



**COUNTY OF MIDDLESEX**

**WOODLANDS MANAGEMENT PLAN**

**2002 – 2021**

**Prepared by**

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**Silv-Econ Ltd.**



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## EXECUTIVE SUMMARY

The Middlesex County Forests consist of 1041 ha on 27 tracts of land located in three townships, Southwest Middlesex, North Middlesex, and Thames Centre. Many of the County Woodland tracts in Southwest Middlesex are within the larger Skunk's Misery/Bothwell Forest Area of Natural and Scientific Interest (ANSI) and are recognized as habitat for a diverse range of flora and fauna indicative of Southwestern Ontario.

The Middlesex County Forests are recognized as areas of biological significance and contain several provincially rare species of flora including tulip tree, American chestnut, black gum, and broad-beech fern. Due to the large extent of forest cover, the presence of corridors connecting areas of forest cover, and the diversity of vegetation communities, the County Forests attracts several species of area-sensitive and forest interior birds, including Acadian flycatcher, Cerulean warbler, and Hooded warbler.

Eight forest communities are associated with the Middlesex County Forests. Soft maple-oak (46%) and oak (20%) forest types dominate the forest. Conifer plantations account for approximately 11% of the total forest area. The majority of stands in the County Forests are between 50 and 80 years old. Although adequate regeneration can be found throughout the forest, seedlings and saplings of mid-tolerant tree species such as oak, hickory, sassafras, tulip and hackberry are generally lacking.

Public consultation and participation in determining the future of the Middlesex County Forests has been a cornerstone in the development of this Woodlands Management Plan. County residents have pride in their woodlands and recognize the ecological significance and contribution of the woodlands to the southern Ontario landscape. They are committed to conserving the unique forest communities and wildlife habitats found in the County Forests.

The Middlesex County Forests have been used for a plethora of recreational activities and there is strong support for maintaining a variety of uses throughout the County Forests. Of particular concern are the impacts associated with the increased use of forest trails by motorized vehicles, the illegal dumping of garbage, the difficulty experienced by the County in controlling unauthorized uses.

County residents have also expressed strong support for active and appropriate management of their woodlands. This support is predicated on the use of silvicultural systems that are appropriate for the forest communities involved, that biological diversity and wildlife habitats are maintained, and that any potential impacts of forest management activities on soil and groundwater be minimized.

The opinions and suggestions from County residents and forest users have been consolidated into broad themes. These themes: (i) Forest Stewardship, (ii) Conservation of Natural Heritage Woodlands, (iii) Sustainable Forest Management, (iv) Science and Education, and (v) Recreation form the basis for objectives and recommended actions for integrated forest management of the Middlesex County Forests.

This plan proposes the creation of a Woodlands Advisory Committee to participate in implementing the plan, raising awareness of the ecological significance of the woodlands, and monitoring forest use. The plan also recommends that a system of High Conservation Value Forests be established to conserve unique forest communities and habitats.

The Woodlands Management Plan also recognizes the importance of applying forest management techniques as a means to achieving a variety of ecological and forest use objectives. The County is encouraged to assume a leading role in identifying appropriate silvicultural systems for managing mid-tolerant hardwoods and forest interior habitats. This will require cooperation from all forest users and a long-term commitment to forest research.

Many tracts within the County Forests are located close to area schools and provide opportunities for environmental education. Infrastructure improvements such as trails, washroom facilities, and parking areas may be required to facilitate environmental education in designated tract(s).

Several recreational activities are also proposed for the County Forests, including hiking, skiing, horseback riding, hunting, and snowmobiling. Restrictions are recommended for some of the proposed activities. It will be important for forest users to work together to establish guidelines or rules for forest use and to resolve potential conflicts. This is expected to be one of the primary functions of the proposed Woodlands Advisory Committee.

Uniform shelterwood and uneven-aged single tree and group selection silvicultural systems are proposed for managing the timber resources in the County Forests. The Woodlands Management Plan contains an assessment of the long-term sustainable timber management for the forests. The results of the assessment form the basis for a 5-year Forest Management Schedule of activities during the 2002-2006 operating period of this management plan. Access and infrastructure improvements are also proposed.

Within the 2002-2006 operating period, priority should be given to implementing the following recommended management activities:

1. Establish a Woodlands Advisory Committee.
2. Develop criteria for conserving biological diversity and areas of High Conservation Value Forest and establish a system of High Conservation Value Forests within the County Forests.
3. Establish rules and guidelines for recreational use of County Forests.
4. Implement the proposed 5-Year Forest Management Schedule and associated management practices.
5. Undertake the proposed Access and Infrastructure Improvements.
6. Continue to support scientific study within the County Forests.
7. Explore partnerships with area schools for environmental education.

# CHAPTER 1: CONTEXT

## Introduction and Historical Perspective

The County of Middlesex has a rich history of forest conservation dating back to 1937 when the County appointed its first Reforestation Committee to study and promote opportunities for afforestation of marginal agricultural land. With enabling legislation under the *Counties Reforestation Amendment Act 1939*, a property was acquired near Crumlin where the first County plantation was established. This property was eventually sold but in the intervening years the County has acquired some 1041 hectares (ha) (2516 acres) on 27 tracts of land.

In 1946, the County entered into an agreement with the Province of Ontario whereby the province would assist with the reforestation of County lands. In 1954, a formal agreement was signed through the provincial Agreement Forests program (1921-1998) wherein the Ministry of Natural Resources (MNR) (formerly Department of Lands & Forests) would manage the County Forests for a period of 50 years (Department of Lands & Forests 1964). The original 1954 agreement was subsequently replaced by a 40-year agreement signed on November 23, 1961 pursuant to *The Forestry Amendment Act 1960*. Under the agreement, the MNR would provide comprehensive management of lands suitable for "forestry purposes". *The Forestry Amendment Act 1960*, defined "forestry purposes" as meaning primarily the production of timber and wood products and including such secondary purposes as proper environmental conditions for wild life, protection against floods and erosion, recreation, and protection and production of water supplies.

The terms of the 1961 agreement called for the MNR to furnish all equipment and to undertake all activities required in connection with the management of the Agreement Forest. Management expenditures were recorded and revenues from the sale of timber or other sources were deducted from the amount owing. The outstanding balance was maintained interest free by the provincial government. *The Forestry Amendment Act 1960* also authorized the province to provide grants to Agreement Forest owners for the purpose of acquiring properties.

The first Management Plan for the Middlesex County Forests 1963-1973 was prepared by the MNR in 1964 (MNR 1964). This 10-year plan was followed by a Policy Statement for Middlesex County Agreement Forest 1979-1989 (MNR 1978a) and accompanied by a 10-year operating plan (MNR 1978b). Both the 1963-1973 Management Plan and the 1978 Policy Statement outlined goals and objectives for forest management and described proposed management activities for the respective 10-year periods. The MNR also provided annual reports on management activities and financial statements to the County from 1977-78 to 1993-94.

The MNR's goal in 1978 in managing Middlesex County Forests was "to produce a sustained yield of hardwood timber, to provide opportunities for extensive recreation, and to produce suitable wildlife habitat" (MNR 1978a). Active management of the Agreement Forest involved silvicultural management including tree planting, stand tending, and improvement thinning and infrastructure improvements such as access trails, fencing, signage, and fireguards. An historical summary of silvicultural management is given in Appendix A. Approximately \$125,000 has been generated from the sale of timber from the County Forests since 1978.

In 1994, the MNR began to negotiate the termination of the formal agreements with Agreement Forest owners, thereby transferring all management responsibilities to the owners. In December 2000, the County passed By-Law #5528 authorizing the Warden and the Clerk to enter into a termination agreement with the MNR with respect to the management of the County's Agreement Forest.

Due to the unique accounting system of the agreement forest program (all costs associated with management activities and revenues from timber sales were accumulated over the period of the agreement), some forests were "in the black" and transition of responsibility was not an issue. Many others, including Middlesex Agreement Forest were "in the red", meaning that revenues had not caught up to the accumulated expenditures at that time. Agreement Forest owners were reluctant to assume both management responsibilities and the outstanding net management costs at the same time. Accordingly, the provincial government agreed to finally ignore these outstanding costs, and view them as an investment in a healthy natural environment instead. At the time that the agreement with Middlesex County was terminated, accumulated management expenditures that were forgiven by the province amounted to \$11,057.

In anticipation of assuming primary responsibility for its Agreement Forests, the County undertook a comprehensive review of past management activities, a survey of conditions on all Agreement Forest tracts, and recommendations for future management (Amin et.al. 1997). In 2001, Silv-Econ Ltd. Resource Management Consultants were retained to prepare a 20-year Woodlands Management Plan for the Middlesex County Forests.

## **Plan Period**

This Woodlands Management Plan is for the 20-year period January 1, 2002 to December 31, 2021. The plan is intended to guide the development of more detailed 5-year forest management schedules and annual work programs. Five-year forest management schedules should be prepared before the beginning of each 5-year period.

# CHAPTER 2: PROFILE OF MIDDLESEX COUNTY FORESTS

## Landscape Context

During early European settlement in the mid-nineteenth century, the forests in Middlesex County were cleared for farmland at an alarming rate. The most rapid loss of forests occurred before 1880, and by 1910 there was less than 10% forested land remaining (Bowles 1994). Forests now occupy only about 13% of the total area in Middlesex County. The 1041 ha Middlesex County Forests represent approximately 3% of the total forest area in the County (Figure 1).

The County Forests are located in three townships, Southwest Middlesex, North Middlesex, and Thames Centre (Figure 1). There are 52 distinct stands within the 1041 ha forest area; ranging in size from 0.8 ha to 123.4 ha. The largest block of forest is located in Southwest Middlesex where the County owns 921 ha of woodlands on 25 tracts. Many of these tracts are physically adjacent to one another and/or adjacent to private and other public forests (Figure 1). These woodlands are an integral component of the larger Skunk's Misery/Bothwell Forest complex. The Skunk's Misery/Bothwell Forest complex is recognized as a Life Science Area of Natural and Scientific Interest (ANSI). A Life Science ANSI is an area identified by the Ontario Ministry of Natural Resources as having provincially significant or regionally significant representative ecological features

The Banks Tract in the Township of Thames Centre is also part of a larger complex known as the Dorchester Swamp. The swamp, which covers approximately 548 ha, represents the transition zones for both northern and southern as well as eastern and western flora and fauna (Upper Thames River Conservation Authority 1997). It is recognized as a Class 1 Provincially Significant Wetland and a Life Science ANSI.

Middlesex County lies within the Deciduous Forest Region of Canada (Farrar 1995). Forests within this region are typically dominated by maple, beech, ash and oak species. Within this forest region there are forest pockets that are representative of the broader Carolinian Life Zone. This life zone derives its name from its southern limits, which are located in the Carolina States. The Carolinian Zone extends along eastern North America with its most northerly limits ending near Sarnia and Toronto (Amin et.al. 1997). Skunk's Misery and Dorchester Swamp are recognized as Carolinian Canada sites. Many of the County's forest properties can play a key role in Carolinian Canada's Big Picture Project which aims to develop a long term natural heritage vision for Canada's southernmost ecological region (Jalava et al. 2000).

## Earth Science Features

The glacial history, geology, and physiography of Middlesex County have been described by Chapman and Putnam (1984), Bowles (1994), McIllwraith Field Naturalists (1985), the Upper Thames River Conservation Authority (1997), and others.

Beneath the glacial landscape of Southern Ontario is a series of Palaeozoic sedimentary rocks about 1000 metres thick. They form overlapping layers of limestones, dolostones, shales, and sandstones which dip gently to the south and west. The last glacier to cover Southern Ontario

was responsible for depositing the soil materials and shaping the landforms as they exist today. During the retreat of the last glacier, extensive lowland areas were submerged in glacial lakes for a time. Glacial Lake Warren occupied much of Southwestern Ontario west of London including what is now Lakes Erie and St. Clair (Chapman and Putnam 1984). Skunk's Misery is located in the Bothwell Sand Plain Physiographic Region (Chapman and Putnam 1984). This sand plain represents the delta of the Thames River in Lake Warren. The sands were spread thinly over the clay floor of Lake Warren, covering some 700 square miles and now form the surface features in the Skunk's Misery complex. The lacustrine clays and silts associated with Big Swamp in East Williams Township were also deposited in the same way.

In the vicinity of the Dorchester Swamp, which includes the Banks Tract, three main physical features form the current landscape. Two nearly parallel ridges lie on opposite sides of the Thames River. The northern ridge is named the Dorchester moraine, and the southern ridge is called the Ingersoll Moraine. Meltwater from the receding glacier deposited sandy soil in the spillway between the two moraines. The sand deposit is called the Dorchester Sand Plain and within this area lies the Dorchester Swamp (Chapman and Putnam 1984), including the Banks Tract of the Middlesex County Forests.

The clay based sand deposits associated with the Middlesex County Forests are typically poorly drained and often nutrient deficient. Skunk's Misery, Dorchester Swamp, and Big Swamp have soils that hold the water close to the surface. Numerous vernal pools and seeps provide differentiation to an otherwise flat to gently rolling landscape. Drainage ditches (drains) are another feature of the topography in many of the forest tracts.

## **Biological Significance**

The Middlesex County Forests are recognized as areas of biological significance. Many of the County Woodland tracts in Southwest Middlesex are within the larger Skunk's Misery/Bothwell Forest Area of Natural and Scientific Interest (ANSI) and are recognized as habitat for a diverse range of flora and fauna indicative of Southwestern Ontario. Parts of the Skunk's Misery forest have also been classified as Provincially Significant (Class 1) Wetlands. The Banks Tract within the Dorchester Swamp ANSI and Big Swamp in North Middlesex are also recognized as Provincially Significant Wetlands. ANSI's and Provincially Significant Wetlands are recognized in the Middlesex County Official Plan (1999). The Official Plan restricts development and limits certain land uses on these sites.

## **Vegetation and Flora**

About 710 taxa of vascular plants have been reported from the Skunk's Misery/Bothwell Forest Complex. These include 583 native species and 124 non-native species in 105 Families and comprise almost 30% of all the plant species known to occur in Middlesex County. Thirty-five of the species are considered provincially rare, and 77 species are currently listed as rare in Middlesex County. The majority of provincially rare plant species recorded from the County Forests at Skunk's Misery are prairie/savanna indicators that thrive in openings, along roadsides and trail and wet meadows and along ditches (Table 1). Provincially rare flora found in County Forests include Tulip tree (*Liriodendron tulipifera*), American chestnut (*Castanea dentate*), Fox grape (*Vitis labrusca*), Panic grass (*Panicum dichotomum*), and Broad-beech fern (*Phegopteris*

*hexagonoptera*). The proportion of non-native species (17%) is within the normal range for similar sites in southern Ontario, but varies across the different parts of the Skunk's Misery.

Most of the Skunk's Misery/Bothwell Forest complex lies on the Bothwell sand plain that was formed about 15,000 years ago as an outwash plain in a glacial lake. Because of this, the topography is quite flat except to the south where tributary ravines make their way to the Thames River. The complex consists mainly of forests dominated by oaks and Red Maple (*Acer rubrum*) and the swamps dominated by soft maples. Some 39 tree species were identified during the forest inventory, with some stands containing up to seventeen different species. The high diversity can likely be attributed to the large size of the site, one of the largest forest complexes in southwestern Ontario, and its geographic location.



Tulip tree - Bayne Tract

Skunk's Misery lies within the Carolinian Zone, Canada's "deep south", and several species that occur there have ranges in Canada that are limited to extreme southern Ontario. These includes trees such as Tulip tree (*Liriodendron tulipifera*), Sassafras (*Sassafras albidum*), Black gum (*Nyssa sylvatica*) and Flowering dogwood (*Cornus florida*) as well as a number of understory herbs. For example Wild geranium (*Geranium maculatum*) and Running strawberry bush (*Euonymus obovatus*) are quite common in forests in and around Skunk's Misery, but they are rarely found 100 km to the north. Sassafras has also been identified in the Big Swamp Tract of the Middlesex County Forests.

The sandy soil that underlies much of the Skunk's Misery complex makes an ideal habitat for prairie species that find their way into Ontario at the eastern edge of their range. These are usually found where there are gaps and openings in the forest canopy, in small pockets of savanna, and along the banks of the Thames River. Such species include Tick-trefoils (*Desmodium* spp.) and Bush-clovers (*Lespedeza* spp.) and plants such as Wingstem (*Verbesina alternifolia*).

The 1987 life science inventory of the Dorchester Swamp ANSI (McLeod 1987) identified some 485 native species of vascular plants including 46 rare plants. Dorchester Swamp is renowned in Southern Ontario for its orchids. According to McLeod (1987), one-third of the total orchids of known status in Middlesex County, are found in Dorchester Swamp.

Non-native, weedy species probably enter the forests in disturbed areas such as trails. The seeds may be brought in on clothing or vehicles, and they find sites to germinate where the soil surface has been exposed. Removed from their natural diseases and predators non-native species may flourish. Once established some may out-compete and eliminate the native woodland plants and become a dominant component in the forest.

