp Dock	16f
	GUTTIFERAE (HYPERICACEAE)	ST.JOHN'S-WORT FAMILY	
	<i>Hypericum canadense</i> L.	Canadian St. John's-wort	8
D	<i>Hypericum mutilum</i> L. ssp. <i>boreale</i> (Britton) J.M. Gillett	Northern St. John's-wort	5a,6
+	<i>Hypericum perforatum</i> L.	Common St. John's-wort	30
	<i>Triadenum fraseri</i> (Spach) Gleason	Fraser's St. John's-wort	5b,C12a
	TILIACEAE	LINDEN FAMILY	
	<i>Tilia americana</i> L.	American Basswood	19a,19b,19c,19d,19e,19f,20b,21c,22,23a,23b,28a,28b
	SARRACENIACEAE	PITCHER-PLANT FAMILY	
	<i>Sarracenia purpurea</i> L.	Pitcher-plant	8,9,10,C12a,12b,12e
	DROSERACEAE	SUNDEW FAMILY	
	<i>Drosera rotundifolia</i> L.	Round-leaved Sundew	C12a,12c
	VIOLACEAE	VIOLET FAMILY	
	<i>Viola blanda</i> Willd.	Sweet White Violet	C21b
D	<i>Viola canadensis</i> L.	Canada Violet	19a
	<i>Viola conspersa</i> Reichb.	American Dog Violet	19a,19c
	<i>Viola pubescens</i> Aiton	Downy Yellow Violet	18,20c,25b,26c
	<i>Viola renifolia</i> A. Gray	Kidney-leaved Violet	C16d,23a
	SALICACEAE	WILLOW FAMILY	
	<i>Populus balsamifera</i> L. ssp. <i>balsamifera</i>	Balsam Poplar	X

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Populus grandidentata</i> Michx.	Large-tooth Aspen	19c,20c,21c,21e,26b
	<i>Populus tremuloides</i> Michx.	Trembling Aspen	19c,20b,20c,20d,21b,21c,21e,25b,29, 30
	<i>Salix bebbiana</i> Sarg.	Long-beaked Willow	15
	<i>Salix candida</i> Flüegge ex Willd.	Hoary Willow	9,10,11b,C12a,12c
	<i>Salix discolor</i> Muhlenb.	Pussy Willow	5b,7a,12d,12e,15,16c
+	<i>Salix fragilis</i> L.	Crack Willow	X
	<i>Salix lucida</i> Muhlenb.	Shining Willow	6,C12a,12e
	<i>Salix petiolaris</i> Sm.	Slender Willow	7c,C12a,15,16f
	BRASSICACEAE	MUSTARD FAMILY	
R	<i>Arabis drummondii</i> A. Gray*	Drummond's Rock-cress	17a
R	<i>Cardamine pratensis</i> L. ssp. <i>pratensis</i>	Cuckoo-flower	12c
	ERICACEAE	HEATH FAMILY	
	<i>Andromeda polifolia</i> L. ssp. <i>glaucophylla</i> (Link) Hultén	Bog Rosemary	9,10,12c
	<i>Arctostaphylos uva-ursi</i> (L.) Spreng.	Common Bearberry	17a,17b
	<i>Chamaedaphne calyculata</i> (L.) Moench	Leatherleaf	8,12c,12e
	<i>Gaultheria hispidula</i> (L.) Muhlenb. ex Bigelow	Creeping Snowberry	12a,12d,12e,16a,C16d,16f
	<i>Gaultheria procumbens</i> L.	Wintergreen	18,19c,20a,20b,20c,26a,26b,26c,27
	<i>Gaylussacia baccata</i> (Wangenh.) K. Koch	Black Huckleberry	17b
	<i>Kalmia angustifolia</i> L.	Sheep Laurel	9,11a,11b
	<i>Ledum groenlandicum</i> Oeder	Labrador-tea	5e,11b,12b,12d,12e,16a,16b,C16d,16 f
	<i>Vaccinium angustifolium</i> Aiton	Low Sweet Blueberry	12e,16b,17a,17b,20a,20c,27
	<i>Vaccinium macrocarpon</i> Aiton	Large Cranberry	8
	<i>Vaccinium oxycoccos</i> L.	Small Cranberry	11b,12b,12c
	PYROLACEAE	WINTERGREEN FAMILY	
	<i>Chimaphila umbellata</i> (L.) Barton ssp. <i>cisatlantica</i> (S.F. Blake) Hultén	Common Pipsissewa	18,19d
	<i>Orthilia secunda</i> (L.) House	One-sided Shinleaf	12e,16a,16d
D	<i>Pyrola asarifolia</i> Michx.	Pink Pyrola	C16d,23a
D	<i>Pyrola chlorantha</i> Sw.	Green-flowered Pyrola	12e
	<i>Pyrola elliptica</i> Nutt.	Shinleaf	12a,18,19c,19d,20c,23a

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
D	<i>Pyrola grandiflora</i> Radius	Arctic Pyrola	19c
	MONOTROPACEAE		
	<i>Monotropa uniflora</i> L.	Indian-pipe	19f,20c,26c
S2	<i>Pterospora andromedea</i> Nutt.	Giant Bird's Nest	26b
	PRIMULACEAE	PRIMROSE FAMILY	
	<i>Lysimachia terrestris</i> (L.) B.S.P.	Swamp Loosestrife	3,5a,5b,7a,C16d
	<i>Lysimachia thyrsiflora</i> L.	Tufted Loosestrife	C12a
	<i>Trientalis borealis</i> Raf. ssp. <i>borealis</i>	Star-flower	12e,16d,23b
	GROSSULARIACEAE	GOOSEBERRY FAMILY	
	<i>Ribes americanum</i> Miller	Wild Black Currant	X
	<i>Ribes cynosbati</i> L.	Prickly Gooseberry	X
	SAXIFRAGACEAE	SAXIFRAGE FAMILY	
	<i>Mitella diphylla</i> L.	Two-leaved Bishop's Cap	18,19a
	<i>Mitella nuda</i> L.	Naked Mitrewort	16a,16c,16d,16f
	ROSACEAE	ROSE FAMILY	
	<i>Agrimonia gryposepala</i> Wallr.	Tall Hairy Agrimony	20b,20c
	<i>Amelanchier arborea</i> (Michx. f.) Fern.	Downy Juneberry	17b,18,27
	<i>Amelanchier laevis</i> Wiegand	Smooth Juneberry	17b,18,20c,27
	<i>Amelanchier spicata</i> (Lam.) K. Koch	Low Juneberry	17b
	<i>Aronia melanocarpa</i> (Michx.) Elliott	Black chokeberry	10,11b,12c,17b
	<i>Fragaria vesca</i> L. ssp. <i>americana</i> (Porter) Staudt	Woodland Strawberry	18,20b
	<i>Fragaria virginiana</i> Miller ssp. <i>virginiana</i>	Scarlet Strawberry	C16d,17b,20c
+	<i>Potentilla argentea</i> L.	Silvery Cinquefoil	30
D	<i>Potentilla fruticosa</i> L. ssp. <i>floribunda</i> (Pursh) Elkington*	Shrubby Cinquefoil	5a,8,9,10,C12a,12c,12e
	<i>Potentilla norvegica</i> L. ssp. <i>norvegica</i>	Cinquefoil	3
	<i>Potentilla palustris</i> (L.) Scop.	Marsh Cinquefoil	7a,7b,8,11b,14
+	<i>Potentilla recta</i> L.	Rough-fruited Cinquefoil	20c
	<i>Prunus pensylvanica</i> L. f.	Pin Cherry	23a,26c
	<i>Prunus serotina</i> Ehrh.	Black Cherry	28b