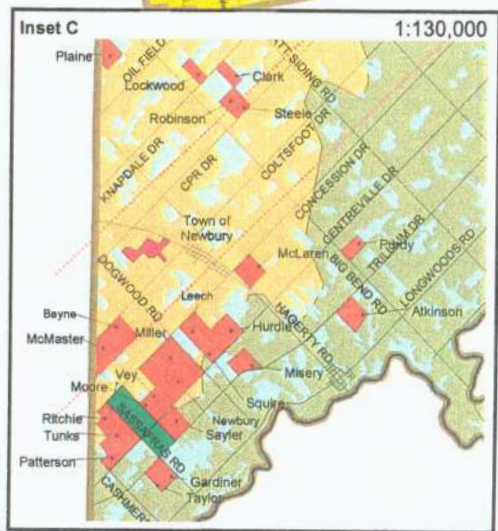
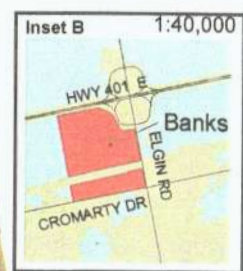
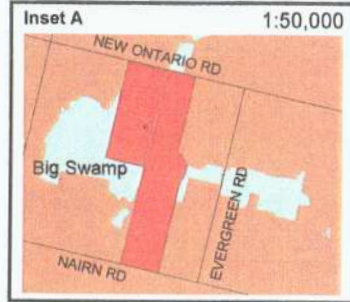
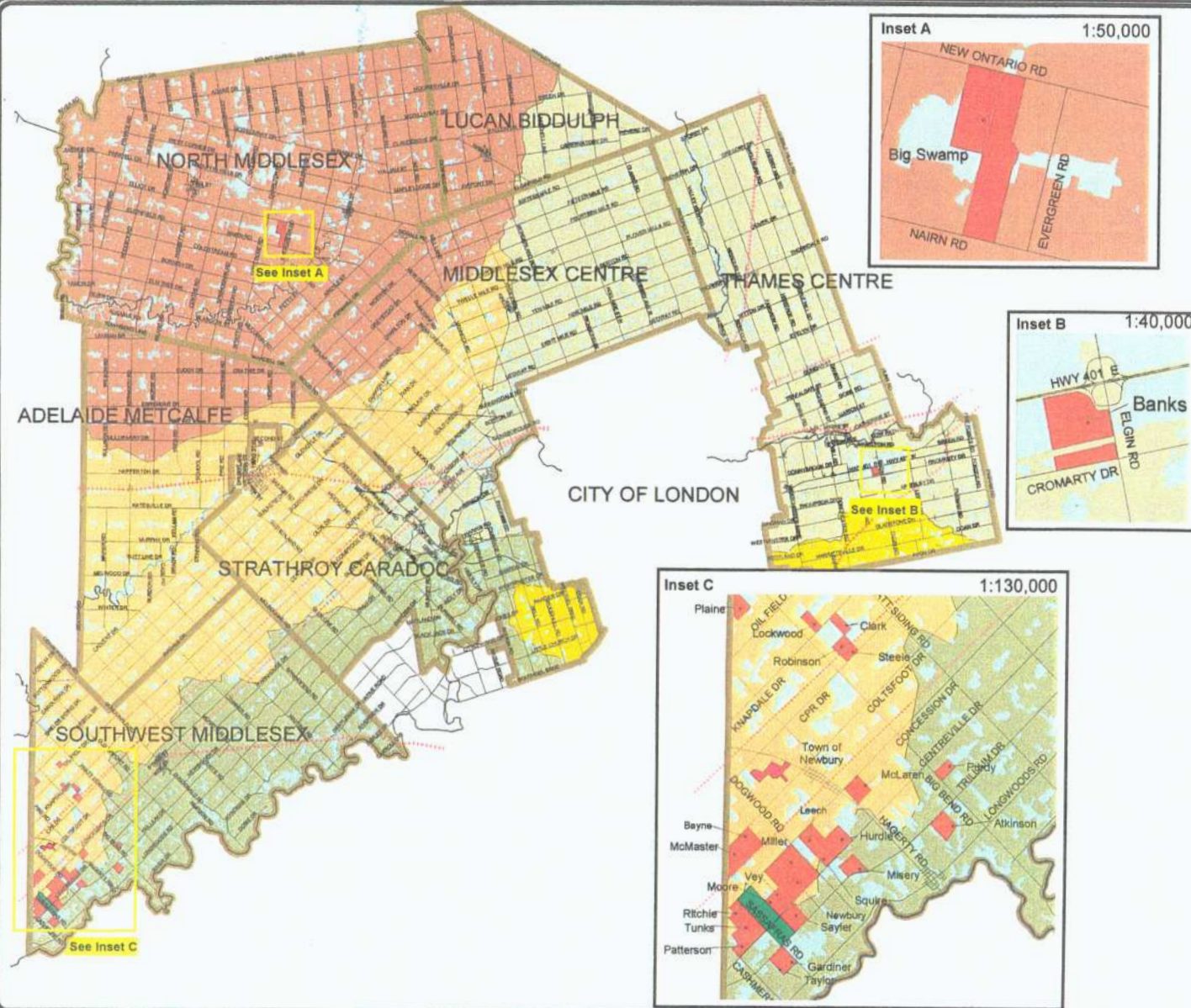


Orchid - Newbury Tract

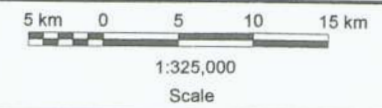


# Figure 1

## Forest Cover and Key Map Middlesex County Forest



- Key to Features**
- Watercourse
  - Railroad
  - County road
  - Municipal boundary
  - Mosa Township Forest
  - LTVCA Forest
  - Middlesex County Forest
  - Private woodland
- Watershed**
- Ausable-Bayfield
  - Kettle Creek
  - Lower Thames Valley
  - St. Clair Region
  - Upper Thames



Printed Jan 2002  
Data provided by Middlesex County  
Projection: NAD83, ZONE 17

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Table 1: List of Provincially and Regionally rare species in the Middlesex County Forests at Skunk's Misery (Bowles 2002). Column headings include S- RANK = Status in Ontario [S1 = extremely rare, S2 = very rare, s3 = rare to uncommon] (Oldham, 1994), MIDD = Status in Middlesex County [R1 to R5 indicates the number of known locations for the species] (Bowles, 2002), P/S = prairie or savanna indicator (Rodger, 1998).

| SP_CODE | SCIENTIFIC NAME                                      | COMMON NAME                   | S-RANK | MIDD | P/S |
|---------|--|-------------------------------|--------|------|-----|
| DIGCOGN | <i>Digitaria cognata</i>                             | FALL WITCH GRASS              | S1     | R3   | X   |
| VITLABR | <i>Vitis labrusca</i>                                | FOX GRAPE                     | S1S2   | R3   |     |
| ARILONG | <i>Aristida longespica</i>                           | THREE-AWNED GRASS             | S2     | R?   |     |
| ARINECO | <i>Aristida necopina</i>                             | THREE-AWNED GRASS             | S2     | R1   |     |
| PASSETA | <i>Paspalum setaceum</i>                             | HAIRY LENS GRASS              | S2     | R1   | X   |
| PANDICH | <i>Panicum dichotomum</i>                            | PANIC GRASS                   | S2     | R3   | X   |
| SPIOCHR | <i>Spiranthes ochroleuca</i>                         | YELLOW LADIES'-TRESSES        | S2     | VU   | X   |
| LUDPALU | <i>Ludwigia palustris</i>                            | WATER-PURSLANE                | S2     | X    |     |
| ASITRIL | <i>Asimina triloba</i>                               | PAWPAW                        | S3     | R2   |     |
| NYSSYLV | <i>Nyssa sylvatica</i>                               | BLACK GUM;SOUR-GUM            | S3     | R2   |     |
| GALPILO | <i>Galium pilosum</i>                                | HAIRY BEDSTRAW                | S3     | R3   | X   |
| PANSPHA | <i>Panicum sphaerocarpon</i>                         | ROUND-FRUITED PANIC GRASS     | S3     | R3   | X   |
| PHEHEXA | <i>Phegopteris hexagonoptera</i>                     | BROAD BEECH-FERN              | S3     | R4   |     |
| EUPPURP | <i>Eupatorium purpureum</i>                          | PURPLE JOE-PYE WEED           | S3     | VU   | X   |
| JUNACUM | <i>Juncus acuminatus</i>                             | SHARP-FRUITED RUSH            | S3S4   | R1   | X   |
| BOTONEI | <i>Botrychium oneidense</i>                          | BLUNT-LEAVED GRAPE-FERN       | S3S4   | R2   |     |
| LIRTULI | <i>Liriodendron tulipifera</i>                       | TULIP TREE                    | S3S4   | U    |     |
| CASDENT | <i>Castanea dentata</i>                              | AMERICAN CHESTNUT             | S3S4   | VU   |     |
| JUGCINE | <i>Juglans cinerea</i>                               | BUTTERNUT                     | S3S4   | X    |     |
| DESPANI | <i>Desmodium paniculatum</i> var. <i>paniculatum</i> | PANICLED TICK-TREFOIL         |        | R?   |     |
| CIRDISC | <i>Cirsium discolor</i>                              | PASTURE-THISTLE               |        | R1   | X   |
| GRANEGL | <i>Gratiola neglecta</i>                             | CLAMMY HEDGE HYSSOP           |        | R1   |     |
| LYCTRIS | <i>Lycopodium tristachyum</i>                        | GROUND-CEDAR                  |        | R1   |     |
| PANBORE | <i>Panicum boreale</i>                               | NORTHERN PANIC GRASS          |        | R1   |     |
| SOLBICO | <i>Solidago bicolor</i>                              | SILVERROD, WHITE GOLDENROD    |        | R1   |     |
| BOTMATR | <i>Botrychium matricariaefolium</i>                  | DAISY-LEAVED MOONWORT         |        | R2   |     |
| CAMAMER | <i>Campanula americana</i>                           | TALL BELLFLOWER               |        | R2   |     |
| ECHMURI | <i>Echinochloa muricata</i>                          | BARNYARD GRASS                |        | R2   |     |
| ORTSECU | <i>Orthilia secunda</i>                              | ONE-SIDED PYROLA              |        | R2   |     |
| POLBIFL | <i>Polygonatum biflorum</i>                          | SOLOMON-SEAL                  |        | R2   |     |
| RUBCANA | <i>Rubus canadensis</i>                              | BRAMBLE;DEWBERRY              |        | R2   |     |
| VERSCUT | <i>Veronica scutellata</i>                           | MARSH SPEEDWELL               |        | R2   |     |
| VIOMACL | <i>Viola macloskeyi</i>                              | SMOOTH WHITE VIOLET           |        | R2   |     |
| ANAMARG | <i>Anaphalis margaritacea</i>                        | PEARLY EVERLASTING            |        | R3   |     |
| ARAGLAB | <i>Arabis glabra</i>                                 | TOWER MUSTARD                 |        | R3   |     |
| BROPUBE | <i>Bromus pubescens</i>                              | CANADA BROME                  |        | R3   |     |
| CENLONG | <i>Cenchrus longispinus</i>                          | SANDBUR;SANDSPUR              |        | R3   |     |
| HEDPULE | <i>Hedeoma pulegioides</i>                           | AMERICAN PENNYROYAL           |        | R3   |     |
| HYPMAJU | <i>Hypericum majus</i>                               | LARGER CANADA ST. JOHN'S-WORT |        | R3   |     |
| HYPMUTI | <i>Hypericum mutilum</i> ssp. <i>mutilum</i>         | WEAK ST. JOHN'S-WORT          |        | R3   |     |
| LYCINUN | <i>Lycopodium inundatum</i>                          | BOG CLUBMOSS                  |        | R3   |     |
| MELLINE | <i>Melampyrum lineare</i>                            | COW-WHEAT                     |        | R3   |     |
| PYRAMER | <i>Pyrola americana</i>                              | ROUND-LEAVED PYROLA           |        | R3   |     |
| RANFASC | <i>Ranunculus fascicularis</i>                       | EARLY BUTTERCUP               |        | R3   | X   |
| UVUSESS | <i>Uvularia sessilifolia</i>                         | MERRYBELLS                    |        | R3   |     |
| AGANEPE | <i>Agastache nepetoides</i>                          | YELLOW GIANT HYSSOP           |        | R4   |     |

Table 1 continued: List of Provincially and Regionally rare species in the Middlesex County Forests at Skunk's Misery (Bowles 2002). Column headings include S-RANK = Status in Ontario [S1 = extremely rare, S2 = very rare, S3 = rare to uncommon] (Oldham, 1994), MIDD = Status in Middlesex County [R1 to R5 indicates the number of known locations for the species] (Bowles, 2002), P/S = prairie or savanna indicator (Rodger, 1998).

| SP_CODE | SCIENTIFIC NAME                                   | COMMON NAME              | S-RANK | MIDD | P/S |
|---------|---|--------------------------|--------|------|-----|
| ELEELLI | <i>Eleocharis elliptica</i>                       | GOLDEN-SEEDED SPIKE RUSH | R4     |      |     |
| EQUPALU | <i>Equisetum palustre</i>                         | MARSH-HORSETAIL          | R4     |      |     |
| ERAHYPN | <i>Eragrostis hypnoides</i>                       | CREEPING LOVE GRASS      | R4     |      |     |
| LEPVIRG | <i>Lepidium virginicum</i>                        | COMMON PEPPERGRASS       | R4     |      |     |
| OENBIEN | <i>Oenothera biennis</i>                          | COMMON EVENING-PRIMROSE  | R4     |      |     |
| RHUVERN | <i>Rhus vernix</i>                                | POISON SUMAC             | R4     |      |     |
| RUBHISP | <i>Rubus hispidus</i>                             | SWAMP DEWBERRY           | R4     |      |     |
| SANCACA | <i>Sanicula canadensis</i> var. <i>canadensis</i> | BLACK SNAKEROOT          | R4     |      |     |
| SISANGU | <i>Sisyrinchium angustifolium</i>                 | STOUT BLUE-EYED-GRASS    | R4     |      |     |
| CONAMER | <i>Conopholis americana</i>                       | SQUAWROOT                | R5     |      |     |
| LOBSPIC | <i>Lobelia spicata</i>                            | PALE SPIKED LOBELIA      | R5     |      | X   |
| RUBFLAG | <i>Rubus flagellaris</i>                          | NORTHERN DEWBERRY        | R5     |      |     |
| VACMYRT | <i>Vaccinium myrtilloides</i>                     | CANADA BLUEBERRY         | R5     |      |     |

## Fauna

The Middlesex County Forests account for some 50% of the Skunk's Misery/Bothwell Forest Complex. This complex is one of the largest remaining forest blocks in southwestern Ontario and is habitat to a rich diversity of forest-dwelling birds (85 breeding species), reptiles, amphibians, mammals and butterflies, including several species that are classified as vulnerable, threatened or endangered (VTE species). However, the diversity of fauna is not exclusive to the Skunk's Misery group of County Woodland tracts. Eighty-seven bird species, including several forest interior species, were recorded in the 1987 life science inventory of Dorchester Swamp including the Banks Tract of the Middlesex County Forests (McLeod 1987). The diversity of faunal species is affected by size of habitat area, diversity of vegetation communities, and diversity of structure within a given community.

## Size of Habitat

The large extent of forest cover and other habitats in the County Forests, and particularly within the Skunk's Misery complex of tracts, is important for the high diversity of faunal species, especially birds and butterflies, because it attracts area-sensitive and forest interior species in addition to species that are found in smaller woodlands or prefer edges, meadows and shrub communities. Area-sensitive and forest interior species are generally not found in small woodland patches (MNR 2000b).

## Diversity of Vegetation Communities

The high diversity of bird and butterfly species in County Forests is also influenced by the diversity of vegetation communities which range from forested swamps to upland forest, from drain-side shrub thickets to meadow, and from deciduous forest to coniferous plantation. These diverse vegetation communities can be conserved and enhanced through appropriate forest management activities. For example, the conifer plantations are of such an age that they are now attracting species that prefer conifers. These include species such as Sharp-shinned hawk (*Accipiter striatus*), Blackburnian warbler (*Dendroica fusca*), and especially Pine warbler

(*Dendroica pinus*). During the 1983/84 Life Science Inventory no Pine warblers were recorded (McIllwraith Field Naturalists 1985). Habitats for these and other conifer-dwelling species can be conserved by maintaining conifer stands within the County Forests.

While most species are attracted by the structural array of a forest community some are partial to certain plant species. The Cerulean warbler (*Dendroica cerulea*) is a canopy species that is found scattered individually throughout the forest complex but is also found in at least two clusters where there are super-canopy white oaks (*Quercus alba*). Opportunities for increasing the population of Cerulean warbler can be enhanced by managing for super-canopy trees where possible.

Several rare woodland butterflies are found in good numbers at Skunk's Misery. These include Giant swallowtail (*Heracles cressphontes*), the Tawny emperor (*Asterocampa clyton*) and Hackberry emperor (*Asterocampa celtis*). In each case the caterpillar is very specific in its food requirements. The Giant swallowtail caterpillar only eats the leaves of Prickly-ash (*Zanthoxylum americanum*), and the two Emperors eat only the leaves from the Hackberry tree (*Celtis occidentalis*).

### **Diversity of Forest Structure**

The variety of forest structures found in the County Forests and adjacent forests attracts a great variety of species that specialize in the various forest niches. Of particular interest are those species that prefer forests that exhibit "old growth" or late seral characteristics. Late seral forests have a complex, multi-layered structure with trees of all ages and sizes. Cavity trees, snags (dead standing trees), and coarse woody debris are also more abundant in late seral forests than in younger forests (MNR 1996, Stabb 1996). Species such as the Acadian flycatcher (*Empidonax vireescens*), Cerulean warbler, Broad-winged hawk (*Buteo platypterus*), Pileated woodpecker (*Dryocopus pileatus*), and Black rat snake (*Elaphe o. obsoleta*) are species that prefer forests with late seral characteristics. The Cerulean warbler is a canopy specialist preferring the super canopy white oaks. The Acadian flycatcher's niche is an open understorey in a 70+ % canopy cover created by large, tall trees (Friesen et.al. 1999) Pileated woodpeckers prefer older trees because these provide the food (ants and beetle larva), and roosting and nesting sites that such a large bird needs (Naylor et.al. 1996). The Black rat snake likes very large, broad horizontal limbs to bask on in early spring and also uses the cavities for roosting and possibly even as birth dens (MNR 2000b).

Recent research has shown that even some of the forest interior species that colonize the openings in the forest still prefer to have large trees in their habitat. The Hooded warbler (*Wilsonia citrina*), for example, raises more young when there are at least some very large trees (i.e > 38 cm diameter) scattered throughout the canopy gaps that it inhabits (pers. comm. Dave Martin, Acadian Flycatcher/Hooded Warbler Recovery Team).

Other wildlife species of interest that have been observed in the County Forests include the Eastern hognose snake (*Heterodon platyrhinos*) (observed in the Ritchie Tract 2001), Ovenbird (*Seiurus aurocapillus*), Scarlet tanager (*Piranga olivacea*), Chestnut-sided warbler (*Dendroica pensylvanica*), Blue-winged warbler (*Vermivora pinus*), American redstart (*Setophaga ruticilla*), Cooper's hawk (*Accipiter cooperii*) (observed in the McLaren Tract 2001),

and Prothonotary warbler (*Protonotaria citrea*) (observed in the Miller Tract 2001). The Prothonotary warbler is an endangered species in Ontario and Canada.

Many amphibians - frogs, toads, and salamanders – inhabit the small wetland ponds scattered throughout the County Forests. One of the more interesting salamanders is the Blue-spotted salamander (*Ambystoma laterale*) which is greyish black in background colour and spotted with fluorescent blue.

The County Forests provide habitats for a variety of mammals including White-tailed deer (*Odocoileus virginianus borealis*), and various smaller mammals typically found in southern Ontario forests. Two species of mammals are of special interest. The Southern flying squirrel (*Glaucomys volans*), which is another endangered species, has been recorded here. The American badger (*Taxidea taxus*) (also endangered) is found scattered throughout southwestern Ontario and has been recorded here in fairly good numbers in the past. Unfortunately, there are not many recent records.

## Forest Communities

The Ecological Land Classification for Southern Ontario (Lee et.al. 1998) and other forest classification systems have been developed to identify recurring forest ecosystem patterns on the landscape in order to reduce complex natural variation to a reasonable number of meaningful forest ecosystem units. Forest communities are differentiated by the response of the vegetation to differing ecological conditions, referred to as ecosites. Classification is based on detailed field assessments of soil properties and the structure, species composition and physiognomy of the vegetation. This level of detail is not available in the forest resource inventory. However, the forest inventory does provide detailed descriptions of the stand-level forest cover including species composition, age, height, basal area, and regeneration. Forest communities have been differentiated according to species composition, species associations, and degree of shade tolerance. Criteria used in this classification system are found in Appendix B. Eight forest communities are associated with the Middlesex County Forests. An area summary by forest community is given in Table 2. Appendix C provides a summary of the forest inventory for all stands. A more detailed forest inventory is available in electronic format.

Table 2. Forest Communities in the Middlesex County Forests.

| FOREST COMMUNITY      | NUMBER OF STANDS | AREA (HA)     | PERCENT OF TOTAL |
|-----------------------|------------------|---------------|------------------|
| Soft Maple – Oak      | 14               | 480.7         | 46%              |
| Soft Maple            | 7                | 212.8         | 20%              |
| Oak                   | 4                | 120.8         | 12%              |
| Mixed Deciduous       | 4                | 96.7          | 9%               |
| White Pine Plantation | 14               | 84.7          | 8%               |
| Spruce Plantation     | 4                | 25.8          | 2%               |
| Red Pine Plantation   | 4                | 12.8          | 1%               |
| Mixed Coniferous      | 1                | 6.9           | 1%               |
| <b>Total</b>          | <b>52</b>        | <b>1041.2</b> | <b>100.0</b>     |

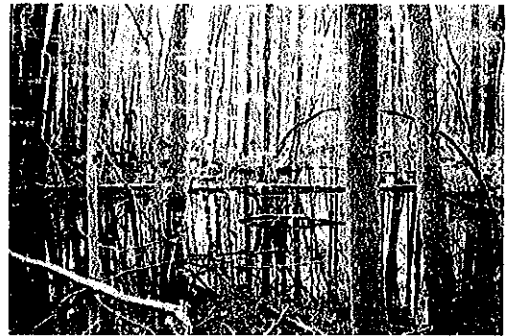
The sandy soils at Skunk's Misery suggest that historically, much of the natural upland forest was oak woodland. Species considered to be prairie/savanna/oak woodland indicators are found in at Skunk's Misery in canopy opening such as drainage ditches and trails. Their presence supports the idea that part of the Skunk's Misery forest was a natural oak woodland community. Other evidence lies in the relatively low branching and spreading crowns of some of the large oak trees at some sites. These trees grew up under a more open canopy that is now present.



Black cherry and red oak- Newbury Tract

Another major change that has taken place in some stands is the loss of American chestnut. Until the early 1940's when the species was decimated by the Chestnut Blight fungus, it was an important component of the rich forests of the Deciduous Forest Region. Once the chestnut trees died, their place in the forest canopy was filled by other species, but the character of the forest may have changed substantially as a result of this. Fortunately, chestnut saplings are present in the regeneration and understory layers in the County Forests. These trees could be encouraged to advance into the upper canopy through appropriate silvicultural activities.

Red maple is a tree species with an extraordinary range in its tolerance to environmental conditions. It will grow from wet swamps to very dry sandy uplands, and it is present across a range of sites in Skunk's Misery. Red maple appears to have increased in northeastern North America both as a result of the loss of chestnut and because of the suppression of natural forest fires (Abrams, 1992, 1998). In the oak and soft maple-oak forest types, red maple often appears as smaller trees in the canopy and as a dominant component of the sub-canopy and sapling layers. This suggests that red maple is increasing in these forests. In wet sites it hybridizes with Silver maple (*Acer saccharinum*) to produce fertile hybrid Swamp maple or Freeman maple (*Acer freemanii*) offspring that are optimally fitted to the local swamp conditions.



Silver maple swamp - Big Swamp Tract

The majority of stands in the Middlesex County Forests are between 50 and 80 years old, reflecting past land uses and management activities. However, many of the tree species found in the County Forests are known to live to 150 years of age or older under similar site conditions and climate. Stands can be grouped according to 10-year age classes. The distribution of area by age class is presented in Table 3. There are only two stands less than 20 years of age, however every forest stand contains some regeneration, i.e. seedlings and saplings less than 20 years old. White ash (*Fraxinus Americana*), Green ash (*Fraxinus pennsylvanica*), Red maple, Basswood (*Tilia americana*) and White elm (*Ulmus americana*) can be found in the regeneration layer throughout most of the forest. Witch hazel (*Hamamelis virginiana*) and Blue beech (*Carpinus*

*caroliniana*) form dense understories in many areas, and may pose a significant competition problem for the regeneration of other tree species. However, White hazel is also a preferred nesting habitat for the Acadian flycatcher. Seedlings and saplings of oak, hickory, sassafras, tulip and hackberry are generally lacking. Eastern hemlock (*Tsuga canadensis*), White pine (*Pinus strobus*), and White cedar (*Thuja occidentalis*) are also infrequent in the regeneration. Silvicultural management is proposed as an effective tool for regenerating some of the species currently not well represented in the regeneration layers, such as Red oak (*Quercus rubra*) and White oak (*Quercus alba*), and White pine.

Table 3. Distribution of age classes in the Middlesex County Forests.

| AGE CLASS        | REGEN. <sup>1</sup> | 0-19 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90-99 | 100+ |
|------------------|---------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Area (ha)        | 1041                | 18.5 | 5.1   | 57.3  | 40.8  | 201   | 261.3 | 270.9 | 82.0  | 104.3 | 0    |
| Percent of total | 100                 | 2%   | 0%    | 6%    | 4%    | 19%   | 25%   | 26%   | 8%    | 10%   | 0    |

## Wildlife Habitat

### Core Forest Areas and Habitat Linkages

The policy framework for Natural Heritage Areas and Functions expressed in the Middlesex County Official Plan is based on establishing a “green system” of County Natural Heritage Features across the County. The County Forests are a vital component in this system and also contribute to Carolinian Canada’s efforts to develop a long-term natural heritage vision for Canada’s southernmost ecological region (Jalava et al. 2000). County Forests provide Core Forest areas and corridors that connect Core Forest areas to other natural heritage features. Figure 2 shows the location of Core Forest areas and corridors associated with the County Forests in the Skunk’s Misery area. A summary of Core Forest areas is presented in Table 4.

In this plan, Core Forest areas are defined as areas with greater than 25ha of contiguous forest habitat, with an area greater than 4 ha that is 200 metres or more away from a perimeter of differing habitat (such as a road, railway, field, residential development) (Henshaw and Leadbeater 1999). Forest interior birds are more likely to be found within these areas (Sandilands and Hounsel 1994, Environment Canada et.al. 1998).

Corridors are elongated areas of similar habitat usually at least 40 metres to 50 metres wide, often wider, and generally continuously connected; the characteristics of corridors depend upon scale (Fielder and Jain 1992, Riley and Mohr 1994, Environment Canada et.al. 1998). Corridors primarily provide movement conduits, although some authorities argue that corridors must provide intrinsic breeding habitat and must be sufficiently robust to withstand disturbance and edge effects. In these cases effective corridors may be 200 metres or greater in width (Riley and Mohr 1994, Environment Canada et.al. 1998).

<sup>1</sup> Regeneration area refers to the forest area containing seedlings and saplings less than 20 years old.

This plan identifies two categories of corridor. Regional corridors are large corridors identifiable at the landscape scale (e.g. 1:50000) that often incorporate one or more core natural areas. Regional corridors are generally 200 metres or more in width. Pathways of connectivity are similar to corridors but differ in that there are breaks of unsuitable habitat, caused by fragmentation within the pathway (e.g. roads, railway lines, pipelines, wide trails).

Table 4. Core Forest areas within the Middlesex County Forest.

| TRACT      | TOTAL TRACT AREA (HA) | CORE FOREST AREA (HA) |
|------------|-----------------------|-----------------------|
| Atkinson   | 41                    | 8                     |
| Banks      | 36                    | 3                     |
| Bayne      | 46                    | 14                    |
| Big Swamp  | 117                   | 36                    |
| Clark      | 21                    | 9                     |
| Gardiner   | 21                    | 2                     |
| Hurdle     | 81                    | 30                    |
| Leech      | 19                    | 13                    |
| Livingston | 22                    | 0                     |
| Lockwood   | 21                    | 0                     |
| McMaster   | 53                    | 14                    |
| McLaren    | 41                    | 5                     |
| Miller     | 40                    | 18                    |
| Misery     | 33                    | 5                     |
| Moore      | 13                    | 5                     |
| Newbury    | 125                   | 66                    |
| Patterson  | 31                    | 7                     |
| Plaine     | 35                    | 0                     |
| Purdy      | 21                    | 0                     |
| Richie     | 37                    | 1                     |
| Robinson   | 19                    | 1                     |
| Sayler     | 42                    | 11                    |
| Steele     | 17                    | 0                     |
| Squire     | 19                    | 5                     |
| Taylor     | 21                    | 4                     |
| Tunks      | 41                    | 17                    |
| Vey        | 29                    | 12                    |
| Total      | 1042                  | 226                   |










## Wildlife Habitat Features

The Middlesex County Forests are habitat for a variety of southern or Carolinian bird species including species that are classified as area-sensitive and forest interior species. As with other areas of concern, silvicultural systems should be suitably modified to ensure that forestry operations serve to maintain or enhance forest interior and other habitat conditions. A forest-level approach to bird habitat management is recommended over the traditional stand-level approach to management. In this regard, there are several references that can be used to guide the development of appropriate silvicultural systems (Dickson et.al. 1993, Thompson et.al. 1993, Thompson et.al. 1995, Annand and Thompson 1997).

The County Forests provide a variety of habitats for wildlife including upland deciduous forest, mixed conifer forests, conifer plantations, and forested wetlands (swamps). Many forest stands also contain small wetland ponds that provide habitat for amphibians. Snags (dead standing trees), fallen trees and rotting logs (often referred to as coarse woody debris), and cavity trees (trees with cavities for nesting, feeding, or escape) are important forest habitat attributes. Compared to "old growth" forests in southern Ontario, the average abundance of snags in the County Forests is normal, while cavity trees and coarse woody debris are generally less abundant (Table 5).

Table 5. Abundance of wildlife habitat features in the Middlesex County Forests.

| HABITAT FEATURE  | AVERAGE ABUNDANCE  | HOT SPOTS   |
|--|--|---|
| Standing Dead Trees (Snags)<br> | 47 snags / hectare<br>Average diameter 25 cm<br>Range 0 – 419 / hectare<br>*40 snags / hectare is common in old growth hemlock-hardwood (Goodburn & Lorimer 1998)                              | Stands dominated by conifer trees. Most common in the following forest types:<br><i>Mixed coniferous</i> (234/ha)<br><i>Spruce plantations</i> (138/ha)<br><i>White pine plantations</i> (117/ha)<br><i>Red pine plantations</i> (104/ha)<br><br>Least common in stands of soft maple (25/ha) |
| Cavity Trees<br>                | 5 cavity trees / hectare<br>Average diameter 47 cm<br>Range 0 – 26 / hectare<br>*9/hectare is common in old growth hemlock-hardwood (Goodburn & Lorimer 1998)                                  | Mature hardwood forests dominated by soft maple. (7/ha)<br><br>Least common and sometimes not present in plantations  |
| Coarse Woody Debris (CWD)<br>   | 58 logs/ha (7 m <sup>3</sup> /hectare)<br>Range 0 – 326 / hectare<br>Average diameter 22 cm<br>*100 m <sup>3</sup> /hectare is common in old growth hemlock-hardwood (Goodburn & Lorimer 1998) | Stands dominated by conifer trees. Most common in the following forest types:<br><i>Red pine plantations</i> (110/ha)<br><i>Mixed coniferous</i> (106/ha)<br><i>White pine plantations</i> (75/ha)<br><i>Spruce plantations</i> (69/ha)   |



# CHAPTER 3: PUBLIC CONSULTATION

## Background

Public consultation and participation in determining the future of the Middlesex County Forests has been a cornerstone in the development of this Woodlands Management Plan. The planning team met with a broad constituency of forest users including groups representing the Skunk's Misery Advisory Committee, the Lower Thames Valley Conservation Authority, provincial resource managers, trail riders, hunters, all-terrain vehicle users and 4WD off-road clubs, field naturalists, scientists and educators, and members of County Council, among others. The planning team also conducted a survey of forest users to identify user concerns, priority uses, and compatibility among uses. Written comments were also received from many County residents. Public information sessions were also undertaken following completion of a draft management plan in March 2002. Appendix D lists the individuals and groups who contributed their comments and suggestions. Copies of the comments are available upon request from the County of Middlesex.

It is often stated that forest management is the science and art of achieving a balance between short-term preservation of various existing forest values, management to ensure the long-term renewal of these values, and management for the sustainable production of materials and social values needed by society. The Middlesex County Forests are no exception. Forest users have expressed opinions and have offered suggestions on a variety of issues regarding the use and management of the County Forests. While there are a variety of opinions expressed on specific issues, some general themes have emerged.

County residents have pride in their woodlands and recognize the ecological significance and contribution of the woodlands to the southern Ontario landscape. They are committed to conserving the unique forest communities and wildlife habitats found in the County Forests. They expect this to be accomplished through a variety of management activities including protecting areas of high conservation value forests, sustainable forest management, and by identifying appropriate forest uses.

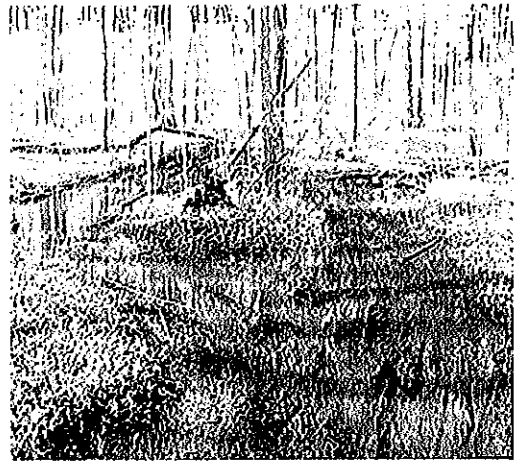
## Concerns and Opportunities

Residents and forest users are concerned about maintaining the ecological integrity of the woodlands, minimizing the impacts of forest use, and ensuring that the woodlands will be available for future generations to enjoy. They are also willing to actively participate in activities designed to achieve these objectives. Of particular concern are the impacts associated with the increased use of forest trails by motorized vehicles, the illegal dumping of garbage, the difficulty experienced by the County in controlling unauthorized uses, and the potential effects of future forest management activities.

The Middlesex County Forests have been used for a plethora of recreational activities and there is strong support for maintaining a variety of uses throughout the County Forests. Low-impact, non-motorized recreational activities such as hiking, nature appreciation, cross-country skiing, and cycling are considered to be compatible with one another and consistent with the broader goal of conserving the ecology of the woodlands. Horseback riding is also considered to be an

appropriate use of the woodlands providing the activity is restricted to existing access roads and that the County place limits on the number of participants in a group at any one time. There is also a long tradition of hunting in the County Forests, in some cases spanning several generations of family members. Forest users support the continued use of the woodlands for this activity.

There is great concern regarding the use of off-road vehicles in the County Forests. Many of the forest access roads have been severely impacted by dirt bikes, ATV's, and 4-wheel drive vehicles. The most visible impacts are severe rutting and widening of the access roads, especially in lowland areas. In some cases, the roads are now impassible for other users and will require repairs. There is also concern that the micro-habitats and the quality of surface water in these damaged areas has been irreparably harmed. For these reasons, County residents feel that the presence of motorized vehicles, particularly dirt bikes, ATV's, and 4-wheel drive vehicles in the forest is not compatible with other uses, nor with the broader goal of



Damaged roads - Newbury Tract.

conserving the ecology of the woodlands. Residents have also expressed concern over the use of snowmobiles in the forests. However, their use is considered compatible, perhaps due to the seasonal nature of the activity. The County may wish to confine the use of snowmobiles to those trails that are sanctioned and maintained by the Ontario Federation of Snowmobile Clubs (OFSC). The Glencoe Snowmobile Club, an OFSC member club, presently maintains trails in the Bayne, Lockwood, McLaren, Purdy, Robinson, Steele, and Hurdle Tracts. Residents have also suggested that the County limit the number of participants in a group at any one time.

Many respondents to the forest user survey and those attending the public meetings have expressed their dismay at the amount of garbage found in the County Forests. There is virtually no tract within the woodlands that is free of garbage, including household waste, animal carcasses, tires, and yard clippings. The woodland tracts are relatively remote and therefore more difficult to patrol on a regular basis. Furthermore, access points are not gated and many forest roads are accessible to light vehicles.

County residents recognize the potential of their woodlands as venues for scientific study and environmental education. The County Forests have been the focus of scientific research for some time including breeding bird surveys, butterfly surveys, and research to assess forest growth. The woodlands are also considered to be a valuable resource for environmental education, especially for area schools.

Finally, County residents have expressed strong support for active and appropriate management of the County Forests. This support is predicated on the use of silvicultural systems that are appropriate for the forest communities involved, that biological diversity and wildlife habitats are maintained, and that any potential impacts of forest management activities on soil and groundwater are minimized. The potential of the County Forests to generate considerable revenues from the sale of timber is also acknowledged. However, residents place a low priority

on revenue generation as a management objective. Revenues from the sale of timber are considered to be a by-product of sustainable forest management and are not to be used as a rationale for timber harvesting. Residents suggest that any revenues from the sale of timber be “re-invested” in the forest to support the various management proposed in this management plan.

The opinions and suggestions from County residents and forest users have been consolidated into broad themes, which in turn lead to objectives and recommended actions for integrated forest management of the Middlesex County Forests.



# CHAPTER 4: INTEGRATED FOREST MANAGEMENT

## Vision

It is now widely accepted that an integrated ecosystem-based approach to forest management is required to maintain the ecological integrity and productive capacity of the forest while providing multiple benefits to society (Heilman 1990; Kimmins 1992). This paradigm, termed ecosystem management, is founded on the concept of sustainability. The vision for the future management of the Middlesex County Forests reflects this approach to management.