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Rosa blanda</i> Aiton	Smooth Rose	17a,20a
	<i>Rosa palustris</i> Marshall	Marsh Rose	4a,9,12c
	<i>Rubus allegheniensis</i> Porter	Alleghany Blackberry	20c,20d,23a,25a
	<i>Rubus hispidus</i> L.	Trailing Blackberry	C12a
	<i>Rubus idaeus</i> L. ssp. <i>melanolasius</i> (Dieck) Focke	Wild Red Raspberry	30
	<i>Rubus odoratus</i> L.	Purple Flowering Raspberry	30
	<i>Rubus pubescens</i> Raf.	Dwarf Raspberry	11a,12b,12d,12e,15,16c,16d,16e,16f,26b,29
	<i>Spiraea alba</i> Du Roi	Narrow-leaved Meadow-sweet	7c,14
	<i>Spiraea tomentosa</i> L.	Tomentose Meadow-sweet	5b,5d
	<i>Waldsteinia fragarioides</i> (Michx.) Tratt.	Barren Strawberry	17b,19c,20a,20b,20c,20d,25b,26a,26b,26c,27,29
	FABACEAE	PEA FAMILY	
	<i>Amphicarpaea bracteata</i> (L.) Fern.	Hog Peanut	19a,20b
	<i>Apios americana</i> Medik.	Groundnut	23a
D	<i>Desmodium glutinosum</i> (Muhlenb. ex Willd.) Alph. Wood	Pointed-leaved Tick-trefoil	18
+	<i>Medicago lupulina</i> L.	Black Medick	32
+	<i>Melilotus alba</i> Medik.	White Sweet-clover	20c
+	<i>Trifolium aureum</i> Pollich	Yellow Clover	30
+	<i>Trifolium hybridum</i> L. ssp. <i>elegans</i> (Savi) Asch. & Graebn.	Alsike Clover	32
+	<i>Trifolium pratense</i> L.	Red Clover	20c
	ELAEAGNACEAE	OLEASTER FAMILY	
	<i>Shepherdia canadensis</i> (L.) Nutt.	Canada Soapberry	21b,26b
	HALORAGACEAE	WATER MILFOIL FAMILY	
	<i>Myriophyllum sibiricum</i> Kom.	Pale Water-milfoil	2
R	<i>Myriophyllum verticillatum</i> L. *	Whorled Water-milfoil	11b
	LYTHRACEAE	LOOSESTRIFE FAMILY	
	<i>Decodon verticillatus</i> (L.) Elliott	Swamp Loosestrife	11b,12c

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
+	<i>Lythrum salicaria</i> L.	Purple Loosestrife	5d, 14
	THYMELAEACEAE	MEZEREUM FAMILY	
	<i>Dirca palustris</i> L.	Leatherwood	18, 19a, 19d, 19f, 20c, 20d, 21a, 21c, 26c, 28b
	ONAGRACEAE	EVENING-PRIMROSE FAMILY	
	<i>Circaea alpina</i> L.	Smaller Enchanter's Nightshade	X
	<i>Circaea lutetiana</i> L. ssp. <i>canadensis</i> (L.) Aschers. & Magnusson	Yellowish Enchanter's Nightshade	19a
	<i>Epilobium angustifolium</i> L.	Fireweed	C21b
	<i>Epilobium ciliatum</i> Raf. ssp. <i>ciliatum</i>	Ciliate Willow-herb	5d
R	<i>Epilobium strictum</i> Muhlenb. ex Spreng.	Soft Willow-herb	C12a, 16f
	CORNACEAE	DOGWOOD FAMILY	
	<i>Cornus amomum</i> Miller ssp. <i>obliqua</i> (Raf.) J.S. Wilson	Silky Dogwood	7c
	<i>Cornus canadensis</i> L.	Bunchberry	16d, 20c, 25b, 26b, 26c, 29
	<i>Cornus rugosa</i> Lam.	Round-leaved Dogwood	18, 19c, 20a, 20b, 20c, 20d, 21a, 21c, 26a, 26b, 26c
	<i>Cornus stolonifera</i> Michx.	Red-osier Dogwood	4b, 5a, 5b, 6, 11b, C12a, 12d, 16c, C16d, 16f
	SANTALACEAE	SANDLEWOOD FAMILY	
	<i>Comandra umbellata</i> (L.) Nutt.	Bastard Toad-flax	20a
	CELASTRACEAE	STAFF-TREE FAMILY	
	<i>Celastrus scandens</i> L.	Climbing Bittersweet	17a, 19a, 19d, 20b, 20c, 21a, 23a
	AQUIFOLIACEAE	HOLLY FAMILY	
	<i>Ilex verticillata</i> (L.) A. Gray	Winterberry	C12a
	<i>Nemopanthus mucronatus</i> (L.) Loeske	Mountain-holly	11b
	EUPHORBIACEAE	SPURGE FAMILY	
	<i>Euphorbia cyparissias</i> L.	Cypress Spurge	32
	RHAMNACEAE	BUCKTHORN FAMILY	
	<i>Ceanothus americanus</i> L.	New Jersey Tea	26b
	<i>Rhamnus alnifolia</i> L'Hér.	Alder-leaved Buckthorn	4b, 12e, 16a, 16d, 16f
	VITACEAE	GRAPE FAMILY	

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Parthenocissus inserta</i> (A. Kern.) Fritsch	Inserted Virginia-creeper	21a
	<i>Vitis riparia</i> Michx.*	Riverbank Grape	17a,21a
	POLYGALACEAE	MILKWORT FAMILY	
	<i>Polygala paucifolia</i> Willd.	Gay Wings	C16d,20c,20d,25b,26b,26c,28b
	ACERACEAE	MAPLE FAMILY	
	<i>Acer pensylvanicum</i> L.	Striped Maple	18,19c,19e,20c,20d,22
	<i>Acer rubrum</i> L.	Red Maple	11a,16d,20c,26a,27
	<i>Acer saccharum</i> Marshall ssp. <i>saccharum</i>	Sugar Maple	18,19a,19b,19c,19d,19e,19f,20a,20b,20c,20d,21c,22,23a,23b,25b,26a,26b,28b,30
	<i>Acer spicatum</i> Lam.	Mountain Maple	11a,16c
	ANACARDIACEAE	CASHEW FAMILY	
	<i>Rhus radicans</i> L. ssp. <i>negundo</i> (Greene) McNeill	Poison-ivy	16d,16e,19c,19d,20b,20c,20d,23a,25b,26c
	<i>Rhus typhina</i> L.	Staghorn Sumac	30
	OXALIDACEAE	WOOD-SORREL FAMILY	
	<i>Oxalis dillenii</i> Jacq.	Dillen's Wood-sorrel	19a
	GERANIACEAE	GERANIUM FAMILY	
+	<i>Geranium robertianum</i> L.	Herb-robert	19b
	BALSAMINACEAE	TOUCH-ME-NOT FAMILY	
	<i>Impatiens capensis</i> Meerb.	Spotted Touch-me-not	C12a,16c
	ARALIACEAE	GINSENG FAMILY	
	<i>Aralia nudicaulis</i> L.	Wild Sarsaparilla	18,19b,19c,19d,19e,19f,20a,20b,20c,21c,22,23a,23b,25a,25b,26a,26c,27,28b
	<i>Aralia racemosa</i> L. ssp. <i>racemosa</i>	Spikenard	19a
	APIACEAE	CARROT FAMILY	
	<i>Cicuta bulbifera</i> L.	Bulb-bearing Water-hemlock	5a,5d,6,7a,11b,C12a,16e
	<i>Sanicula canadensis</i> L. var. <i>canadensis</i>	Canada Snakeroot	20a,20b,20c
	<i>Sium suave</i> Walter	Hemlock Water-parsnip	4b,5a,5b,5c,6,7b,16f
	ASCLEPIADACEAE	MILKWEED FAMILY	
	<i>Asclepias incarnata</i> L. ssp. <i>incarnata</i>	Swamp Milkweed	5a,5b,6