*The Middlesex County Forests will be managed to...Ensure the ecological sustainability of the Middlesex County Forests and their associated natural heritage features and social and economic values through the utilization of an integrated ecosystem-based approach to management.*

## Themes and Recommended Actions

### Theme

#### Forest Stewardship

The preparation of a new Woodlands Management Plan provides opportunities for innovative approaches to managing the Middlesex County Forests. However, all of the planning and management techniques will be in vain if there is no commitment to sustaining the many different values provided by the woodlands. The stewardship ethic that has been evident during the management planning process must be sustained and carried forward to the implementation phase of the Woodlands Management Plan. The participation of all interested parties will be required if the objectives of the plan are to be achieved.

#### Objective 1. Woodlands Advisory Committee

It is recommended that the County establish a Woodlands Advisory Committee (WAC) with membership representing the various forest users, technical agencies, and the County. The Skunk's Misery Advisory Committee and the Dorchester Swamp Local Advisory Group are already actively participating in the development of this management plan. These groups could form the core of a WAC with some possible modifications to accommodate those forest users who may not currently be members of either group.

Possible roles for the WAC include education and public involvement in monitoring forest use. This will likely be the most effective means of controlling unwanted activities in the County Forests. The Dorchester Swamp Model Management Strategy (Upper Thames River Conservation Authority 1997) provides a useful model for public education involving contacting private landowners adjacent to County Forests, articles in local newspapers, and information packages. Education should be combined with active public involvement in a "Forest Watch" program and an annual "Green Up – Clean Up" day. These programs could be coordinated through the proposed WAC.

## **Recommended Actions**

- 1.1 The County should establish a Woodlands Advisory Committee with clearly defined terms of reference and membership comprised of forest users, representatives from technical agencies, and the County.
- 1.2 Through the proposed Woodlands Advisory Committee, the County should develop a public awareness and education strategy to further inform forest users and County residents of the biological significance and sensitivity of the County Forests.
- 1.3 Through the proposed Woodlands Advisory Committee, the County should facilitate the formation of a "Forest Watch" program to monitor forest use and other programs and activities to maintain the County Forests free of garbage.

## ***Theme***

### **Conservation of Natural Heritage Woodlands**

The Middlesex County Forests are recognized as areas of biological significance. Many of the County Forests in Southwest Middlesex are within the larger Skunk's Misery/Bothwell Forest ANSI and are recognized as habitat for a diverse range of flora and fauna indicative of Southwestern Ontario. Parts of the Skunk's Misery forest have also been classified as Provincially Significant (Class 1) Wetlands. The Banks Tract within the Dorchester Swamp ANSI and Big Swamp in North Middlesex are also recognized as Provincially Significant Wetlands.

The County Forests support diverse vegetation communities, including forest communities that are representative of the Carolinian Life Zone. Some 39 tree species and over 400 species of vascular plants have been identified in the County Forests. Many plant species are considered provincially and/or regionally rare.

The County Forests also provide a variety of habitats for wildlife and contain most of the forest-dwelling birds, reptiles, amphibians, mammals and butterflies that should be present in southwestern Ontario woodlands. Some bird species such as Ovenbird and Scarlet Tanager, which are not found in large numbers elsewhere in southwestern Ontario, are abundant in the Middlesex County Forests. These two species are examples of birds that are classified as area-sensitive and forest interior. As well, some 20 different species of warblers, and at least three species of hawks are known to breed in the County Forests.

Conservation of these unique natural heritage woodlands is of fundamental importance and concern to County residents. There have been a number of suggestions as to how this should be accomplished. Common elements from these suggestions include:

- Conserving biological diversity by protecting areas of high conservation value forest and by promoting diversity of naturally occurring forest types and age classes, including representative late seral ("old growth") forests, and
- Conserving and enhancing Core Forest areas, prairie and savanna communities, and other wildlife habitats.

## **Objective 2: Conserving Biological Diversity**

Healthy forests include a diversity of naturally occurring forest types and age classes. These features are achieved by employing a suite of forest management activities including the protection of areas of unique High Conservation Value Forest (HCVF) and the application of appropriate silvicultural systems.

Approximately 79% of the County Forests are comprised of mid-tolerant hardwood forest types, i.e. soft maple-oak, soft maple, and oak forest communities. Within these forest communities there are pockets of forest that are unique within the context of the County Forests and may also be unique within the regional or provincial landscape. The following criteria are proposed for identifying potential areas of High Conservation Value Forest:

1. Stands that contain provincially rare flora,
2. Woodlands that are in the late seral stage of development, (i.e.  $\geq 90$  years of age),
3. Areas that have been identified as "hot spots" for rare species of birds, and
4. Areas that satisfy one or more of the above criteria and contain Core Forest area.

Applying these criteria yields several potential locations of HCVF and their characteristics as shown in Table 6. Some forest stands such as Bayne 3b, Leech 8a, and Sayler 22b satisfy more than one of the proposed criteria. Bayne 3b is an excellent example of upland deciduous forest and contains some very large trees including tulip trees. Leech 8a and Miller 13b are significant habitat for several rare species of warbler and Acadian flycatcher. These three stands would also be excellent sites for further research and study. The County may wish to consider these stands as the priority areas of HCVF in the County Forests.

Where possible, natural ecological functions (e.g. windthrow, natural succession) should prevail as the agents of change in HCVF areas. Active management in these areas should be limited to those activities that will protect or enhance the unique features of the forest. Active management might also include felling hazard trees and protecting the forest from invasive species, exotic forest pests, and excessive disturbance from human activities.

Silvicultural systems and forest management practices can also be used to maintain or enhance forest diversity. Previous management activities in the County Forests appear to have favoured the use of the single-tree selection silvicultural system for managing hardwood stands. This silvicultural system is most appropriate for promoting growth and development in upland stands of shade-tolerant hardwood species such as sugar maple and American beech (MNR 2000a, 2002).

Table 6. Potential Areas of High Conservation Value Forest in the Middlesex County Forests.

| TRACT    | STAND ID | TOTAL AREA (HA) | CORE FOREST AREA (HA) | FOREST TYPE           | AGE <sup>2</sup> | RARE FLORA SPECIES OBSERVED                     | RARE BIRD SPECIES OBSERVED   |
|----------|----------|-----------------|-----------------------|-----------------------|------------------|---|--|
| Bayne    | 3b       | 22              | 7                     | Mixed deciduous       | 90               | Tulip tree<br>Broad beech fern                  | No   |
| Leech    | 8a       | 18              | 6                     | Soft maple-Oak        | 70               | American chestnut                               | Acadian flycatcher<br>Cerulean warbler<br>Hooded warbler                               |
| Miller   | 13b      | 34              | 16                    | Oak                   | 70               | No  | Acadian flycatcher<br>Prothonotary warbler<br>Hooded warbler                           |
| Sayler   | 22b      | 36              | 11                    | Oak                   | 90               | No  | Cerulean warbler   |
| Robinson | 21a      | 19              | 1                     | Soft maple            | 65               | Tulip tree                                      | No   |
| Vey      | 27a      | 28              | 12                    | Soft maple-Oak        | 90               | American chestnut<br>Panic grass<br>Oak savanna | No   |
| Misery   | 14a      | 13              | 1                     | White pine plantation | 45               | Fox grape                                       | No   |
| Newbury  | 16b      | 123             | 66                    | Soft maple-Oak        | 75               | American chestnut (south east portion of tract) | Acadian flycatcher<br>Cerulean warbler<br>Hooded warbler (south east portion of tract) |

Mid-tolerant species such as oak, hickory, sassafras, tulip and hackberry may require larger canopy openings for regeneration and development. Although there is excellent regeneration throughout most of the County Forests, seedlings and saplings of these mid-tolerant species are generally lacking. It has been suggested that group selection may be a more appropriate silvicultural system for managing these mid-tolerant forest communities. Trees are removed in small groups of two or more opening the canopy to a greater degree than single-tree selection. Ontario experience with group selection is limited. However there are a number of examples in the central Appalachians hardwood forests in the United States where the approach has been successful for mid-tolerant hardwoods (Elliott et.al. 1997, Miller et.al. 1995, Law and Lorimer 1989). More Ontario-based research is required to provide a clearer picture of ideal size openings. Middlesex County can assume a leading role by participating in the development of appropriate silvicultural systems for managing mid-tolerant hardwood forests.

Approximately 44% of the County Forests are 70 years of age or older and 10% are more than 90 years old. Although these mature forests may not be considered "old growth", they do exhibit many characteristics often associated with late seral forests including large trees and numerous cavity trees and snags. Silvicultural systems and forest management practices can be modified to allow forests to mature to the late seral stage. Stabb (1996) and MNR (1996) provide general guidelines and practices for managing forests to retain or restore late seral features. The County's silvicultural methods already include many of the recommended practices.

- Creating canopy gaps 10-50 metres in diameter to encourage growth of mid-tolerant species,

<sup>2</sup> Late seral forest ≥ 90 years old.

- Retaining cavity trees and snags and increasing the amount of woody material on the forest floor,
- Leaving at least three trees larger than 50 cm in diameter in each hectare,
- Retaining higher basal areas in the largest diameter classes, and
- Extending timber harvesting cycles (the period between harvests)

### **Recommended Actions**

- 2.1 Within the first 5-year period of this plan, the County should develop criteria for conserving areas of high conservation value forest and should establish a system of High Conservation Value Forests within the County Forests.
- 2.2 The County should participate in research to identify appropriate silvicultural systems and management guidelines to ensure the continued presence of mid-tolerant forest communities and forests having the potential to exhibit characteristics associated with late seral forests.

### **Objective 3: Conserving and Enhancing Core Forest Areas, Prairie and Savanna Communities, and Other Wildlife Habitats**

The Middlesex County Forests provide significant habitats for a variety of flora and fauna and contribute to the county's "green system" of Natural Heritage Features. Of primary importance are the Core Forest areas and woodland corridors that provide habitats for forest interior species. These Core Forest areas and associated corridors should be maintained and enhanced with additional land acquisitions or other means of protecting or enhancing forested lands where feasible. This could be accomplished through land purchases or other means such as land trusts.

Breeding bird surveys carried out from 1999 to 2001 have revealed that the Leech, Miller/Newbury, and Saylor Tracts are "hot spots" for rare species of warblers and the Acadian flycatcher (Figure 3). It is also interesting to note that these species appear to be associated with the Core Forest areas within these particular tracts. The forests in these tracts are predominately soft maple-oak and oak forest types with a high proportion of large diameter trees, high basal area (up to 30 m<sup>2</sup>/ha) and dense canopy cover.

As with other areas of concern, silvicultural systems should be suitably modified to ensure that forestry operations serve to maintain or enhance habitats for rare species. A forest-level approach to bird habitat management is recommended over the traditional stand-level approach to management. In this regard, there are several references that can be used to guide the development of appropriate silvicultural systems (Dickson et.al. 1993, Thompson et.al. 1993, Thompson et.al. 1995, Annand and Thompson 1997). Many of the silvicultural methods that have been recommended for conserving biodiversity and promoting forests with late seral characteristics are also appropriate for providing habitats for rare species of wildlife. Some guidelines specific to individual species are:

- Retain and manage for super canopy trees, especially white oak, for Cerulean warbler and other canopy specialists,
- Conserve Core Forest areas where clusters of Acadian flycatcher and Cerulean warblers occur,

- Manage to retain the existing Hackberry trees and manage to increase the numbers of Hackberry (food source for larvae of Tawny and Hackberry Emperor butterflies),
- Retain patches of mature woodland interspersed with small openings that promote the growth of Prickly-ash (food source for larvae of the Giant swallowtail butterfly).

Silvicultural activities can also be used to enhance other habitat features and to promote biodiversity. A general discussion of wildlife habitat requirements and biodiversity considerations can be found in “*A silvicultural guide to managing southern Ontario forests*” (MNR 2000a). Habitat components of special importance that can be enhanced through well-crafted silvicultural prescriptions and tree marking protocols are (i) cavity trees, (ii) coarse woody debris, (iii) stick nests, (iv) mast trees, and (v) conifer cover. The “*Ontario Tree Marking Guide*” (MNR 2001) provides guidelines for the provision of these important habitat features and for maintaining biodiversity. Other guidelines cover the habitat requirements for individual indicator species such as Pileated woodpecker (Naylor et.al. 1996). The County’s silvicultural methods already follow many of the recommended guidelines for the provision of wildlife habitat.

Finally, there are elements of prairie and savanna communities occurring in canopy openings such as along roadsides, trails and drainage ditches within the County Forests. Prairie and Savanna species require high light conditions. Under natural conditions, prairies and savannas are maintained by fairly frequent fires. A major threat to prairie and savanna habitat is shade, which occurs when trees and shrubs are allowed to establish and grow.

One site, in the southern corner of the Vey Tract, close to the junction with Newbury Tract has scattered, open grown White oak and Black oak and a dense regeneration of shrubs, vines and smaller trees. In the mid 1960’s this site was relatively open and several prairie associates have been recorded here. Clearing the saplings, shrubs and vines that have grown up, thus allowing the shade intolerant prairie elements to grow will help restore this area of savanna.

Other prairie elements can be protected by preventing ingrowth of road verges and ditches. Occasional mowing and/or burning will help to keep these areas open. Burning should take place in early spring. Mowing should be confined to early spring and or late fall. Most prairie and savanna species flower late in the summer or in early fall. Mowing during mid summer prevents these species from flowering and also destroys the large populations of butterflies and other insects that they support.

### **Recommended Actions**

- 3.1 The County should build upon existing Core Forest areas and linkage corridors through land acquisition or other means where feasible.
- 3.2 The County should consult with technical agencies, ecologists, and wildlife specialists to develop silvicultural and vegetation management systems that will conserve the structure and function of Core Forest areas, woodland corridors, prairie and savanna communities, and other wildlife habitats.

# Figure 3





## Rare Bird Species Observations

Middlesex County Forest  
"Skunks Misery Complex"

### Key to Features

-  Middlesex County Forest
-  LTVCA Forest
-  Woodland
-  Core forest area
-  County boundary
-  County road
-  Railroad
-  Forest access

### Rare bird species observations

-  Acadian fly catcher
-  Cerulian warbler
-  Hooded warbler
-  Prothonotary Warbler

Source: Breeding Bird Surveys, 1999-2001.  
Acadian Flycatcher - Hooded Warbler  
recovery team.

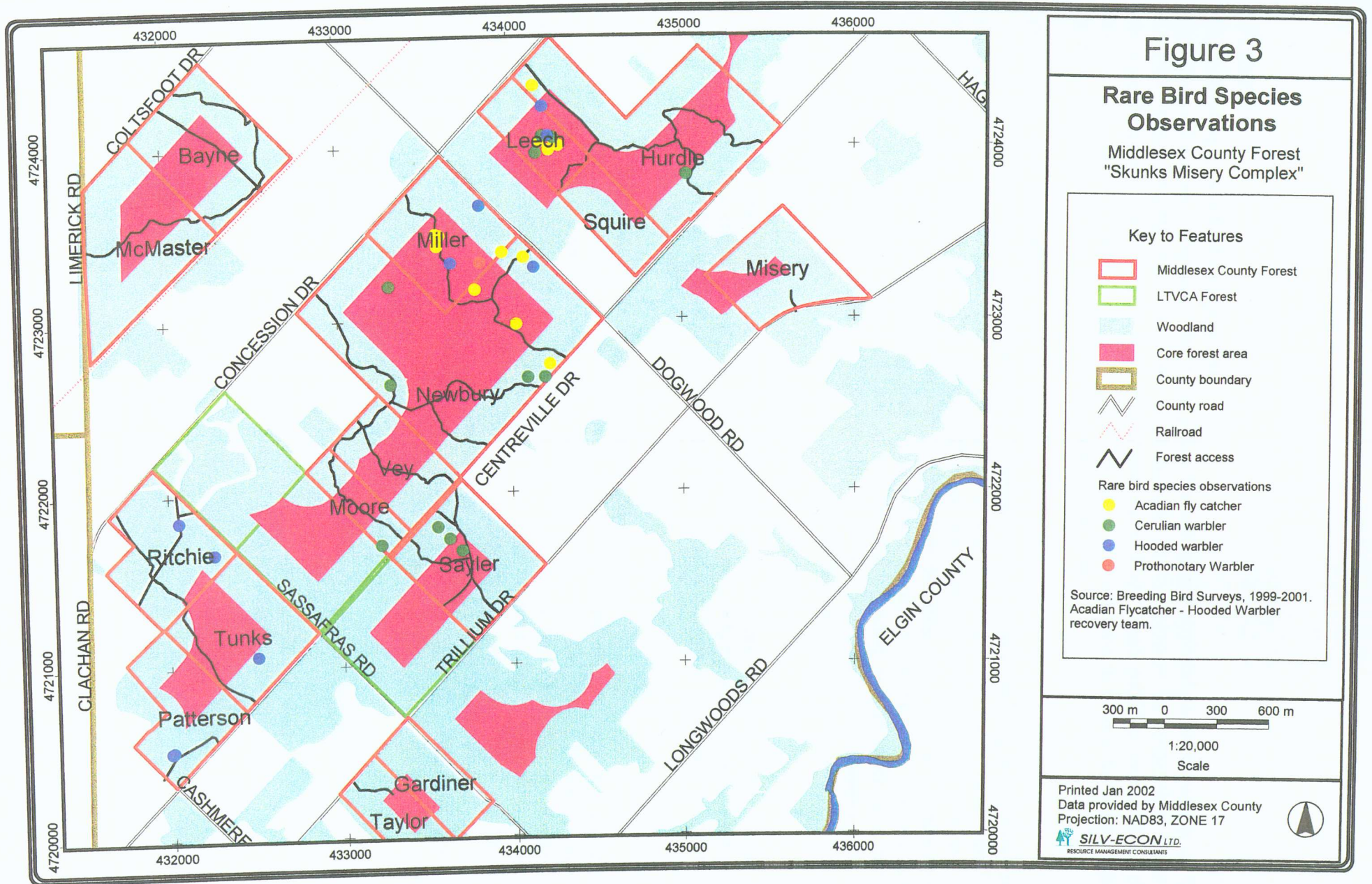
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## *Theme*

### **Sustainable Forest Management**

County residents have expressed strong support for active and appropriate management of the County Forests. Middlesex County has demonstrated its commitment to sustainable forestry through the development of this Woodlands Management Plan, broad public consultation on the future of the County Forests, a current forest inventory, participation in natural heritage studies and scientific research, and a review of appropriate forest uses.