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Asclepias syriaca</i> L.	Common Milkweed	30
	SOLANACEAE	NIGHTSHADE FAMILY	
+	<i>Solanum dulcamara</i> L.	Bitter Nightshade	5a,5d,6,7a,7b,15,16d
R	<i>Solanum nigrum</i> L.*	Black Nightshade	21a,25a
	CONVOLVULACEAE	MORNING-GLORY FAMILY	
+	<i>Convolvulus arvensis</i> L.	Field Bindweed	32
	GENTIANACEAE	GENTIAN FAMILY	
	<i>Menyanthes trifoliata</i> L.	Three-leaved Buckbean	5a,9,10,C12a
	VERBENACEAE	VERVAIN FAMILY	
	<i>Verbena hastata</i> L.	Blue Vervain	C12a
	LAMIACEAE	MINT FAMILY	
	<i>Lycopus americanus</i> Muhlenb. ex Bartram	Cut-leaved Water- horehound	3,6,7a,16c,16e,16f
	<i>Lycopus uniflorus</i> Michx.	Northern Water- horehound	5a,5b,6,7a,12d,16d
	<i>Mentha arvensis</i> L. ssp. <i>borealis</i> (Michx.) R.L. Taylor & Macbryde	American Wild Mint	5c,C12a
	<i>Prunella vulgaris</i> L. ssp. <i>lanceolata</i> (W.C. Barton) Hultén	Heal-all	20c,30
	<i>Scutellaria galericulata</i> L.	Hooded Skullcap	5a,6
	<i>Scutellaria lateriflora</i> L.	Mad-dog Skullcap	C12a,C16d,16f
	PLANTAGINACEAE	PLANTAIN FAMILY	
+	<i>Plantago major</i> L.	Common Plantain	32
	OLEACEAE	OLIVE FAMILY	
	<i>Fraxinus americana</i> L.	White Ash	19a,19c,19d,19e,20b,20c,30
	<i>Fraxinus nigra</i> Marshall	Black Ash	11a,16b,16d,16e,16f
	<i>Fraxinus pennsylvanica</i> Marshall	Red Ash	23a,25b
	SCROPHULARIACEAE	FIGWORT FAMILY	
R	<i>Agalinis tenuifolia</i> (Vahl) Raf. var. <i>tenuifolia</i> *	Slender-leaved Agalinis	31
	<i>Chelone glabra</i> L.	Turtlehead	28a
+	<i>Euphrasia hudsoniana</i> Fern. & Wiegand	Hudson Bay Eyebright	30
	<i>Melampyrum lineare</i> Desr.	Cow-wheat	26b
	<i>Pedicularis canadensis</i> L.	Canada Wood-betony	19f,20a,20c,26b

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
+	<i>Verbascum thapsus</i> L.	Common Mullein	30
R	<i>Veronica americana</i> (Raf.) Schwein. ex Benth.	American Speedwell	5c
	LENTIBULARIACEAE	BLADDERWORT FAMILY	
D	<i>Utricularia gibba</i> L.	Humped Bladderwort	10
	<i>Utricularia intermedia</i> Hayne	Flat-leaved Bladderwort	9,10,C12a
D	<i>Utricularia minor</i> L.*	Lesser Bladderwort	9,10,12c
	<i>Utricularia vulgaris</i> L.	Greater Bladderwort	1
	CAMPANULACEAE	BLUEBELL FAMILY	
	<i>Campanula aparinoides</i> Pursh	Marsh Bellflower	5a,8,9,10
	<i>Lobelia inflata</i> L.	Indian Tobacco	30
	<i>Lobelia kalmii</i> L.	Kalm's Lobelia	9,10
	RUBIACEAE	MADDER FAMILY	
D	<i>Galium circaezans</i> Michx. *	White Wild Licorice	19d,19e
R	<i>Galium labradoricum</i> (Wiegand) Wiegand *	Labrador Marsh Bedstraw	9,10
D	<i>Galium tinctorium</i> L.	Stiff Marsh Bedstraw	5a,8,16e
	<i>Galium trifidum</i> L. ssp. <i>trifidum</i>	Small Bedstraw	7a,C12a,15,16c,16d,16e
	<i>Galium triflorum</i> Michx.	Sweet-scented Bedstraw	16e,18,19a,19c,19e,20c,23a,26b,26c
	<i>Mitchella repens</i> L.	Creeping Partridge-berry	19f,20c,28b
	CAPRIFOLIACEAE	HONEYSUCKLE FAMILY	
	<i>Diervilla lonicera</i> Miller	Bush Honeysuckle	20b,20c,25b,27
	<i>Linnaea borealis</i> L. ssp. <i>longiflora</i> (Torr.) Hultén	Twinflower	16c,C16d,20c,26b,26c,29
	<i>Lonicera canadensis</i> Bartram	American Fly Honeysuckle	C16d,18,19b,19c,20b,20c,21c,23a,26 b,26c,28b,29
	<i>Lonicera dioica</i> L.	Glaucous Honeysuckle	X
D	<i>Lonicera hirsuta</i> Eaton	Hairy Honeysuckle	19c
	<i>Sambucus canadensis</i> L.	Common Elderberry	17b
	<i>Sambucus racemosa</i> L. ssp. <i>pubens</i> (Michx.) House	Red-berried Elderberry	21a,25a,28b
	<i>Symphoricarpos albus</i> (L.) S.F. Blake	Snowberry	17b,20b,20c,26b,26c
	<i>Viburnum acerifolium</i> L.	Maple-leaved Viburnum	18,19b,19c,20c,20d,26b,27
	<i>Viburnum cassinoides</i> L.	Northern Wild Raisin	X

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Viburnum rafinesquianum</i> Schult.	Downy Arrow-wood	17b, 18, 20b
	<i>Viburnum trilobum</i> Marshall	High Bush Cranberry	7c
	ASTERACEAE	ASTER FAMILY	
+	<i>Achillea millefolium</i> L. ssp. <i>millefolium</i>	Common Yarrow	32
	<i>Ambrosia artemisiifolia</i> L.	Common Ragweed	32
	<i>Anaphalis margaritacea</i> (L.) Benth. & Hook. f. ex C.B. Clarke	Pearly Everlasting	17a
	<i>Antennaria neglecta</i> Greene	Field Pussytoes	27
	<i>Antennaria parlinii</i> Fern. ssp. <i>fallax</i> (E. Greene) R.J. Bayer & Stebb.	Parlin's Pussytoes	20c
R	<i>Aster borealis</i> (Torr. & A. Gray) Prov.*	Rush Aster	8, 9, 10, C12a, 12c
	<i>Aster ciliolatus</i> Lindl.	Ciliolate Aster	26b
	<i>Aster cordifolius</i> L.	Heart-leaved Aster	18, 19a, 20b, 20c, 30
	<i>Aster lanceolatus</i> Willd. ssp. <i>lanceolatus</i>	Tall White Aster	9, C12a
	<i>Aster lateriflorus</i> (L.) Britton var. <i>lateriflorus</i>	Calico Aster	5a, 6, 11a, 16c
	<i>Aster macrophyllus</i> L.	Large-leaved Aster	18, 20a, 20b, 20c, 20d, 21c, 25b, 26a, 26c, 27
	<i>Aster puniceus</i> L. var. <i>puniceus</i>	Purple-stemmed Aster	15, C16d
	<i>Aster umbellatus</i> Miller var. <i>umbellatus</i>	Flat-top White Aster	C12a, 16b
	<i>Bidens cernua</i> L.	Stick-tight	5a, 5b, 5e, 6, 7a, 12e, 15, 16c, 16d, 16f
	<i>Bidens frondosa</i> L.	Devil's Beggar-ticks	5a, 6, 14, 16d
+	<i>Chrysanthemum leucanthemum</i> L.	Ox-eye Daisy	30
D	<i>Cirsium muticum</i> Michx. *	Swamp Thistle	14, 15
+	<i>Cirsium vulgare</i> (Savi) Ten.	Bull Thistle	30
	<i>Erigeron strigosus</i> Muhlenb. ex Willd.	Daisy Fleabane	30
	<i>Eupatorium maculatum</i> L. ssp. <i>maculatum</i>	Spotted Joe-pye-weed	5a, 5d, 6, 7a, 15, 16f
	<i>Eupatorium perfoliatum</i> L.	Perfoliate Thoroughwort	15, 16f
	<i>Euthamia graminifolia</i> (L.) Nutt.	Flat-topped Bushy Goldenrod	15
+	<i>Gnaphalium uliginosum</i> L.	Low Cudweed	X
+	<i>Hieracium aurantiacum</i> L.	Devil's Paintbrush	17a
D	<i>Hieracium canadense</i> Michx.	Canada Hawkweed	20c, 17b
+	<i>Hieracium piloselloides</i> Vill.	Glaucous King Devil	30