#### **Objective 4. Forest Certification**

The County may wish to consider having its Woodlands certified as complying with recognized standards for sustainable forestry within the period of this plan. At present, there are no certified forests in southwestern Ontario. The County through this Woodlands Management Plan and the associated public consultation, forest inventory, and other planning activities, has already made an impressive start towards meeting the requirements of forest certification. By pursuing certification of its forests, the County would be assuming a leading role in sustainable forest management in southwestern Ontario. Certification would also provide County residents with the assurances that their forests are being managed on a sustainable basis.

#### **Recommended Actions**

- 4.1 Within the first 10 years of this management plan, the County should consider having its Woodlands certified as complying with recognized standards for sustainable forestry. The requirements for certification already embody many of the other management objectives and actions recommended in this plan.

#### **Objective 5. Sustainable Forest Management Practices**

The County follows Ministry of Natural Resources forest management standards and guidelines (MNR 2000a, 2001). Recent studies, including ongoing research in the County Forests, suggests that silvicultural systems designed to promote multi-aged forest structures through single-tree and small group selection are appropriate for promoting forest health and regeneration of native species while conserving the ecology of those forest communities found in the County Forests. In some cases, these approaches to management may need to be modified in order to conserve the diversity of floral or faunal communities, protect Core Forest areas, and minimize site disturbance (O'Hara 1998, Elliott 1998, Annand and Thompson 1997, Dey and Parker 1996, Dickson et.al. 1993, Stabb 1996).

The long-term sustainable timber supply for the Middlesex County Forest has been estimated following the approach described in "BOREAL©: A tactical planning system for forest ecosystem management" (Puttock et.al. 1998). The results are reflected in the 5-year silvicultural schedule 2002-2006 that accompanies this 20-year Woodlands Management Plan.

Forest management activities will provide revenues from the sale of timber. However, revenue generation should not be the rationale for timber extraction. Rather, timber harvesting should be used as a mechanism for achieving a variety of silvicultural and management objectives. Revenues from the sale of timber are expected to offset direct costs associated with stand-level management activities such as preparing silvicultural prescriptions, tree marking, and harvest

supervision. However, these revenues may not be sufficient to fully support other proposed management activities such as road rehabilitation, gates and signage, and property boundary marking.

Of concern is the common practice by harvesting contractors in southwestern Ontario to employ a two-pass harvesting system in hardwood stands. Under a two-pass harvesting system, veneer and sawlogs are removed first followed by a second entry at a later date to remove fuelwood. This requires additional travel by the skidder across the site and prolongs the duration of the harvesting activities, further disrupting the activities for other forest users. Harvesting contractors should be encouraged to remove the fuelwood component of the harvest at the same time that other more valuable products are removed.

#### **Recommended Actions:**

- 5.1 The County should implement the 5-year forest management schedule that accompanies this plan.
- 5.2 Revenues from the sale of timber should be “re-invested” in the forest to achieve other forest management and use objectives identified in this plan.
- 5.3 The County should allocate sufficient funds to ensure the successful implementation of this management plan.
- 5.4 The County should continue to work with harvesting contractors in developing timber utilization standards and harvesting systems that will conserve the ecology of the County Forests while meeting the needs of other forest users.
- 5.5 A forest management prescription should be prepared for each stand that is scheduled to receive management activities. Trees to be removed should be marked by provincial Certified Tree Markers.

#### **Objective 6. Forest Access, Signage, and Property Boundaries**

Good forest access is a fundamental requirement for sustainable forest management. The Middlesex County Forests contain approximately 26 km of access roads and trails (Figures 4a-e). Most of the tracts have one or more entrances and most are accessible (at least in part) to light vehicles. Unfortunately this contributes to garbage dumping in the woodlands. Heavy use by off-road vehicles has also left many access roads in poor condition and inaccessible to other forest users. These roads will require repairs during the first 5-year period of this management plan.

Some tracts such as Saylor, Vey, and Newbury tracts (Figure 4e) contain more trails than are required for forest management and recreation. Many of these are ‘spontaneous trails’, recently created by off-road vehicles. This management plan recommends the decommissioning of some forest entrances and many of the “spontaneous trails”. However, before this can be accomplished, it will be necessary to control those uses that are contributing to the damage of the access roads and trails. Gates or barriers are recommended at tract entrances to prevent access by light vehicles. The use of gates or barriers to limit access by light vehicles has been successful in other county and regional forests.

Few of the forest tracts have parking areas off the public roadways. Vehicles parked along the shoulder of the roads have sometimes caused problems for area farmers when moving large equipment or attempting to access their fields. It may also be necessary therefore, to construct small parking lots at the entrances to some tracts depending on the level of use.

Many of the forest tracts do not have adequate signage to identify the name of the tract, property boundaries, and any regulations regarding the use of the woodlands. Signage can be effective in informing residents of permitted and unauthorized uses of the forest, highlighting the past history of silvicultural management in the forest, and in raising awareness of the benefits that County residents derive from their forests.

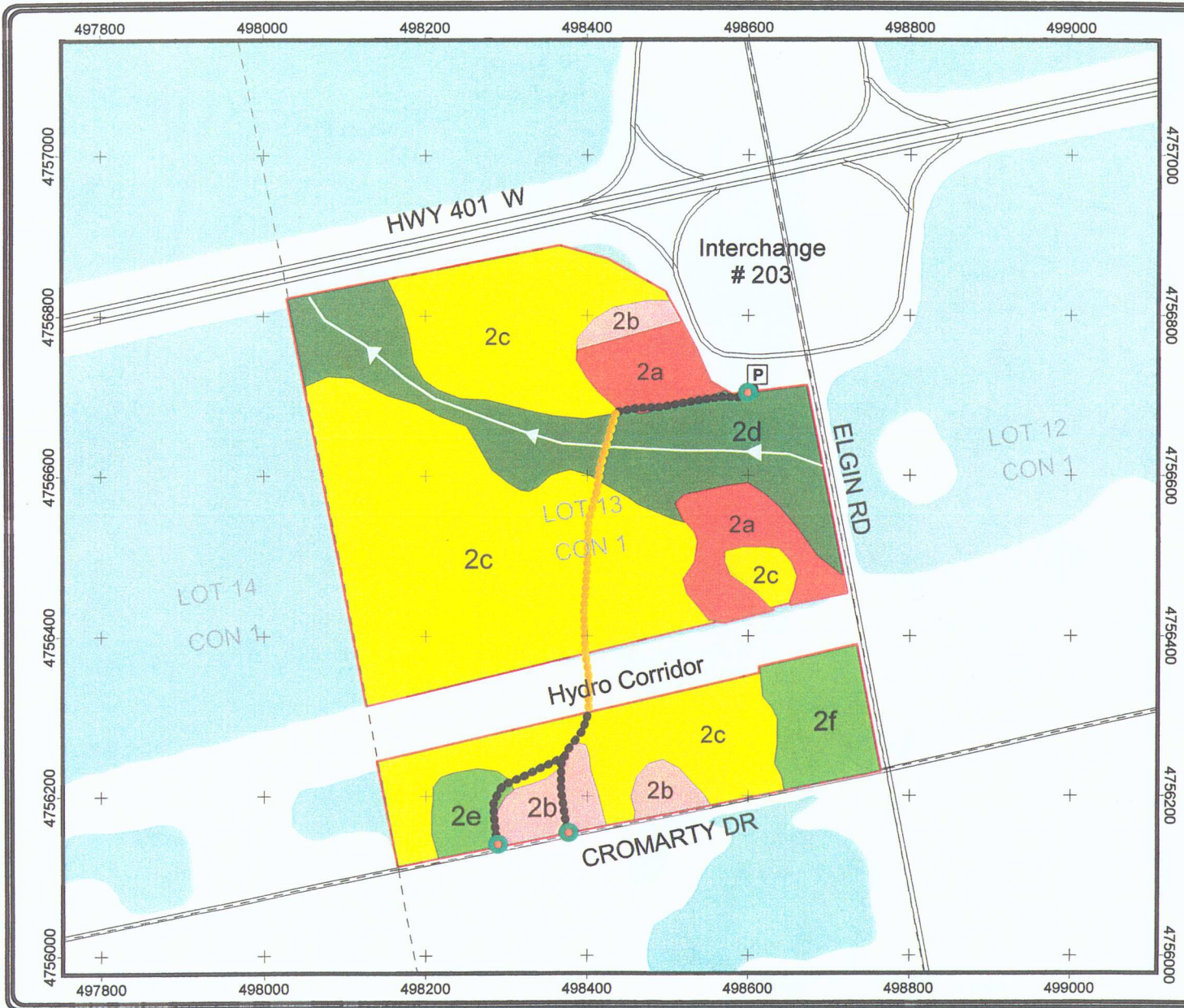
Some of the forest tracts have shared property boundaries with private woodlands. These property lines are not marked. Clearly defined forest property boundaries would help to minimize the possibility that forest users may inadvertently cross into private woodlands. It is also of utmost importance to have clearly defined property boundaries prior to undertaking any forest management activities.

Finally, adjacent landowners have expressed concern regarding trees and large limbs that encroach into their property from County lands. The County should take appropriate measures to resolve these problems when they arise.

#### **Recommended Actions**

- 6.1 The County should maintain a system of access roads and trails sufficient to meet the requirements of forest management and recreation. Recommended routes are indicated in black on the accompanying forest access maps (Figures 4a-e). Parking areas may need to be constructed for some tracts depending on the level of use.
- 6.2 The County should undertake those repairs necessary to restore the recommended access routes to conditions suitable for forest management purposes.
- 6.3 Entrances and trails that are not required for forest management or recreation should be decommissioned. Trails that are recommended for decommissioning are indicated in yellow on the accompanying forest access maps (see Figure 4e).
- 6.4 Gates or barriers should be erected at tract entrances to prevent entry by light vehicles while still providing access for permitted forest uses.
- 6.5 The County should erect appropriate signage at property entrances indicating tract name, permitted uses, and other relevant information.
- 6.6 The County should mark all property boundaries in the County Forests that are shared with private woodlands and with property owned by the LTVCA and should work with adjacent landowners to resolve any problems that may arise from common property boundaries (e.g. trees or limbs that encroach on private property).





# Figure 4a

## Access and Forest Type

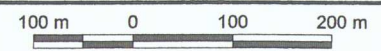
Middlesex County Forest Banks Tract

**Key to Features**

- Forest access
- Proposed trails
- Trails proposed for closure
- Proposed gates or posts
- Parking lot
- Dug pond
- Culvert
- Railroad
- County road
- Watercourse / drain
- Natural gas pipeline
- Lots and concessions
- Township boundary
- Middlesex County Forest
- Woodland

**Forest type**

- Mixed coniferous
- Mixed deciduous
- Oak
- Red Pine Plantation
- Soft maple
- Soft maple-Oak
- Spruce Plantation
- White Pine Plantation
- 10a Compartment number



1:5,000  
Scale

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# Figure 4b

## Access and Forest Type

Middlesex County Forest  
Big Swamp Tract

### Key to Features

- Forest access
- Proposed trails
- Trails proposed for closure
- Proposed gates or posts
- Parking lot
- Dug pond
- Culvert
- Railroad
- County road
- Watercourse / drain
- Natural gas pipeline
- Lots and concessions
- Township boundary
- Middlesex County Forest
- Woodland

### Forest type

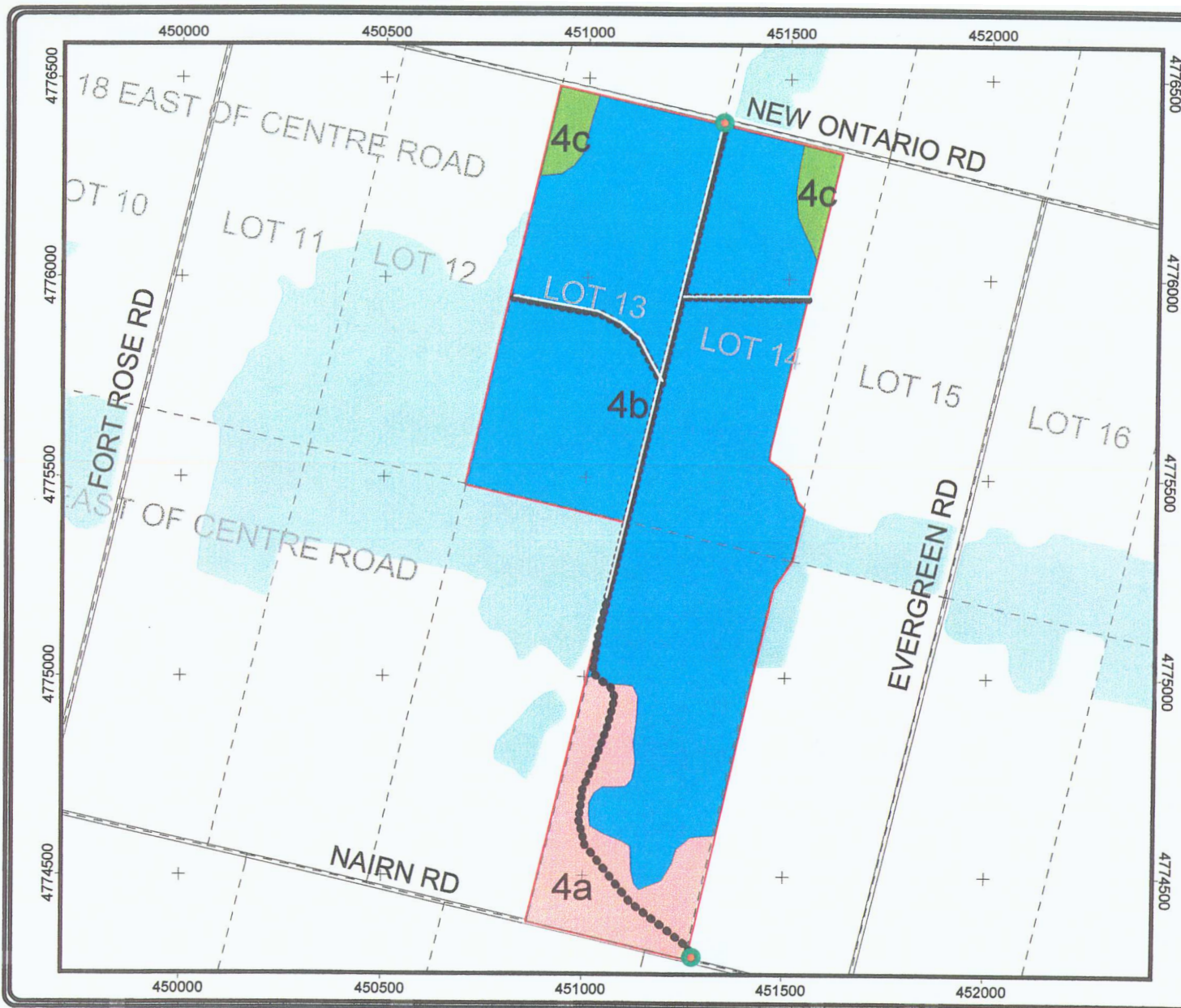
- Mixed coniferous
- Mixed deciduous
- Oak
- Red Pine Plantation
- Soft maple
- Soft maple-Oak
- Spruce Plantation
- White Pine Plantation
- 10a** Compartment number



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# Figure 4c

## Access and Forest Type

Middlesex County Forest  
McLaren, Purdy, Atkinson Tracts

**Key to Features**

- Forest access
- Proposed trails
- Trails proposed for closure
- Proposed gates or posts
- Parking lot
- Dug pond
- Culvert
- Railroad
- County road
- Watercourse / drain
- Natural gas pipeline
- Lots and concessions
- Township boundary
- Middlesex County Forest
- Woodland

**Forest type**

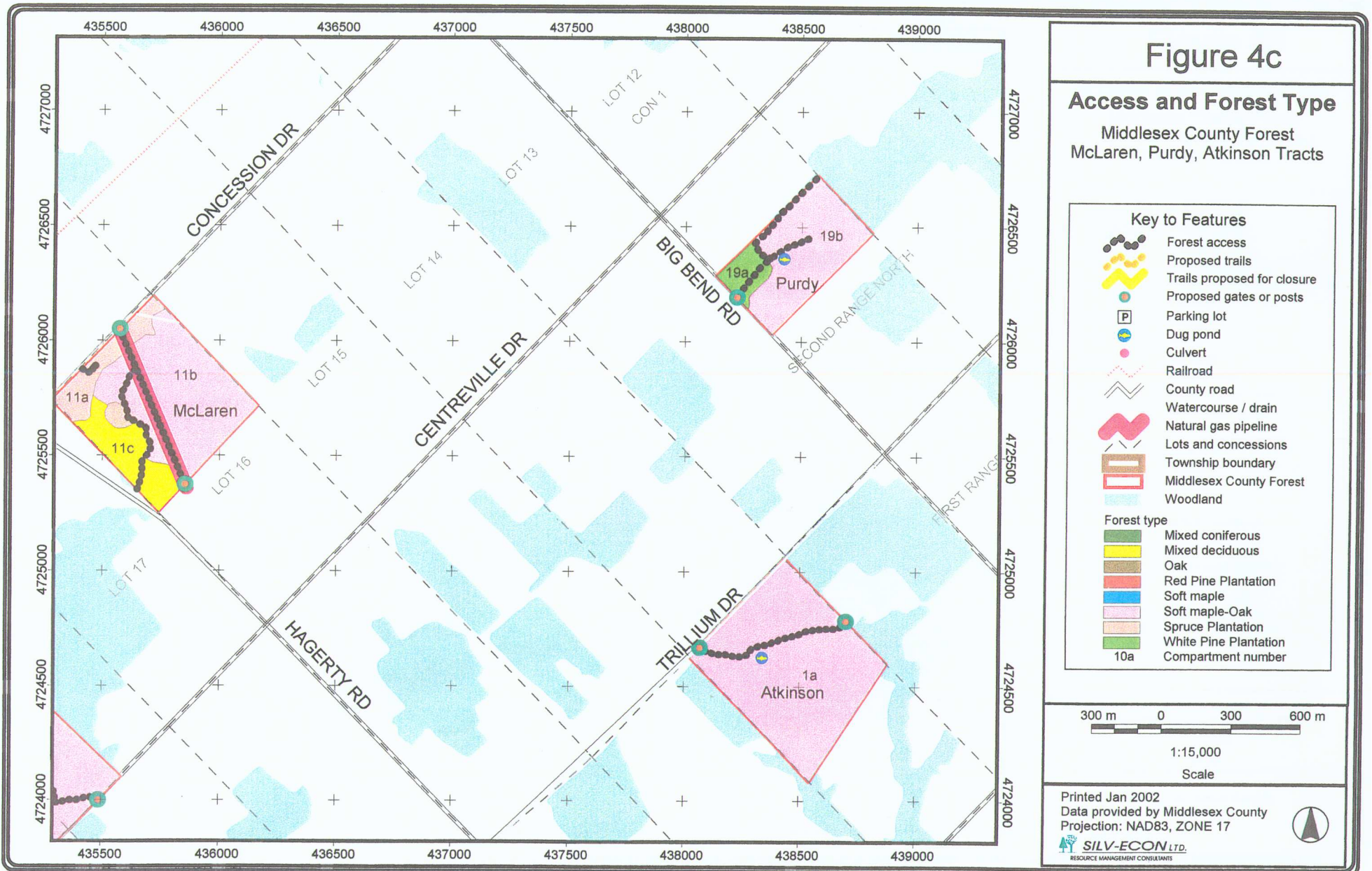
- Mixed coniferous
- Mixed deciduous
- Oak
- Red Pine Plantation
- Soft maple
- Soft maple-Oak
- Spruce Plantation
- White Pine Plantation
- 10a  
Compartment number



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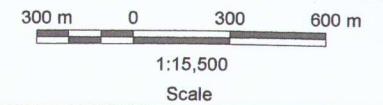
# Figure 4d

## Access and Forest Type

Middlesex County Forest  
Plaine, Livingston, Lockwood,  
Clark, Robinson, Steele Tracts

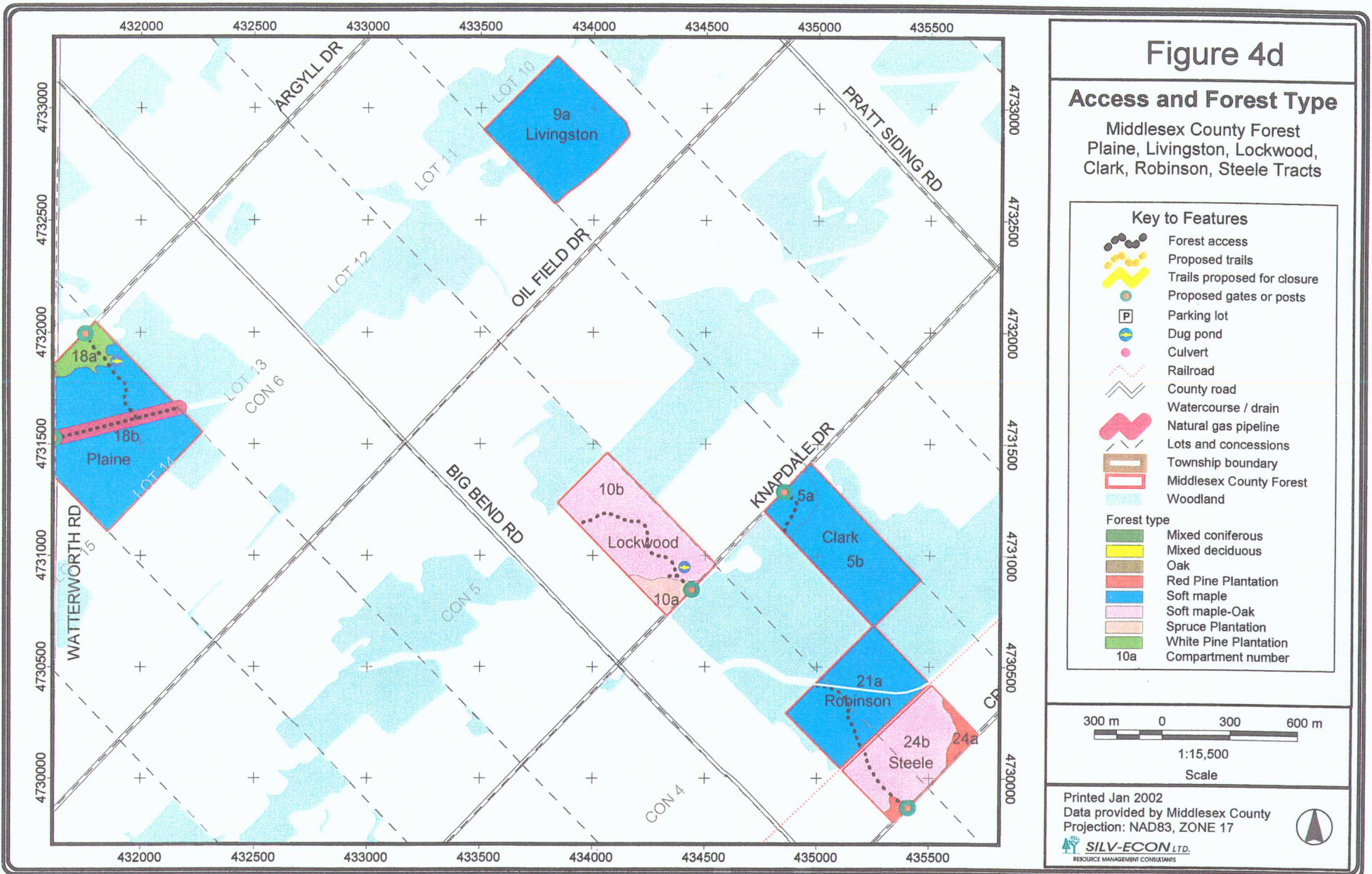
### Key to Features

- Forest access
  - Proposed trails
  - Trails proposed for closure
  - Proposed gates or posts
  - Parking lot
  - Dug pond
  - Culvert
  - Railroad
  - County road
  - Watercourse / drain
  - Natural gas pipeline
  - Lots and concessions
  - Township boundary
  - Middlesex County Forest
  - Woodland
- 
- ### Forest type
- Mixed coniferous
  - Mixed deciduous
  - Oak
  - Red Pine Plantation
  - Soft maple
  - Soft maple-Oak
  - Spruce Plantation
  - White Pine Plantation
  - 10a Compartment number



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# Figure 4e

## Access and Forest Type

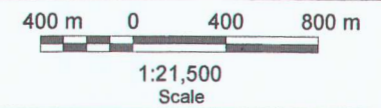
Middlesex County Forest  
"Skunks Misery Complex"

**Key to Features**

- Forest access
- Proposed trails
- Trails proposed for closure
- Proposed gates or posts
- Parking lot
- Dug pond
- Culvert
- Railroad
- County road
- Watercourse / drain
- Natural gas pipeline
- Lots and concessions
- Township boundary
- Middlesex County Forest
- Woodland

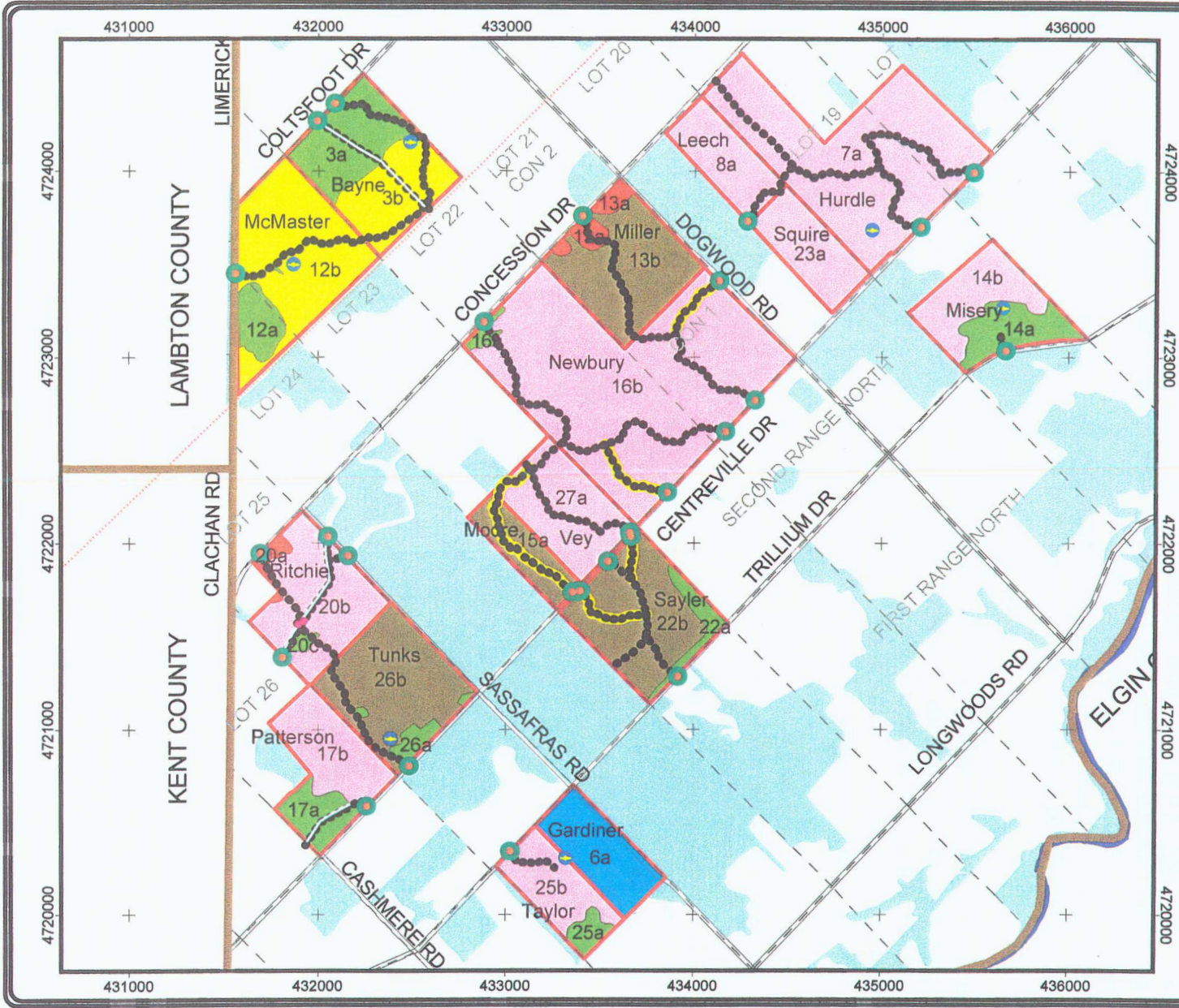
**Forest type**

- Mixed coniferous
- Mixed deciduous
- Oak
- Red Pine Plantation
- Soft maple
- Soft maple-Oak
- Spruce Plantation
- White Pine Plantation
- Compartment number



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## ***Theme***

### **Science and Education**

The Middlesex County Forests are recognized for their biological significance and as a result, are potential venues for scientific study and environmental education. It is evident from the public comments and the responses to the forest user survey that County residents recognize this potential and wish to see their forests used for these purposes.

#### **Objective 7. Science and Education**

The County Forests have been the focus of scientific study for some time. This includes Provincial Growth and Yield research plots in both the McLaren and Big Swamp Tracts. The County has also provided study sites in the McLaren and Bayne Tracts for collaborative research on the responses of vegetation, birds and amphibians to logging in the Carolinian Zone. The County Forests have also been the subject of recent inventories to catalogue the flora and fauna of woodlands in the region.

The information that has been gathered as a result of these studies is useful for identifying baseline forest conditions for a variety of possible long-term scientific studies such as growth rates in wetland forest communities, management systems for conserving biological diversity, and techniques for maintaining forest interior habitats. These kinds of studies are typically long-term and require the stability and continuity of ownership and management that is apparent with the Middlesex County Forests.

The County Forests also provide opportunities for environmental education, especially for area schools. The Ontario curriculum includes several topics on the environment for which field studies are an integral component of the teaching and learning experience. Several elementary and secondary schools are located within 15 km of one or more tracts. Forest tracts such as McLaren, Purdy, Big Swamp, and Banks are possible sites for environmental education due to their proximity to area schools and the diverse environments available for study.

#### **Recommended Actions**

- 7.1 The County should continue to support scientific research related to the forest environment and forest use. This would usually involve providing sites for scientific study but could, where feasible, involve funding or in-kind support.
- 7.2 The County should work with area schools to provide opportunities for environmental education in one or more forest tracts. Infrastructure improvements such as trails, washroom facilities, and parking areas may be required to facilitate environmental education in the designated tract(s).

## Theme

### Recreation

County residents have expressed a strong preference for permitting low-impact, non-motorized recreational activities in the County Forests. Some residents have proposed that separate use zones be established to minimize conflicts between various user groups. Others have suggested that the County issue user permits as a way of regulating the frequency and intensity of the different uses. It will be important for forest users to work together to establish guidelines or rules for forest use and to resolve potential conflicts. This is expected to be one of the primary functions of the proposed Woodlands Advisory Committee. Table 5 lists the proposed recreational uses of the County Forests. Restrictions are recommended for some of the proposed activities.

Table 7. Proposed recreational activities for the Middlesex County Forests.

| ACTIVITY                                 | RECOMMENDED RESTRICTIONS  |
|--|---|
| Hiking<br>Birding<br>Nature Appreciation | None  |
| Cross-country skiing<br>Snowshoeing      | None  |
| Dog walking                              | Dogs should be leashed to minimize danger to wildlife and other forest users.<br>"Stoop and scoop" should apply.  |
| Horseback riding                         | Establish rules for trail etiquette. Limits on the number of participants in a group to be determined by the County in consultation with the Woodlands Advisory Committee.  |
| Hunting (all forms)                      | As required by Provincial hunting regulations and applicable municipal by-laws.<br>Middlesex County should develop a procedure for issuing hunting permits for the County Forests.  |
| Mountain biking<br>Recreational cycling  | Establish rules for use and trail etiquette.  |
| Snowmobiling                             | Use restricted to tracts with existing OFSC sanctioned trails - Bayne, Lockwood, McLaren, Purdy, Robinson, Steele, & Hurdle Tracts.<br>Approval for new trails and limits on the number of participants in a group to be determined by the County in consultation with the Woodlands Advisory Committee.<br>OFSC & associated clubs to maintain trails and monitor use. |

### Objective 8. Recreation

A number of recreational activities are proposed for the County Forests. These activities are considered to be compatible with one another and consistent with the broader goal of conserving the ecology of the woodlands. Restrictions are recommended on some of the activities. Forest users should be encouraged to assist with maintaining the network of access trails and monitoring forest use.

In some tracts, it may be necessary to upgrade the trails to make them accessible to forest users. For example, a boardwalk has been proposed in the Banks Tract to link existing trails in the north and south portions of the tract.

**Recommended Actions**

- 8.1 The County should permit and support the recreational uses proposed in Table 7.
- 8.2 The County, in consultation with the proposed Woodlands Advisory Committee, should develop rules and establish guidelines for recreational use in County Forests.
- 8.3 Forest users should be encouraged to assist with trail maintenance and with monitoring use.
- 8.4 The County should upgrade access roads and trails to make them accessible to forest users.



# CHAPTER 5: SUSTAINABLE TIMBER MANAGEMENT

## Background

The long-term sustainable timber management for the Middlesex County Forests is estimated following the approach described in "BOREAL: A tactical planning system for forest ecosystem management" (Puttock et al. 1998). The system projects outcomes of management alternatives in terms of sustainable harvest area. System components include descriptive statistics and other information that describe the state of the forest, silvicultural systems and yield tables, and various policy scenarios.

The deciduous forest communities within the County Forests are dominated by stands 51 – 90 years of age. Conifer plantations are generally younger, 11-60 years old (Table 8). It is assumed that stands Bayne 3b (22.4 ha), Leech 8a (18.5 ha), and Miller 13b (34.4 ha), will form the foundation of the proposed system of High Conservation Value Forests within the County Forests and will not be available for timber production during the term of this management plan. Based on this assumption, some 965 hectares can be considered for management. However, it is possible that additional area within some stands would not be managed due to operating constraints, e.g. sensitive sites, adjacency requirements, wildlife habitat requirements, or other considerations.

Table 8. Middlesex County Forests - Area by age class and forest community with average stocking 2002.

| AGE CLASS                     | SOFT MAPLE-OAK | SOFT MAPLE   | OAK          | MIXED DECIDUOUS | WHITE PINE PLANTATION | SPRUCE PLANTATION | RED PINE PLANTATION | MIXED CONIFEROUS |
|-------------------------------|----------------|--------------|--------------|-----------------|-----------------------|-------------------|---------------------|------------------|
| 1-10                          |                |              |              |                 |                       |                   |                     |                  |
| 11-20                         |                |              |              |                 | 3.8                   | 14.6              |                     |                  |
| 21-30                         |                |              |              |                 |                       |                   | 5.1                 |                  |
| 31-40                         | 33.6           |              |              | 8.0             | 20.3                  | 9.2               | 2.1                 |                  |
| 41-50                         |                |              | 13.1         |                 | 48.1                  |                   |                     |                  |
| 51-60                         | 102.4          |              |              | 73.1            | 12.5                  | 2.0               | 3.2                 |                  |
| 61-70                         | 115.9          |              | 34.4         |                 |                       |                   |                     | 6.9              |
| 71-80                         | 156.8          | 173.9        | 37.2         |                 |                       |                   | 2.3                 |                  |
| 81-90                         | 72.0           | 39.0         | 36.1         | 22.4            |                       |                   |                     |                  |
| 91+                           |                |              |              |                 |                       |                   |                     |                  |
| <b>Total</b>                  | <b>480.7</b>   | <b>212.8</b> | <b>120.8</b> | <b>96.7</b>     | <b>84.7</b>           | <b>25.8</b>       | <b>12.8</b>         | <b>6.9</b>       |
| Average Stocking <sup>1</sup> | 0.92           | 0.84         | 0.81         | 1.0             | 0.91                  | 0.75              | 1.0                 | 1.0              |

<sup>1</sup>Average stocking = Average basal area at age 50/ Normal basal area at age 50 from Plonski's Yield Tables, Site Class 1

## Silvicultural Systems and Forest Yield

Uniform shelterwood and uneven-aged single tree and group selection are the dominant silvicultural systems proposed for managing the timber resources in the Middlesex County Forests. The *Silvicultural Guide to Managing Southern Ontario Forests* (MNR 2000) provides an excellent discussion of these silvicultural systems.

Following Plonski (1974), normal yield tables were developed for each forest type. The yield tables were then modified to reflect the average stocking for each forest type. The modified yield tables were used to determine gross merchantable harvest volumes based on proposed silvicultural specifications and management criteria as given in Table 9.