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Hieracium scabrum</i> Michx.	Rough Hawkweed	20c
	<i>Prenanthes alba</i> L.	White Rattlesnake-root	19a, 19c, 19e, 19f
	<i>Solidago bicolor</i> L.	White Goldenrod	17b, 20a, 20c, 27
	<i>Solidago caesia</i> L.	Blue-stem Goldenrod	18, 19d, 19f
	<i>Solidago canadensis</i> L.	Canada Goldenrod	5d
	<i>Solidago gigantea</i> Aiton	Giant Goldenrod	C12a
	<i>Solidago juncea</i> Aiton	Early Goldenrod	30
	<i>Solidago nemoralis</i> Aiton ssp. <i>nemoralis</i>	Gray Goldenrod	17a
	<i>Solidago rugosa</i> Aiton ssp. <i>rugosa</i>	Rough Goldenrod	11a, C16d, 30
	<i>Solidago squarrosa</i> Muhlenb. ex Nutt.	Rugged Goldenrod	18, 20a, 20c, 23a, 26c
	<i>Solidago uliginosa</i> Nutt.	Marsh Goldenrod	9, 10, C12a, 12d
+	<i>Taraxacum officinale</i> G. Weber	Common Dandelion	32X
+	<i>Tussilago farfara</i> L.	Coltsfoot	21b
	BUTOMACEAE	FLOWERING-RUSH FAMILY	
+	<i>Butomus umbellatus</i> L.	Flowering-rush	Wlshore
	ALISMATACEAE	WATER-PLANTAIN FAMILY	
	<i>Alisma plantago-aquatica</i> L.	Common Water-plantain	5a, 5b, 5c, 6
	<i>Sagittaria latifolia</i> Willd.	Broad-leaved Arrowhead	4b, 5c, 8
	HYDROCHARITACEAE	FROG'S-BIT FAMILY	
	<i>Elodea canadensis</i> Rich. ex Michx.	Canada Waterweed	2
+	<i>Hydrocharis morsus-ranae</i> L. *	Frog's-bit	6
	<i>Vallisneria americana</i> Michx.	Water-celery	2
R	<i>Triglochin maritimum</i> L.	Seaside Arrow-grass	10
	POTAMOGETONACEAE (ZOSTERACEAE)	PONDWEED FAMILY	
	<i>Potamogeton amplifolius</i> Tuckerm.	Large-leaved Pondweed	2
	<i>Potamogeton gramineus</i> L.	Grass-like Pondweed	2
R	<i>Potamogeton illinoensis</i> Morong*	Illinois Pondweed	2
	<i>Potamogeton natans</i> L.	Common Floating Pondweed	1
	<i>Potamogeton pectinatus</i> L.	Fennel-leaved Pondweed	2

SCIENTIFIC NAME	COMMON NAME	COMMUNITY
<i>Potamogeton praelongus</i> Wulfen*	White-stemmed Pondweed	2
<i>Potamogeton pusillus</i> L. *	Small Pondweed	1
<i>Potamogeton richardsonii</i> (A. Bennett) Rydb.	Richardson's Pondweed	1
<i>Potamogeton zosteriformis</i> Fern.	Flat-stemmed Pondweed	2
NAJADACEAE	NAIAD FAMILY	
<i>Najas flexilis</i> (Willd.) Rost. & W. Schmidt*	Slender Najas	1,2,14,LL
ARACEAE	ARUM FAMILY	
<i>Calla palustris</i> L.	Wild Calla	5a,7a,12e,14,15,16d,16f
LEMNACEAE	DUCKWEED FAMILY	
<i>Lemna minor</i> L.	Lesser Duckweed	C12a,16c
<i>Spirodela polyrhiza</i> (L.) Schleid.	Greater Duckweed	3,14
<i>Wolffia columbiana</i> Karst.	Water-meal	3
JUNCACEAE	RUSH FAMILY	
<i>Juncus dudleyi</i> Wiegand	Dudley's Rush	31
CYPERACEAE	SEDGE FAMILY	
<i>Carex aquatilis</i> Wahlenb.	Aquatic Sedge	5a,6,7a,12c,16f
<i>Carex arctata</i> Boott	Drooping Wood Sedge	19e,28b
<i>Carex aurea</i> Nutt.	Golden-fruited Sedge	23a
<i>Carex crinita</i> Lam.	Fringed Sedge	6
<i>Carex diandra</i> Schrank	Lesser Panicked Sedge	12d,15
<i>Carex eburnea</i> Boott	Bristle-leaved Sedge	21b,23a
<i>Carex flava</i> L.	Yellow Sedge	14
<i>Carex gracillima</i> Schwein.	Graceful Sedge	30
<i>Carex interior</i> L.H. Bailey	Inland Sedge	12b,12d,12e,15,16b,16f
<i>Carex intumescens</i> Rudge	Bladder Sedge	5b,23a
<i>Carex lacustris</i> Willd.	Lake-bank Sedge	5d,15
<i>Carex lasiocarpa</i> Ehrh.	Slender Sedge	4a,5a,5b,5e,8,9,10,11b,C12a,12c
<i>Carex limosa</i> L.	Mud Sedge	10
<i>Carex livida</i> (Wahlenb.) Willd.	Livid Sedge	9,10
<i>Carex lupulina</i> Muhlenb. ex Willd.	Hop Sedge	X

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
D	<i>Carex lurida</i> Wahlenb. *	Sallow Sedge	6
	<i>Carex magellanica</i> Lam. ssp. <i>irrigua</i> (Wahlenb.) Hiit.	Stunted Sedge	12a, 12d, 12e, C16d
D	<i>Carex peckii</i> Howe	Peck's Sedge	19b
	<i>Carex pedunculata</i> Muhlenb. ex Willd.	Long-stalked Sedge	18, 19a, 19b, 19c, 19d, 19e, 19f, 20c, 21c, 23a, 23b, 26c, 28b
	<i>Carex pellita</i> Willd.	Woolly Sedge	C12a
	<i>Carex pensylvanica</i> Lam.	Pennsylvania Sedge	17b, 19d, 19b
	<i>Carex plantaginea</i> Lam.	Plantain-leaved Sedge	19a
	<i>Carex pseudo-cyperus</i> L.	Cypress-like Sedge	5a, 7a, 7c, C12a, 12e, 15, 16f
	<i>Carex retrorsa</i> Schwein.	Retorse Sedge	5a, 5c, 6
	<i>Carex rosea</i> Schkuhr ex Willd.	Stellate Sedge	X
	<i>Carex scabrata</i> Schwein.	Rough Sedge	19a
	<i>Carex stricta</i> Lam.	Tussock Sedge	4a, 5e, 14, 15
	<i>Carex tonsa</i> (Fern.) Bicknell var. <i>rugosperma</i> (Mack.) Crins	Red-seeded Sedge	17b
	<i>Carex trisperma</i> Dewey var. <i>trisperma</i>	Three-seeded Sedge	12e, 16a, C16d
	<i>Carex tuckermanii</i> Dewey *	Tuckerman's Sedge	6
	<i>Carex utriculata</i> Boott *	Beaked Sedge	4a, 5b, 5c, 6, C12a
	<i>Carex vulpinoidea</i> Michx.	Fox Sedge	31
	<i>Cladium mariscoides</i> (Muhlenb.) Torr.	Water Bog-rush	8, 9, 10, 12c
	<i>Cyperus bipartitus</i> Torr.	Umbrella Sedge	31
	<i>Dulichium arundinaceum</i> (L.) Britton	Reed-like Three-way Sedge	5a, 5b, 6, C12a
	<i>Eleocharis acicularis</i> (L.) Roem. & Schult.	Needle Spike-rush	3
	<i>Eleocharis elliptica</i> Kunth	Elliptic Spike-rush	10
	<i>Eleocharis erythropoda</i> Steud.	Red-footed Spike-rush	6
	<i>Eleocharis smallii</i> Britton	Small's Spike-rush	5a, 7a, 7c
	<i>Rhynchospora alba</i> (L.) M. Vahl*	White Beaked-rush	8, 9, 10, 12c
	<i>Scirpus acutus</i> Muhlenb. ex Bigelow	Hard-stemmed Bulrush	6, 7c
	<i>Scirpus atrovirens</i> Willd.	Dark-green Bulrush	X