Table 9. Middlesex County Forests - Silvicultural systems and management criteria.

| FOREST TYPE           | SILVICULTURAL SYSTEM               | THINNING STAGES  | % BASAL AREA CUT  | BASAL AREA GROWTH FACTOR IN MANAGED STANDS   |
|-----------------------|------------------------------------|--|---|--|
| Red pine plantation   | Uniform Shelterwood                | 1 <sup>st</sup> thinning at age 30<br>Subsequent thinning at age 40, 50, 60, 70, & 90<br>Stand converts to mixed                 | 1 <sup>st</sup> - 25%<br>subsequent 20%<br>final 75%                              | 0.85 m <sup>2</sup> /ha/yr<br>after 1 <sup>st</sup> thinning<br>0.70 m <sup>2</sup> /ha/yr<br>after 2 <sup>nd</sup> thinning |
| Spruce plantation     | Uniform Shelterwood<br>3-cut       | 1 <sup>st</sup> thinning at age 40<br>2 <sup>nd</sup> thinning at age 70<br>Final thinning at age 90.<br>Stand converts to mixed | 1 <sup>st</sup> - 50%<br>2 <sup>nd</sup> - 50%<br>final - 72%                     | 0.65 m <sup>2</sup> /ha/yr   |
| White pine plantation | Uniform Shelterwood<br>3-cut       | 1 <sup>st</sup> thinning at age 40<br>2 <sup>nd</sup> thinning at age 70<br>Final thinning at age 90.<br>Stand converts to mixed | 1 <sup>st</sup> - 50%<br>2 <sup>nd</sup> - 50%<br>final - 72%                     | 0.70 m <sup>2</sup> /ha/yr   |
| Soft Maple            | Individual tree or group selection | 1 <sup>st</sup> thinning at age 70<br>Subsequent thinning at 15-year cycles  | All thinnings 20% - 30%<br>depending on site conditions and management objectives | 0.32 m <sup>2</sup> /ha/yr   |
| Soft-Maple - Oak      | Individual tree or group selection | 1 <sup>st</sup> thinning at age 70<br>Subsequent thinning at 15-year cycles  | All thinnings 20% - 30%<br>depending on site conditions and management objectives | 0.32 m <sup>2</sup> /ha/yr   |
| Oak                   | Individual tree or group selection | 1 <sup>st</sup> thinning at age 70<br>Subsequent thinning at 15-year cycles  | All thinnings 20% - 30%<br>depending on site conditions and management objectives | 0.25 m <sup>2</sup> /ha/yr   |
| Mixed Deciduous       | Individual tree or group selection | 1 <sup>st</sup> thinning at age 70<br>Subsequent thinning at 15-year cycles  | All thinnings 20% - 30%<br>depending on site conditions and management objectives | 0.40 m <sup>2</sup> /ha/yr   |

## Sustainable Timber Management Policies

The BOREAL planning system is driven by a number of user-defined policies and criteria for sustainable timber management. These include one or more policy objectives and management constraints, a planning horizon and planning cycle, and required outcomes from the timber management analysis.

A 100-year planning horizon was established with 10-year planning cycles. Harvesting was assumed to take place at the beginning of each period. The outcomes of the analysis included volume and area harvested by period. A management policy to optimize timber production over the 100 year planning horizon was considered. This policy was assessed for several management scenarios including area and volume regulation (control). Following a review of the results, a policy that optimized timber production under sustained yield area control was chosen. Area regulation was selected because it is relatively simple to administer and provides a more even harvest flow over time.

Sustained yield area control was imposed by limiting period-to-period variation of area harvested. The general form of the constraint is:

$$A_{t+1} \geq (1-a)A_t \text{ and } A_{t+1} \leq (1+a)A_t \quad (1)$$

where: A represents area harvested in hectares, t is period t (t = 1...10), and a is the permitted period-to-period variation in area harvested - set at 15%.

Finally, constraints limiting the area of each forest unit and age class are specified as:

$$AREA_{ij} = X \quad (2)$$

where: i and j represent the forest community and age class respectively and X denotes area available for harvest (from Table 8).

## Sustainable Timber Management Area Projections

Sustainable timber management area projections are given in Table 10. Table 11 gives the sustainable area harvested by forest community for the 20-year period represented in this plan. This information is used to develop a timber management schedule for the 5-year Operating Plan in Chapter 6.

Table 10. Middlesex County Forests maximum sustainable area harvested by planning period for all forest communities.

| PERIOD    | TOTAL AREA (HA) | AVERAGE ANNUAL AREA (HA) |
|-----------|-----------------|--------------------------|
| 2002-2011 | 590             | 59                       |
| 2012-2021 | 505             | 50                       |
| 2022-2031 | 529             | 53                       |
| 2032-2041 | 494             | 49                       |
| 2042-2051 | 481             | 48                       |
| 2051-2061 | 445             | 45                       |
| 2062-2071 | 423             | 42                       |
| 2072-2081 | 453             | 45                       |
| 2082-2091 | 455             | 46                       |
| 2092-2101 | 485             | 48                       |

Table 11. Middlesex County Forests maximum sustainable area harvested 2002-2021 by forest community.

| FOREST COMMUNITY               | MAXIMUM SUSTAINABLE HARVEST AREA BY PERIOD (HA) |                      |                       |
|--------------------------------|---|----------------------|-----------------------|
|                                | 2002-2006<br>5-YEARS                            | 2007-2011<br>5-YEARS | 2012-2021<br>10-YEARS |
| Soft maple-Oak                 | 131   | 119                  | 273                   |
| Soft maple                     | 72  | 141                  | 174                   |
| Oak                            | 36  | 37                   | 0                     |
| Mixed (deciduous & coniferous) | 0   | 0                    | 0                     |
| White pine plantation          | 33  | 0                    | 48                    |
| Spruce plantation              | 11  | 0                    | 0                     |
| Red pine plantation            | 10  | 0                    | 10                    |
| <b>Total area (ha)</b>         | <b>293</b>                                      | <b>297</b>           | <b>505</b>            |

## **CHAPTER 6: 5-YEAR OPERATING PLAN 2002-2006**

### **Implementation of the Woodlands Management Plan**

#### **Priority Management Activities**

This Woodlands Management Plan contains 25 management recommendations for the Middlesex County Forests for the next 20 years. Many of these recommendations can be implemented with minimal effort and expenditure. Others such as the proposed access and infrastructure improvements will take time and may require allocation of funds beyond normal operating expenses.

A 5-year schedule for forest management of the County Forests is proposed based on the analysis of the sustainable timber supply. It is anticipated that the revenues from timber sales will more than offset the costs of preparing silvicultural prescriptions, tree marking, and harvest supervision. Surplus revenues from timber sales can be used to fund other management activities.

Within the 2002-2006 operating period, priority should be given to implementing the following recommended management activities:

1. Establish a Woodlands Advisory Committee (recommended action 1.1).
2. Develop criteria for conserving biological diversity and areas of High Conservation Value Forest and establish a system of High Conservation Value Forests within the County Forests (recommended actions 2.1, 3.1, 3.2).
3. Establish rules and guidelines for recreational use of County Forests (recommended action 8.2).
4. Implement the proposed 5-Year Forest Management Schedule (recommended action 5.1 - refer to schedule below) and associated management practices (recommended actions 5.4, 5.5).
5. Implement the proposed Access and Infrastructure Improvements (recommended actions 6.1-6.6 - refer to schedule below).
6. Continue to support scientific study within the County Forests (recommended actions 2.2, 7.1).
7. Explore partnerships with area schools for environmental education (recommended action 7.2).

## MIDDLESEX COUNTY FOREST

### 5-Year Forest Management Schedule

#### Year 1

| STAND ID     | TRACT   | FOREST TYPE    | SILVICULTURAL SYSTEM | AREA (HA)   | COMMENTS   |
|--------------|---------|----------------|----------------------|-------------|--|
| 16b          | Newbury | Soft maple-Oak | Group selection      | 60.0        | Stand 16b is 123 ha in size. The proposed thinning would take place in the west portion of the stand. The thinned area will be used as a study site for forest research. |
| <b>Total</b> |         |                |                      | <b>60.0</b> |  |

#### Year 2

| STAND ID     | TRACT  | FOREST TYPE    | SILVICULTURAL SYSTEM | AREA (HA)   | COMMENTS   |
|--------------|--------|----------------|----------------------|-------------|--|
| 18b          | Plaine | Soft maple     | Selection            | 31.7        | Stand 18b was harvested in 2001.   |
| 7a           | Hurdle | Soft maple-Oak | Selection            | 25.0        | Stand 7a is 60 ha in size. The proposed thinning would take place on 25 ha. only. The thinned area will be used as a study site for forest research. |
| <b>Total</b> |        |                |                      | <b>56.7</b> |  |

**Year 3**

| STAND ID     | TRACT  | FOREST TYPE           | SILVICULTURAL SYSTEM              | AREA (HA)   | COMMENTS |
|--------------|--------|-----------------------|-----------------------------------|-------------|----------|
| 2a           | Banks  | Red pine plantation   | Shelterwood / selection           | 3.2         |          |
| 2b           | Banks  | Spruce plantation     | Shelterwood / selection           | 1.9         |          |
| 2e           | Banks  | White pine plantation | Shelterwood / selection           | 0.8         |          |
| 2f           | Banks  | White pine plantation | Shelterwood / selection           | 1.9         |          |
| 22b          | Saylor | Oak                   | Individual tree & group selection | 36.1        |          |
| 25b          | Taylor | Soft maple-Oak        | Individual tree & group selection | 17.2        |          |
| <b>Total</b> |        |                       |                                   | <b>61.1</b> |          |

### Year 4

| STAND ID     | TRACT    | FOREST TYPE           | SILVICULTURAL SYSTEM              | AREA (HA)   | COMMENTS |
|--------------|----------|-----------------------|-----------------------------------|-------------|----------|
| 13a          | Miller   | Red pine plantation   | Shelterwood / selection           | 5.1         |          |
| 20a          | Richie   | Red pine plantation   | Shelterwood / selection           | 2.1         |          |
| 10a          | Lockwood | Spruce plantation     | Shelterwood / selection           | 2.4         |          |
| 11a          | McLaren  | Spruce plantation     | Shelterwood / selection           | 6.8         |          |
| 16a          | Newbury  | White pine plantation | Individual tree & group selection | 2.0         |          |
| 19a          | Purdy    | White pine plantation | Individual tree & group selection | 3.4         |          |
| 5a           | Clarke   | Soft maple            | Individual tree & group selection | 3.6         |          |
| 5b           | Clarke   | Soft maple            | Individual tree & group selection | 17.2        |          |
| 21a          | Robinson | Soft maple            | Individual tree & group selection | 19.1        |          |
| <b>Total</b> |          |                       |                                   | <b>61.7</b> |          |

**Year 5**

| STAND ID     | TRACT     | FOREST TYPE           | SILVICULTURAL SYSTEM              | AREA (HA)   | COMMENTS |
|--------------|-----------|-----------------------|-----------------------------------|-------------|----------|
| 17a          | Patterson | White pine plantation | Shelterwood / selection           | 9.7         |          |
| 20c          | Richie    | White pine plantation | Shelterwood / selection           | 1.2         |          |
| 22a          | Sayler    | White pine plantation | Shelterwood / selection           | 5.9         |          |
| 25a          | Taylor    | White pine plantation | Shelterwood / selection           | 3.7         |          |
| 26a          | Tunks     | White pine plantation | Individual tree & group selection | 4.0         |          |
| 27a          | Vey       | Soft maple-Oak        | Individual tree & group selection | 28.6        |          |
| <b>Total</b> |           |                       |                                   | <b>53.1</b> |          |

### Summary of Forest Management by Forest Type: 2002-2006 (Years 1-5)

| FOREST TYPE           | TOTAL AREA (HA) |
|-----------------------|-----------------|
| Red pine plantation   | 10.4            |
| Spruce plantation     | 11.1            |
| White pine plantation | 32.6            |
| Soft maple            | 71.6            |
| Soft maple-Oak        | 130.8           |
| Oak                   | 36.1            |
| <b>Total</b>          | <b>292.6</b>    |

## MIDDLESEX COUNTY FOREST

### Proposed Access and Infrastructure Improvements: 2002-2006 (Years 1-5)

| TRACT   | PROPOSED ACCESS AND INFRASTRUCTURE IMPROVEMENTS   |
|---|---|
| All tracts  | Erect signage, Install gates/barriers to limit vehicle access.  |
| All tracts. Refer to Figures 4a-e.  | Access road improvements where required. Priority should be given to improving access roads in those areas scheduled for forest management in the first 5 years.<br>Decommission excess trails in Sayler, Vey, and Newbury tracts (refer to Figure 4e). |
| Atkinson, Patterson, Moore, Sayler, Leech, Squire, Hurdle, Misery, Plaine, Lockwood, Clarke, Robinson, Big Swamp, Banks | Mark property boundaries adjacent to private forests.   |



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## **Appendix A: Summary of Past Management By Tract**



Banks Tract

| Banks Tract |       |                     |          |       |           |        |
|-------------|-------|---------------------|----------|-------|-----------|--------|
| Location    |       |                     | Area     |       | County    | Grants |
| Lot         | Conc. | Township            | Hectares | Acres | Middlesex | NIL    |
| S.Pt. 13    | 1     | North<br>Dorchester | 39.1     | 96.6  |           |        |

|                  |      |
|------------------|------|
| Compartments: ha |      |
| Forest           | 30.0 |
| Protection       | 4.1  |
| Plantation       | 4.9  |

|                  |      |
|------------------|------|
| Date Acquired:   | 1945 |
| Agreement Date:  | 1960 |
| Prior Agreement: | 1953 |

|                 |          |
|-----------------|----------|
| Purchase Price: | 1850.00  |
| Original Owner: | G. Banks |

|        | Pw    | Ps    | Pr    | Pj  | Sw   | Sn   | Pa   | Cr  | Tu  | La    | Or  |
|--------|-------|-------|-------|-----|------|------|------|-----|-----|-------|-----|
| 1946 - | 5450  | 1400  | 12000 | 750 | 3650 | 2000 | 0    | 0   | 0   | 0     | 0   |
| 1947 - | 0     | 0     | 0     | 0   | 0    | 0    | 600  | 800 | 500 | 850   | 0   |
| 1949 - | 0     | 0     | 0     | 0   | 0    | 0    | 0    | 0   | 0   | 3000  | 0   |
| 1955 - | 0     | 0     | 0     | 0   | 0    | 0    | 500  | 0   | 0   | 0     | 500 |
| 1956 - | 0     | 0     | 0     | 0   | 0    | 2000 | 0    | 0   | 0   | 0     | 0   |
| Total  | 5,450 | 1,400 | 12000 | 750 | 3650 | 4000 | 1100 | 800 | 500 | 3,850 | 500 |

- 1947 - Easement grant between Hydro Electric Power Commission & Cty of Middlesex
- 1951 - Harvest of commercial Ps and Christmas trees from Hydro rightaway - 130 trees
- 1952 - Harvest of commercial Ps and Christmas trees from Hydro rightaway - 720 trees
- 1953 - Harvest of commercial Ps and Christmas trees from Hydro rightaway - 250 trees
- 1953 - Agreement for the removal of all cedar & tamarack - no record of completion.
- 1954 - Harvest of commercial Ps and Christmas trees from Hydro rightaway - 310 trees
- 1956 - Harvest of commercial Ps and Christmas trees from Hydro rightaway - 15 trees
- 1957 - Commercial sale of cedar posts 280 units - year of sale questionable.
- 1957 - Commercial harvest of Po - 150 cds - \$.02 / cubic foot
- 1957 - Improvement thinning - 10.0 ha
- 1958 - Entrance and trail construction - 4300 ft trail and one bridge
- 1958 - Pruned Pr to 5 ft - 1.6 ha
- 1958 - Project Regeneration Report
- 1959 - Expenditure summary & communications re: UTRCA purchase attempt.
- 1961 - Easement grant between Hydro Electric Power Commission & Cty of Middlesex
- 1985 - Commercial harvest contract - Giant Timber - Pj, Pr, & Pw - approx. 285 cubic meters
- 1986 - Marked for 4th row and 40% selection thinning Pw, Pr & Pj - 3.0 ha
- 1987 - Scale record of commercial harvest of Pj, Pr, & Pw - 274,781 cubic meters
- 1989 - Record of Sale - Pr - 36.0 m<sup>3</sup> - Robert Armstrong - \$200.00 - salvage material.
- 1991 - Agreement - re: release of land - 0.385 ha

Annually: During the agreement annual maintenance was carried out as required on fireguards, trails, fences, signs and area cleanup.

Bayne Tract

| Bayne Tract                             |       |          |          |       |           |        |
|---|-------|----------|----------|-------|-----------|--------|
| Location                                |       |          | Area     |       | County    | Grants |
| Lot                                     | Conc. | Township | Hectares | Acres | Middlesex | NIL    |
| N1/2 of 22<br>Pt. W1/2 of<br>S1/2 of 22 | 2     | Mosa     | 45.6     | 112.7 |           |        |

|                  |      |
|------------------|------|
| Compartments: ha |      |
| Forest           | 22.4 |
| Protection       |      |
| Plantation       | 23.2 |

|                  |      |
|------------------|------|
| Date Acquired:   | 1953 |
| Agreement Date:  | 1960 |
| Prior Agreement: | 1954 |

|                 |          |
|-----------------|----------|
| Purchase Price: | 4400.00  |
| Original Owner: | R. Bayne |

|        | Pw    | Ps    | Pr | Aw    | Sw   | Sn    | Wn | Bd | Lb   | Tu    | Or    |
|--------|-------|-------|----|-------|------|-------|----|----|------|-------|-------|
| 1954 - | 12000 | 6000  | 0  | 0     | 0    | 6000  | 0  | 0  | 1000 | 5950  | 5000  |
| 1955 - | 8000  | 4500  | 0  | 0     | 1300 | 2200  | 0  | 0  | 0    | 0     | 0     |
| 1958 - | 0     | 0     | 0  | 0     | 0    | 3000  | 0  | 0  | 0    | 0     | 0     |
| 1959 - | 1000  | 0     | 0  | 0     | 0    | 9000  | 0  | 0  | 0    | 0     | 5000  |
| 1960 - | 0     | 0     | 0  | 4000  | 0    | 0     | 0  | 0  | 0    | 0     | 4000  |
| 1961 - | 10000 | 0     | 0  | 0     | 0    | 0     | 0  | 0  | 0    | 0     | 0     |
| 1972 - | 1000  | 0     | 0  | 0     | 0    | 0     | 0  | 0  | 0    | 0     | 0     |
| Total  | 32000 | 10500 | 0  | 4,000 | 1300 | 20200 | 0  | 0  | 1000 | 5,950 | 14000 |

- 1954 - Commercial harvest - 12,500 fbm
- 1958 - Commercial harvest - 100 oak pilings
- 1959 - Commercial harvest - 11,500 fbm & 950 christmas trees.
- 1960 - Commercial harvest - 100 christmas trees & 600 airport markers
- 1961 - Commercial harvest - 300 airport markers
- 1962 - Commercial harvest - 3,320 fbm, 750 airport markers, & 425 poplar poles
- 1962 - Manual cleaning - removal of Bb, Id, & Hawthorn.
- 1963 - Commercial harvest - 450 airport markers
- 1964 - Commercial harvest - 8,000 fbm & 540 poles
- 1966 - Commercial harvest - 2,000 fbm
- 1974 - Site protection - fire pond construction
- 1975 - Pruned Pw crop trees - 4.0 ha
- 1984 - Pruned Pw crop trees to 17 ft. - 14.2 ha
- 1985 - Marked for Pw crop tree pruning - 9.4 ha
- 1985 - Pruned Pw crop trees to 17 ft. - 9.4 ha - Sec. 38
- 1985 - Marked Pw for crop tree release - 10.1 ha - not completed.
- 1996 - Cruised for marking prescription - 20 ha.
- 1996 - Marked for Commercial harvest - 130,341 fbm - 20 ha - comb. selection/patch system.
- 72 cds fuelwood.
- 
- 

Annually: During the agreement annual maintenance was carried out as required on fireguards,  
 - trails, fences, signs and area cleanup.