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Scirpus cyperinus</i> (L.) Kunth	Wool-grass	5d,6,16f
D	<i>Scirpus hudsonianus</i> (Michx.) Fern.	Hudson Bay Bulrush	8
	<i>Scirpus validus</i> L.	American Great Bulrush	5d,15
	POACEAE	GRASS FAMILY	
+	<i>Agrostis gigantea</i> Roth	Red-top	6
	<i>Brachyelytrum erectum</i> (Schreb.) P. Beauv.	Bearded Short-husk	17b,19a
	<i>Bromus ciliatus</i> L. *	Fringed Brome	20a,25b
+	<i>Bromus inermis</i> Leyss. ssp. <i>inermis</i>	Awnless Brome	30
	<i>Calamagrostis canadensis</i> (Michx.) P. Beauv.*	Blue-joint Grass	3,5a,5b,5d,5e,6,7a,7b,7c,11b,12d,12e,14,15,17a
R	<i>Calamagrostis stricta</i> (Timm) Koeler ssp. <i>inexpansa</i> (A. Gray) C.W. Greene*	Narrow Reed Grass	8
+	<i>Dactylis glomerata</i> L.	Orchard Grass	31,32
	<i>Danthonia spicata</i> (L.) P. Beauv. ex Roem. & Schult.	Poverty Oat Grass	17a,17b,26a,27,30
	<i>Deschampsia cespitosa</i> (L.) P. Beauv. ssp. <i>cespitosa</i>	Tufted Hairgrass	17a,17b
+	<i>Echinochloa crusgalli</i> (L.) P. Beauv.	Common Barnyard Grass	32
	<i>Elymus hystrix</i> L.	Bottle-brush Grass	19b,19d,19f,20a
	<i>Elymus trachycaulus</i> (Link) Gould in Shinn. ssp. <i>trachycaulus</i>	Slender Wheat Grass	17b,18
	<i>Elymus virginicus</i> L. var. <i>virginicus</i>	Virginia Wild Rye	7c
	<i>Festuca subverticillata</i> (Pers.) Alexeev	Nodding Fescue	19b,19e
	<i>Glyceria borealis</i> (Nash) Batch.	Northern Manna Grass	5c,15
	<i>Glyceria canadensis</i> (Michx.) Trin.	Rattlesnake Grass	5b
	<i>Glyceria grandis</i> S. Watson	Tall Manna Grass	X
	<i>Glyceria striata</i> (Lam.) A. Hitchc.	Fowl Meadow Grass	16c,16e,16f
	<i>Leersia oryzoides</i> (L.) Sw.	Rice Cut Grass	3,4b,5a,5d,6,7a,11a,21a
	<i>Muhlenbergia glomerata</i> (Willd.) Trin.	Glomerate Satin Grass	8,9,10,11b,C12a,12c
	<i>Muhlenbergia mexicana</i> (L.) Trin var. <i>mexicana</i>	Mexican Satin Grass	20c,30
	<i>Oryzopsis asperifolia</i> Michx.	White-grained Mountain-rice	18,19c,19d,19e,19f,20a,20c,20d,22,23a,25b,26a,26b,26c,27
	<i>Oryzopsis racemosa</i> (Sm.) Ricker ex A. Hitchc.*	Black-fruited Mountain-rice	19a,19b,19c,19d,19f,20b,23a

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Panicum acuminatum</i> Sw. var. <i>acuminatum</i>	Acuminate Panic Grass	17b
	<i>Panicum capillare</i> L.	Witch Grass	32
	<i>Panicum linearifolium</i> Nash	Narrow-leaved Panic Grass	17b
	<i>Panicum xanthophysum</i> A. Gray	Slender Panic Grass	17b
	<i>Phalaris arundinacea</i> L.	Reed Canary Grass	6
+	<i>Phleum pratense</i> L.	Timothy	31,32
	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	Common Reed	9,10,C12a
	<i>Poa compressa</i> L.	Canada Blue Grass	30
	<i>Poa palustris</i> L.	Fowl Meadow Grass	5d
	<i>Poa pratensis</i> L. ssp. <i>pratensis</i>	Kentucky Bluegrass	30
	<i>Schizachne purpurascens</i> (Torr.) Swallen ssp. <i>purpurascens</i>	False Melic Grass	26a
+	<i>Setaria viridis</i> (L.) P. Beauv.	Green Foxtail	32
	<i>Zizania aquatica</i> L.	Southern Wild-rice	C-LL
	<i>Zizania palustris</i> L. *	Northern Wild-rice	1
	SPARGANIACEAE	BUR-REED FAMILY	
	<i>Sparganium emersum</i> Rehmann ssp. <i>emersum</i>	Green-fruited Bur-reed	11b
	<i>Sparganium eurycarpum</i> Engelm. ex A. Gray	Broad-fruited Bur-reed	6
D	<i>Sparganium natans</i> L.	Small Bur-reed	12e
	TYPHACEAE	CATTAIL FAMILY	
	<i>Typha angustifolia</i> L.	Narrow-leaved Cattail	5e,7a,7c,9,10
	<i>Typha latifolia</i> L.	Broad-leaved Cattail	4a,5d,6,7a,7b,8,9,10,11b,12a,12b,12c,12d,12e,15
	<i>Typha X glauca</i> Godron	Glaucous Cattail	7a,7c
	PONTEDERIACEAE	PICKERELWEED FAMILY	
	<i>Heteranthera dubia</i> (Jacq.) MacMill.	Water Star-grass	2,LL
	LILIACEAE	LILY FAMILY	
	<i>Clintonia borealis</i> (Aiton) Raf.	Bluebead-lily	16a,16c,16d,20c,25b,26b,26c,28b
	<i>Lilium philadelphicum</i> L.	Wood Lily	20a
	<i>Maianthemum canadense</i> Desf.	Wild Lily-of-the-valley	16f,17a,17b,18,19d,19e,20c,20d,23a,25b,26b,26c

STA TUS	SCIENTIFIC NAME	COMMON NAME	COMMUNITY
	<i>Maianthemum racemosum</i> (L.) Link ssp. <i>racemosum</i>	False Solomon's Seal	19c
	<i>Maianthemum trifolium</i> (L.) Sloboda	Three-leaved Solomon's Seal	12b, 12d, 12e, 16a, 16d, 16f
	<i>Polygonatum biflorum</i> (Walter) Ell.	Hairy Solomon's Seal	19e, 19f
	<i>Polygonatum pubescens</i> (Willd.) Pursh	Hairy Solomon's Seal	19a, 19c, 19d, 20c, 21c, 23b, 26b, 26c, 27
	<i>Trillium grandiflorum</i> (Michx.) Salisb.	White Trillium	18, 19a, 19c, 19d, 19e, 23a
	<i>Uvularia grandiflora</i> Sm.	Large-flowered Bellwort	19c, 19d, 23a
	IRIDACEAE	IRIS FAMILY	
	<i>Iris versicolor</i> L.	Multi-coloured Blue-flag	5a, 5b, 5d, 12c, 16f
	ORCHIDACEAE	ORCHID FAMILY	
	<i>Calopogon tuberosus</i> (L.) B.S.P.	Grass Pink	10
G3, S3,R	<i>Cypripedium arietinum</i> R. Br.	Ram's-head Lady's Slipper	C16d
	<i>Cypripedium calceolus</i> L. var. <i>pubescens</i> (Willd.) Correll.	Large Yellow Lady's Slipper	C16d, 16f, 18, 19a, 19c, 19f, 23a
	<i>Cypripedium reginae</i> Walter	Showy Lady's Slipper	12d, 12e, 16a, C16d, 16f
+	<i>Epipactis helleborine</i> (L.) Crantz	Common Helleborine	18, 19d, 20b, 20c, 21a, 23a, 26b, 26c, 28b
D	<i>Goodyera tessellata</i> Lodd.	Checkered Rattlesnake-plantain	26b
D	<i>Liparis loeselii</i> (L.) Rich. ex Lindl.	Fen Twayblade	8, C12a
D	<i>Malaxis monophyllos</i> (L.) Sw. ssp. <i>brachypoda</i> (A. Gray) A. & D. Löve	White Adder's-mouth	C16d
D	<i>Malaxis unifolia</i> Michx.	Green Adder's-mouth	31
D	<i>Platanthera dilatata</i> (Pursh) Lindl. ex Beck	Tall White Bog Orchis	10
	<i>Platanthera hyperborea</i> (L.) Lindl.	Tall Leafy Green Orchis	C16d
	<i>Platanthera obtusata</i> (Banks ex Pursh) Lindl.	Small Northern Bog Orchis	16f
D	<i>Platanthera orbiculata</i> (Pursh) Lindl.	Small Round-leaved Orchid	29
	<i>Pogonia ophioglossoides</i> (L.) Juss.	Rose Pogonia	10, C12a, 12c
D	<i>Spiranthes casei</i> Catling & Cruise	Case's Ladies' Tresses	31

APPENDIX 2: AMPHIBIANS AND REPTILES OF THE WHITE LAKE STUDY AREA

Seventeen species of amphibians and reptiles were observed in the study area as follows: by Vivian R. Brownell and Paul Catling from September 10 to October 15, 2000; by Don Cuddy and Shaun Thompson on 18 August 1999; or recorded in the Ontario Herpetofaunal Summary (OHS) (1984-1989). Records derived solely from the OHS are indicated by an asterisk (*) in front of the scientific name and are based on occurrence in either of the two 10 x 10 km squares (18UF71 and 18UF81) which include the study area. None of the species are provincially rare or rare in Eastern Ontario or in the Northwest subregion of Eastern Ontario according to Norris (1992), however maps compiled by Oldham and Weller (2000) indicate that Ribbon Snake is rare within Site-District 5E-11 and Site Region 5E.

SCIENTIFIC NAME	COMMON NAME	RARITY
BUFONIDAE	TOADS	
<i>Bufo americanus</i>	Eastern American Toad	
HYLIDAE	TREEFROGS	
<i>Hyla versicolor</i> *	Gray Treefrog	
<i>Pseudacris crucifer</i>	Northern Spring Peeper	
RANIDAE	TRUE FROGS	
* <i>Rana sylvatica</i>	Wood Frog	
<i>Rana pipiens</i>	Northern Leopard Frog	
<i>Rana clamitans</i>	Green Frog	
<i>Rana septentrionalis</i>	Mink Frog	
<i>Rana catesbiana</i>	Bull Frog	
AMBYSTOMATIDAE	MOLE SALAMANDERS	
* <i>Ambystoma (jeffersonianum-laterale complex)</i>	Jefferson-Blue Spotted Salamander complex (undetermined)	
PLETHODONTIDAE	LUNGLESS SALAMANDERS	
* <i>Plethodon cinereus</i>	Northern Redback Salamander	
CHELYDRIDAE	SNAPPING TURTLES	
<i>Chelydra serpentina</i> *	Common Snapping Turtle	
EMYDIDAE	POND AND MARSH TURTLES	
<i>Chrysemys picta marginata</i>	Midland Painted Turtle	
* <i>Emydoidea blandingii</i>	Blanding's Turtle	

SCIENTIFIC NAME	COMMON NAME	RARITY
<i>COLUBRIDAE</i>	TYPICAL SNAKES	
<i>Storeria occipitomaculata</i> <i>occipitomaculata</i>	Redbelly Snake	
<i>Thamnophis sirtalis</i>	Eastern Garter Snake	
<i>Thamnophis sauritus septentrionalis</i>	Northern Ribbon Snake	R
<i>Nerodia sipedon</i>	Northern Water Snake	

APPENDIX 3: BREEDING BIRDS OF THE WHITE LAKE STUDY AREA

This is a checklist of 110 breeding birds of the White Lake study area. It is based completely on data from the Ontario Breeding Bird Atlas Project (Cadman et al., 1987) since fieldwork for this study took place in the fall. Records are based on occurrence in one 10 x 10 km square (18UF81) which includes almost all of the study area plus some additional lands east of the study area at the edge of the Pakenham Mountains. A very small portion of the study area lies outside of this square in 18UF71. Under the breeding evidence column, the symbols "O, PO, P, CO" mean respectively observed, possibly breeding, probably breeding and confirmed breeding, following definitions provided by Cadman, Eagles and Helleiner (1987). Breeding evidence category as indicated in the Atlas is included in brackets after the breeding level. Provincially significant species as listed by OMNR (1997) are indicated by a S rank and MNR status in the rarity column. National status as determined by the Committee on the Status of Endangered and Threatened Wildlife in Canada (COSEWIC) is indicated by SC (special concern), THR (threatened) or END (endangered). Species that are listed as rare in Site Region 5 by OMNR (1994) are designated with a "R".

SCIENTIFIC NAME	COMMON NAME	BREEDING EVIDENCE	RARITY
GAVIIDAE	LOONS		
<i>Gavia immer</i>	Common Loon	CO (FY)	
ARDEIDAE	HERONS AND BITTERNS		
<i>Ardea herodias</i>	Great Blue Heron	PO (SH)	
ANATIDAE	SWANS, GEESE, AND DUCKS		
<i>Aix sponsa</i>	Wood Duck	P (P)	
<i>Anas rubripes</i>	American Black Duck	P (P)	
<i>Anas platyrhynchos</i>	Mallard	CO (FY)	
<i>Anas discors</i>	Blue-winged Teal	P (A)	
<i>Aythya collaris</i>	Ring-necked Duck	PO (SH)	
CATHARTIDAE	VULTURES		
<i>Cathartes aura</i>	Turkey Vulture	PO (SH)	
ACCIPITRIDAE	HAWKS, FALCONS AND EAGLES		
<i>Pandion haliaetus</i>	Osprey	CO (NU)	
<i>Accipiter striatus</i>	Sharp-shinned Hawk	P (P)	
<i>Accipiter cooperi</i>	Cooper's Hawk	CO (FS)	

SCIENTIFIC NAME	COMMON NAME	BREEDING EVIDENCE	RARITY
<i>Buteo lineatus</i>	Red-shouldered Hawk	P (T)	S4, VUL, SC
<i>Buteo platypterus</i>	Broad-winged Hawk	PO (SH)	
<i>Buteo jamaicensis</i>	Red-tailed Hawk	PO (SH)	
<i>Falco sparverius</i>	American Kestrel	P (A)	
TETRAONIDAE	GROUSE		
<i>Bonasa umbellus</i>	Ruffed Grouse	CO (FY)	
RALLIDAE	RAILS, GALLINULES AND COOTS		
<i>Rallus limicola</i>	Virginia Rail	PO (SM)	
<i>Porzana carolina</i>	Sora	PO (SM)	
CHARADRIIDAE	PLOVERS AND TURNSTONES		
<i>Charadrius vociferus</i>	Killdeer	CO (NE)	
SCOLOPACIDAE	WOODCOCK, SNIPE, SANDPIPERS		
<i>Gallinago gallinago</i>	Common Snipe	P (T)	
LARIDAE	GULLS AND TERNS		
<i>Larus argentatus</i>	Herring Gull	X	
COLUMBIDAE	DOVES		
<i>Zenaida macroura</i>	Mourning Dove	PO (SM)	
<i>Columba livia</i>	Rock Dove	PO (SH)	
CUCULIDAE	CUCKOOS		
<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	PO (SM)	
STRIGIDAE	OWLS		
<i>Bufo virginianus</i>	Great Horned Owl	P (P)	
<i>Strix varia</i>	Barred Owl	P (T)	
<i>Aegolius acadicus</i>	Northern Saw-whet Owl	PO (SM)	
CAPRIMULGIDAE	GOATSUCKERS		
<i>Chordeiles minor</i>	Common Nighthawk	X	

SCIENTIFIC NAME	COMMON NAME	BREEDING EVIDENCE	RARITY
<i>Caprimulgus vociferus</i>	Whip-poor-will	PO (SM)	
APODIDAE	SWIFTS		
<i>Chaetura pelagica</i>	Chimney Swift	PO (SH)	
TROCHILIDAE	HUMMINGBIRDS		
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	CO (AE)	
ALCEDINIDAE	KINGFISHERS		
<i>Megaceryle alcyon</i>	Belted Kingfisher	CO (NY)	
PICIDAE	WOODPECKERS		
<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	CO (AE)	
<i>Picoides pubescens</i>	Downy Woodpecker	PO (SH)	
<i>Picoides villosus</i>	Hairy Woodpecker	P (P)	
<i>Colaptes auratus</i>	Northern Flicker	CO (FS)	
<i>Dryocopus pileatus</i>	Pileated Woodpecker	P (P)	
TYRANNIDAE	FLYCATCHERS		
<i>Nuttallornis borealis</i>	Olive-sided Flycatcher	CO (NY)	
<i>Contopus virens</i>	Eastern Wood Pewee	CO (FY)	
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	PO (SM)	
<i>Empidonax alnorum</i>	Alder Flycatcher	CO (FY)	
<i>Empidonax minimus</i>	Least Flycatcher	P (A)	
<i>Sayornis phoebe</i>	Eastern Phoebe	P (T)	
<i>Myiarchus crinitus</i>	Great-crowned Flycatcher	CO(AE)	
<i>Tyrannus tyrannus</i>	Eastern Kingbird	P (P)	
HIRUNDINIDAE	SWALLOWS		
<i>Iridoprocne bicolor</i>	Tree Swallow	CO (AE)	
<i>Stelgidopteryx ruficollis</i>	Northern Rough-winged Swallow	PO (SH)	
<i>Petrochelidon pyrrhonota</i>	Cliff Swallow	PO (SH)	
<i>Hirundo rustica</i>	Barn Swallow	CO (NY)	
CORVIDAE	JAYS AND CROWS		

SCIENTIFIC NAME	COMMON NAME	BREEDING EVIDENCE	RARITY
<i>Cyanocitta cristata</i>	Blue Jay	P (P)	
<i>Corvus brachyrhynchos</i>	American Crow	P (P)	
<i>Corvus corax</i>	Common Raven	P (P)	
PARIDAE	TITMICE		
<i>Parus atricapillus</i>	Black-capped Chickadee	CO (FS)	
SITTIDAE	NUTHATCHES		
<i>Sitta canadensis</i>	Red-breasted Nuthatch	PO (SH)	
<i>Sitta carolinensis</i>	White-breasted Nuthatch	PO (SH)	
CERTHIDAE	CREEPERS		
<i>Certhia familiaris</i>	Brown Creeper	CO (FS)	
TROGLODYTIDAE	WRENS		
<i>Troglodytes aedon</i>	House Wren	CO (AE)	
<i>Troglodytes troglodytes</i>	Winter Wren	PO (SM)	
<i>Cistothorus platensis</i>	Sedge Wren	PO (SM)	
<i>Cistothorus palustris</i>	Marsh Wren	P (T)	R
SYLVIINAE	KINGLETS and GNATCATCHERS		
<i>Regulus satrapa</i>	Golden-crowned Kinglet	PO (SM)	
<i>Regulus calendula</i>	Ruby-crowned Kinglet	CO (FY)	
TURDINAE	THRUSHES AND BLUEBIRDS		
<i>Sialia sialis</i>	Eastern Bluebird	CO (AE)	
<i>Catharus fuscescens</i>	Veery	P (T)	
<i>Catharus ustulatus</i>	Swainson's Thrush	P (T)	
<i>Catharus guttatus</i>	Hermit Thrush	PO (SM)	
<i>Hylocichla mustelina</i>	Wood Thrush	P (T)	
<i>Turdus migratorius</i>	American Robin	CO (FY)	
MIMIDAE	MIMICS		
<i>Dumetella carolinensis</i>	Gray Catbird	CO (FS)	

SCIENTIFIC NAME	COMMON NAME	BREEDING EVIDENCE	RARITY
<i>Toxostoma rufum</i>	Brown Thrasher	PO (SM)	
BOMBYCILLIDAE	WAXWINGS		
<i>Bombycilla cedrorum</i>	Cedar Waxwing	PO(SH)	
STURNIDAE	STARLINGS		
<i>Sturnus vulgaris</i>	European Starling	CO (FS)	
VIREONIDAE	VIREOS		
<i>Vireo solitarius</i>	Solitary Vireo	PO (SM)	
<i>Vireo gilvus</i>	Warbling Vireo	P (T)	
<i>Vireo olivaceus</i>	Red-eyed Vireo	P (A)	
PARULINAE	WOOD WARBLERS		
<i>Vermivora ruficapilla</i>	Nashville Warbler	CO (FY)	
<i>Dendroica petechia</i>	Yellow Warbler	CO(FS)	
<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler	P (A)	
<i>Dendroica magnolia</i>	Magnolia Warbler	P (T)	
<i>Dendroica caerulescens</i>	Black-throated Blue Warbler	P (T)	
<i>Dendroica coronata</i>	Yellow-rumped Warbler	P (T)	
<i>Dendroica virens</i>	Black-throated Green Warbler	P (T)	
<i>Dendroica fusca</i>	Blackburnian Warbler	P (T)	
<i>Dendroica pinus</i>	Pine Warbler	P (N)	
<i>Mniotilta varia</i>	Black-and-White Warbler	P (A)	
<i>Setophaga ruticilla</i>	American Redstart	PO (SM)	
<i>Seiurus aurocapillus</i>	Ovenbird	CO(FY)	
<i>Seiurus noveboracensis</i>	Northern Waterthrush	P (A)	
<i>Oporornis philadelphia</i>	Mourning Warbler	P (A)	
<i>Geothlypis trichas</i>	Common Yellowthroat	CO (FS)	
<i>Wilsonia canadensis</i>	Canada Warbler	P (A)	
THRAUPINAE	TANAGERS		
<i>Piranga olivacea</i>	Scarlet Tanager	P (T)	

SCIENTIFIC NAME	COMMON NAME	BREEDING EVIDENCE	RARITY
CARDINALINAE	CARDINALS AND ALLIES		
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak	CO (FY)	
<i>Passerina cyanea</i>	Indigo Bunting	P (A)	
EMBERIZINAE	SPARROWS AND BUNTINGS		
<i>Spizella passerina</i>	Chipping Sparrow	CO (FY)	
<i>Spizella pusilla</i>	Field Sparrow	P (P)	
<i>Passerculus sandwichensis</i>	Savannah Sparrow	P (T)	
<i>Melospiza melodia</i>	Song Sparrow	CO (FS)	
<i>Melospiza georgiana</i>	Swamp Sparrow	P (T)	
<i>Zonotrichia albicollis</i>	White-throated Sparrow	CO (FS)	
<i>Junco hyemalis</i>	Dark-eyed Junco	PO (SM)	
ICTERINAE	MEADOWLARKS & BLACKBIRDS		
<i>Dolichonyx oryzivorus</i>	Bobolink	P (D)	
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	CO (NE)	
<i>Sturnella magna</i>	Eastern Meadowlark	P (T)	
<i>Quiscalus quiscula</i>	Common Grackle	CO (FS)	
<i>Molothrus ater</i>	Brown-headed Cowbird	CO (FY)	
<i>Icterus galbula</i>	Northern Oriole	CO (FS)	
FRINGILLIDAE	FINCHES		
<i>Carpodacus purpureus</i>	Purple Finch	P (D)	
<i>Loxia curvirostra</i>	Red Crossbill	P (A)	
<i>Carduelis pinus</i>	Pine Siskin	PO (SM)	
<i>Carduelis tristis</i>	American Goldfinch	P (N)	
<i>Hesperiphona vespertina</i>	Evening Grosbeak	P (P)	

APPENDIX 4: MAMMALS OF THE WHITE LAKE STUDY AREA

This is a checklist of 28 mammals of the White Lake study area. It is based on observations of 12 species made by Vivian R. Brownell and Paul Catling from September 10 to October 15, 2000, and an 16 additional species from the Atlas of the Mammals of Ontario (Dobbyn, 1994). Records derived solely from the Atlas are indicated by an asterisk (*) in front of the scientific name and are based on occurrence in either of the two 10 x 10 km squares (18UF71 and 18UF81) which include the study area.

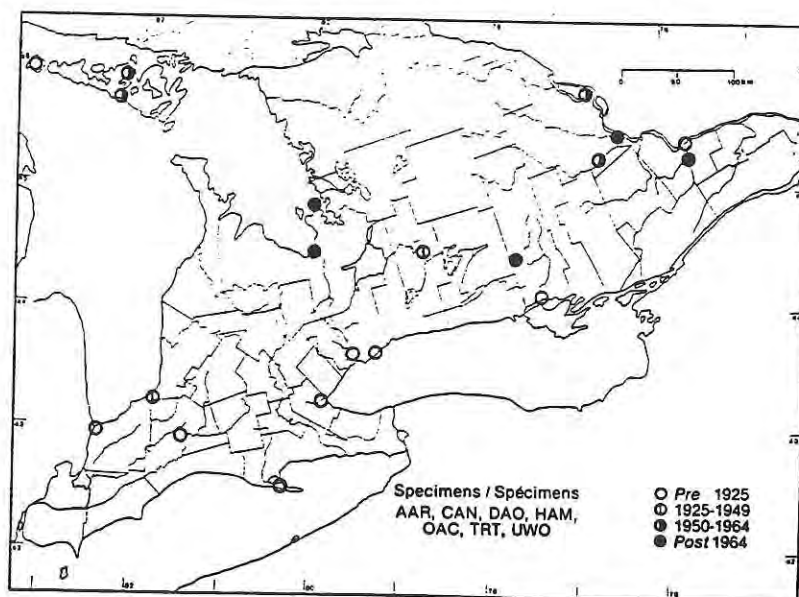
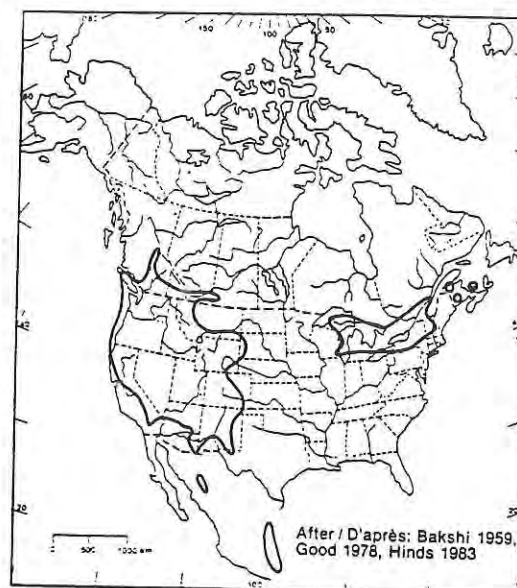
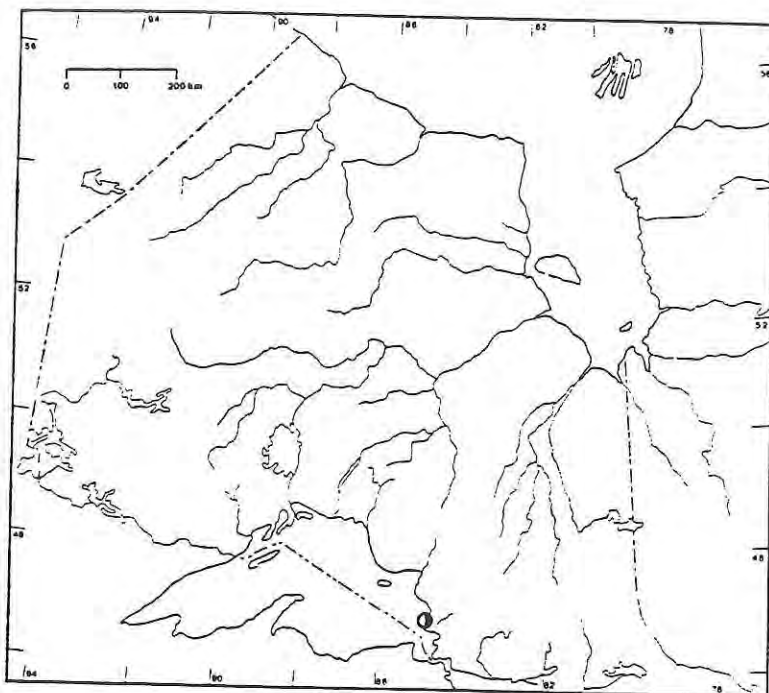
SCIENTIFIC NAME	COMMON NAME	RARITY
INSECTIVORA	SHREWS AND MOLES	
* <i>Sorex cinereus</i>	Common Shrew	
* <i>Blarina brevicauda</i>	Northern Short-tailed Shrew	
* <i>Condylura cristata</i>	Star-nosed Mole	
VESPERTILIONIDAE	BATS	
* <i>Myotis keenii septentrionalis</i>	Northern Long-eared Bat	S3?
<i>Myotis lucifugus lucifugus</i>	Little Brown Bat	
LEPORIDAE	RABBITS AND HARES	
<i>Lepus americanus virginianus</i> *	Snowshoe Hare	
SCIURIDAE	SQUIRRELS	
<i>Tamias striatus lysteri</i>	Chipmunk	
<i>Sciurus carolinensis pennsylvanicus</i> *	Gray Squirrel	
<i>Tamiasciurus hudsonicus loquax</i>	Red Squirrel	
* <i>Glaucomys sabrinus</i>	Northern Flying Squirrel	
CASTORIDAE	BEAVERS	
<i>Castor canadensis</i>	Beaver	
MURIDAE	MICE, RATS, AND VOLES	
* <i>Peromyscus leucopus</i>	White-footed Mouse	
* <i>Peromyscus maniculatus</i>	Deer Mouse	
* <i>Clethrionomys gapperi</i>	Southern Red-backed Vole	
* <i>Microtus pennsylvanicus</i>	Meadow Vole	
<i>Ondatra zibethicus zibethicus</i>	Muskrat	

SCIENTIFIC NAME	COMMON NAME	RARITY
<i>*Napaeozapus insignis</i>	Woodland Jumping Mouse	
ERETHIZONTIDAE	PORCUPINES	
<i>Erithozon dorsatum dorsatum*</i>	Porcupine	
CANIDAE	DOGS	
<i>Vulpes vulpes</i>	Red Fox	
URSIDAE	BEARS	
<i>Ursus americanus americanus</i>	Black Bear	
PROCYONIDAE	RACCOONS	
<i>Procyon lotor lotor</i>	Raccoon	
MUSTELIDAE	WEASELS	
<i>*Martes pennanti</i>	Fisher	
<i>*Mustela erminea</i>	Ermine	D
<i>*Lutra canadensis canadensis</i>	Otter	
<i>*Mustela vison</i>	Mink	
<i>Mephitis mephitis nigra</i>	Skunk	
FELIDAE	CATS	
<i>*Lynx canadensis</i>	Canada Lynx	
CERVIDAE	DEER	
<i>Odocoileus virginianus borealis</i>	White-tailed deer	

ERICACEAE

Pterospora andromedea Nutt.

Pine-drops
Pterospora andromède



HABITAT: Mixed and deciduous woods.

STATUS: Rare in Alberta, New Brunswick, Quebec, and Saskatchewan. Possibly extirpated in New Hampshire and New York; endangered in Texas and Wisconsin; rare in Nevada and Vermont.

HABITAT: Forêts de peuplement mélangé et feuillues.

SITUATION: Rare en Alberta, au Nouveau-Brunswick, au Québec et en Saskatchewan. Peut-être déracinée au New Hampshire et dans l'État de New York; menacée d'extinction au Texas et au Wisconsin; rare au Nevada et au Vermont.

Thamnophis sauritus septentrionalis

NORTHERN RIBBON SNAKE

Couleuvre mince