Big Swamp Tract

| Big Swamp Tract |       |               |          |       |           |          |
|-----------------|-------|---------------|----------|-------|-----------|----------|
| Location        |       |               | Area     |       | County    | Grants   |
| Lot             | Conc. | Township      | Hectares | Acres | Middlesex | 63474.12 |
| Pt. 14          | 17    | East Williams | 111.3    | 275   |           |          |
| Pt. 14          | 18    |               |          |       |           |          |
| 13              | 18    |               |          |       |           |          |

|                  |      |
|------------------|------|
| Compartments: ha |      |
| Forest           | 97.1 |
| Protection       |      |
| Plantation       | 14.2 |

|                 |      |
|-----------------|------|
| Date Acquired:  | 1978 |
| Agreement Date: | 1960 |

|                 |            |
|-----------------|------------|
| Purchase Price: | 125000.00  |
| Original Owner: | K.Furnston |

|        | Pw    | Hbc | Ctd | La  | Sw    | Sn   | Ms   | Mrose | OR  | Oa    | Cw   | HS  |
|--------|-------|-----|-----|-----|-------|------|------|-------|-----|-------|------|-----|
| 1982 - | 0     | 0   | 0   | 0   | 0     | 0    | 0    | 0     | 0   | 0     | 2000 | 0   |
| 1983 - | 0     | 50  | 0   | 0   | 0     | 0    | 0    | 100   | 0   | 1000  | 0    | 0   |
| 1984 - | 2300  | 450 | 800 | 500 | 12900 | 4600 | 1000 | 900   | 250 | 0     | 400  | 250 |
| 1985 - | 0     | 0   | 0   | 0   | 0     | 4000 | 0    | 0     | 0   | 0     | 0    | 0   |
| 1988 - | 0     | 0   | 0   | 0   | 0     | 0    | 0    | 0     | 0   | 2000  | 0    | 0   |
| Total  | 2,300 | 500 | 800 | 500 | 12900 | 8600 | 1000 | 1000  | 250 | 3,000 | 2400 | 250 |

- HS - Honey Suckle

- 1982 - Land Rental Agreement for 1 year - Jim Mchachlan - 11.3 ha
- 1983 - Site preparation - mechanical - disced planting area - 11.3 ha.
- 1984 - Chemical cleaning - simazine - 11.3 ha
- 1985 - Mechanical cleaning - rotovate between rows
- 1985 - Chemical cleaning - simazine - 2.0 ha
- 1986 - Mechanical cleaning - rotovate between rows
- 1987 - Mechanical cleaning - Mowed vegetation with brush mower
- 1991 - Mechanical cleaning - access trail bushed for Agro- Forestry Tour
- 1994 - Establish Provincial Growth and Yield research plot.

Annually: During the agreement annual maintenance was carried out as required on fireguards, trails, fences, signs and area cleanup.













McLaren Tract

| McLaren Tract           |       |          |          |       |           |         |
|-------------------------|-------|----------|----------|-------|-----------|---------|
| Location                |       |          | Area     |       | County    | Grants  |
| Lot                     | Conc. | Township | Hectares | Acres | Middlesex | 6378.70 |
| Pt.N1/2 of 16<br>Pt. 17 | 1     | Mosa     | 41.1     | 101.5 |           |         |

|                  |      |
|------------------|------|
| Compartments: ha |      |
| Forest           | 34.3 |
| Protection       |      |
| Plantation       | 6.8  |

|                 |      |
|-----------------|------|
| Date Acquired:  | 1969 |
| Agreement Date: | 1960 |

|                 |            |
|-----------------|------------|
| Purchase Price: | 10000.00   |
| Original Owner: | R. McLaren |

|       | Pw | Ps | Pr | Pj | Sw | Sn | Wn | Bd | Aw | Ta | Ew |
|-------|----|----|----|----|----|----|----|----|----|----|----|
| -     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| -     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| -     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| -     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| -     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Total | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

- 1971 - Culvert installation
- 1975 - Park establishment - 0.8 ha
- 1993 - Establish Provincial Growth and Yield research plot.

Annually: During the agreement annual maintenance was carried out as required on fireguards, trails, fences, signs and area cleanup.









Newbury Tract

| Newbury Tract              |       |          |          |       |           |         |
|----------------------------|-------|----------|----------|-------|-----------|---------|
| Location                   |       |          | Area     |       | County    | Grants  |
| Lot                        | Conc. | Township | Hectares | Acres | Middlesex | 9821.90 |
| N&S1/2 of 22<br>S1/2 of 21 | 1     | Mosa     | 121.4    | 300   |           |         |

|                  |       |
|------------------|-------|
| Compartments: ha |       |
| Forest           | 120.2 |
| Protection       |       |
| Plantation       | 1.2   |

|                 |      |      |                 |                          |
|-----------------|------|------|-----------------|--------------------------|
| Date Acquired:  | 1962 | 1963 | Purchase Price: | 14000.00                 |
| Agreement Date: | 1960 |      | Original Owner: | F. Hurdle<br>C. Lockwood |

|        | Pw    | Ps | Pr | Pj | Sw | Sn | Wn | Bd | Aw | Ta | Ew |
|--------|-------|----|----|----|----|----|----|----|----|----|----|
| 1965 - | 5000  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| -      | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| -      | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| -      | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| -      | 0     | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |
| Total  | 5,000 | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  |

- 1963 - Timber sale - 400 Christmas trees and 200 runway markers
- 1964 - Timber sale - 13,000 fbm
- 1985 - Marking of Pw crop trees for pruning.
- 1985 - Pw crop trees pruned to 18 ft. - section 38 crew.

Annually: During the agreement annual maintenance was carried out as required on fireguards, trails, fences, signs and area cleanup.



Plaine Tract

| Plaine Tract |       |          |          |       |           |        |
|--------------|-------|----------|----------|-------|-----------|--------|
| Location     |       |          | Area     |       | County    | Grants |
| Lot          | Conc. | Township | Hectares | Acres | Middlesex | NIL    |
| N1/2 of 14   | 6     | Mosa     | 35.0     | 86.5  |           |        |

|                  |      |
|------------------|------|
| Compartments: ha |      |
| Forest           | 31.7 |
| Protection       |      |
| Plantation       | 3.3  |

|                  |      |
|------------------|------|
| Date Acquired:   | 1953 |
| Agreement Date:  | 1960 |
| Prior Agreement: | 1954 |

|                 |          |
|-----------------|----------|
| Purchase Price: | 2300.00  |
| Original Owner: | W.Plaine |

|        | Pw    | Ps    | Pr | La    | Sw | Sn   | Ctd | Pc   | Aw   | Or    | Tp   |
|--------|-------|-------|----|-------|----|------|-----|------|------|-------|------|
| 1954 - | 7000  | 3500  | 0  | 0     | 0  | 3500 | 0   | 0    | 0    | 0     | 2000 |
| 1955 - | 2000  | 500   | 0  | 5000  | 0  | 0    | 0   | 0    | 0    | 0     | 0    |
| 1956 - | 3000  | 0     | 0  | 0     | 0  | 0    | 0   | 0    | 0    | 0     | 0    |
| 1959 - | 0     | 0     | 0  | 0     | 0  | 0    | 0   | 1000 | 2000 | 2000  | 0    |
| 1962 - | 4000  | 0     | 0  | 0     | 0  | 0    | 125 | 0    | 0    | 0     | 0    |
| Total  | 16000 | 4,000 | 0  | 5,000 | 0  | 3500 | 125 | 1000 | 2000 | 2,000 | 2000 |

- 1954 - Improvement thinning - boltwood - 8 cds & 1500 fbm
- 1956 - Research - Mechanical vs Chemical hardwood removal time study - 1ac plot.
- 1958 - Improvement thinning - 75cds & 10,000 fbm - Po, Wi.
- 1959 - Commercial harvest of Elm for pilings - 13,000 fbm
- 1959 - Fence construction - 140 rods
- 1961 - Commercial harvest - 5,588 fbm - measured by Doyle rule.
- 1962 - Mechanical cleaning - patch cuts - .1 - .25 ac. clearings - (Ha,Ir,Bb,Haz removal)
- 1964 - Commercial harvest - 6373 fbm.
- 1976 - Pw crop trees pruned - 2.0 ha
- 1979 - Timber sale- hardwoods-205,101fbm-auction- \$34,000.00 -Hawkesville Hardwds.-28ha
- 1979 - Marked commercial timber - 28 ha
- 1980 - Timber sale - hardwood thinning(fuelwood) 86 cds -\$430.00
- 1985 - Marked for 4th row thinning - 3.6 ha
- 1986 - 4th row thinning - 1.0 ha - Section 38 crew
- 1992 - Marked Pw crop trees for pruning to 17 ft.
- 2000 - Compartment 18b marked for selection thinning.
- 2001 - Compartment 18b thinning - 197,000 fbm - \$107,000
- 
- 
- 
- 

Annually: During the agreement annual maintenance was carried out as required on fireguards,  
 - trails, fences, signs and area cleanup.







Sayler Tract

| Sayler Tract |                  |          |          |       |           |         |
|--------------|------------------|----------|----------|-------|-----------|---------|
| Location     |                  |          | Area     |       | County    | Grants  |
| Lot          | Conc.            | Township | Hectares | Acres | Middlesex | 5198.85 |
| 23           | Range 2<br>north | Mosa     | 40.5     | 100   |           |         |

|               |      |
|---------------|------|
| Compartments: |      |
| Forest        | 35.2 |
| Protection    |      |
| Plantation    | 5.3  |

|                 |      |
|-----------------|------|
| Date Acquired:  | 1968 |
| Agreement Date: | 1960 |

|                 |          |
|-----------------|----------|
| Purchase Price: | 7500.00  |
| Original Owner: | W.Sayler |

|        | Pw    | Ps | Pr   | Pj | Sw | Sn | Wn   | Bd | Aw | Ta | Ew |
|--------|-------|----|------|----|----|----|------|----|----|----|----|
| 1969 - | 8000  | 0  | 0    | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  |
| 1970 - | 2500  | 0  | 1000 | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  |
| 1979 - | 0     | 0  | 0    | 0  | 0  | 0  | 2000 | 0  | 0  | 0  | 0  |
| -      | 0     | 0  | 0    | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  |
| -      | 0     | 0  | 0    | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  |
| Total  | 10500 | 0  | 1000 | 0  | 0  | 0  | 2000 | 0  | 0  | 0  | 0  |

- 1968 - Commercial harvest of Or for oak pilings.
- 1975 - Commercial harvest of hardwoods - 3500 fbm -
- 1977 - Timber Sale of hardwood fuelwood - 2,684 fbm - Basil Murray - \$75.00
- 1978 - Commercial harvest of hardwoods - 142,025 fbm - Sills Lumber - \$18,350.00
- 1980 - Timber Sale of hardwood fuelwood - 25cds - \$100.00 - Max Crawford
- 1992 - Marking for pruning Pw to 17 ft. - 5.3 ha.

Annually: During the agreement annual maintenance was carried out as required on fireguards, trails, fences, signs and area cleanup.











## Appendix B. Forest Communities of Middlesex County Forest

| Forest Type      | Ecosite(s) & Vegetation Characteristics   | Environmental Characteristics   | Understory Vegetation   |
|------------------|---|---|---|
| Soft maple – oak | <p>Oak Mineral Deciduous Swamp</p> <p><u>Composition</u><br/>soft maple &gt; 20%<br/>oak &gt; 20 %</p>  | <p>-poorly drained tablelands with complex microtopography<br/>-standing water or vernal pooling &gt; 20% of ground coverage<br/>-mineral and peaty phase mineral (accumulations of organic material 20 to 40 cm)<br/>-areas where flooding duration is short</p> | <p>Alternate leaved dogwood, Aster, Bed straw, Bloodroot, Blue cohosh, Bracken fern, Buckthorn, Canada may lilly, Cinnamon fern, Cranberry, Dolls eye, Elderberry, False solomon's seal, Garlic mustard, Hairy Solomon's seal, Hawthorn, Jack in the pulpit, Maiden hair fern, Maple leaved viburnum, May apple, Nettle, orchid, Ostrich fern, Partridge berry, Poison ivy, Prickley ash, Purple trillium, Raspberry, Red trillium, Sensitive fern, Spice bush, Trout lilly, Violet, Poison ivy, Virginia creeper, White trillium, Wintergreen, Alder, Witch hazel, Wood anemone, Wood sorrel</p> |
| Soft maple       | <p><i>Maple Mineral Deciduous Swamp;</i><br/><i>Fresh-Moist Sugar Maple Deciduous Forest</i></p> <p><u>Composition</u><br/>soft maple &gt; 30%<br/>sugar maple &lt; 20%<br/>oak &lt; 10 %</p> | <p>-poorly drained tablelands with complex microtopography. Wetland (swamp) – terrestrial transition<br/>-sands, loams; soils may be peaty phase mineral (accumulations of organic material 20 to 40 cm)<br/>-imperfect to poor soil drainage</p>                 | <p>Alternate leaved dogwood, Bed straw, Blue cohosh, Bracken fern, Buckthorn, Canada may lilly, Cinnamon fern, Cranberry, Dolls eye, Elderberry, False solomon's seal, Foam Flower, Garlic mustard, Hazel, Honeysuckle, Horsetail, Iris, Jack in the pulpit, Maple leaved viburnum, Marsh Marigold, May Apple, Nannyberry, Nettle, Poison ivy, Prickley ash, Puple violet, Purple trillium, Raspberry, Red trillium, Sarsaparilla, Sensitive fern, Spice bush, Touch me not, Trout lilly, Violet, Virginia creeper, Virginia waterleaf, White trillium, Wild leek, Wood nettle, Wood sorrel</p>   |
| Oak              | <p><i>Oak Mineral Deciduous Swamp</i></p> <p><u>Composition</u><br/>oak &gt; 40 %</p>   | <p>-poorly drained tablelands with complex microtopography<br/>-standing water or vernal pooling &gt; 20% of ground coverage<br/>-mineral and peaty phase mineral (accumulations of organic material 20 to 40 cm)<br/>-areas where flooding duration is short</p> | <p>Alder, Bed straw, Blue beech, Bracken fern, Bunch berry, Canada may lilly, Cinnamon fern, Cranberry, Current, Elderberry, Garlic mustard, Iris, Maiden hair fern, Maple leaved viburnum, May apple, Nannyberry, Poison ivy, Prickley ash, Raspberry, Red trillium, Rose twisted stalk, Sensitive fern, Touch me not, Violet, Virginia creeper, White trillium, Wood sorel</p>  |

|                                     |   |   |  |
|-------------------------------------|---|---|--|
| <p><b>Mixed deciduous</b></p>       | <p><i>Fresh-Moist Lowland Deciduous Forest; Fresh-Moist Oak-Maple-Hickory Deciduous Forest</i></p> <p><u>Composition</u><br/>sugar maple, ash and other hardwoods (not including soft maple or oak) &gt; 20%<br/>oak &lt; 30 %<br/>soft maple &lt; 20 %</p> | <p>-snads; all soils have finer silt and clay components<br/>-well to poorly drained<br/>- bottomlands<br/>- rich areas where temporary flooding occurs<br/>- complex microtopography</p> | <p>Alternate leaved dogwood, Bed straw, Blue cohosh, Bracken fern, Buckthorn, Canada may lilly, Christmas fern, Dolls eye, Elderberry,<br/>False solomon's seal, Garlic Mustard, Hairy Solomon's seal, Hazel, Horsetail, Hound's Tongue, Iris, Jack in the pulpit, Maiden hair fern, Maple leaved viburnum, May apple, Nannyberry, Nettle, Oak fern, Ostrich fern, Prickley ash, Purple trillium, Rue, Sarsaparilla, Sensitive fern, Spice bush, Touch me not, Trout lilly, Virginia creeper, White trillium, Wild grape</p> |
| <p><b>Mixed coniferous</b></p>      | <p>White Cedar Organic Mixed Swamp</p> <p><u>Composition</u><br/>white cedar + hemlock + tamarack &gt; 50%</p>  | <p>-organic substrates<br/>-standing water or vernal pooling &gt; 20% of ground coverage</p>  | <p>Cinnamon fern, Horsetail, Jack in the pulpit, Marsh marigold, Sarsaparilla, Virginia creeper, Cows tongue, Sensitive fern, Foam flower, White trillium, Blue bead lilly, Poison ivy, Rattlesnake root</p>   |
| <p><b>White pine plantation</b></p> | <p><i>Coniferous Plantation</i></p> <p><u>Composition</u><br/>white pine &gt; 60%</p>   | <p>-sand<br/>-well drained and lowland sites</p>  | <p>Bed straw, Bracken fern, Canada may lilly, Dog strangling vine, Elderberry, False Solomon's seal, Garlic mustard, Hairy Solomon's seal, Hounds tongue, Jack-in-the-pulpit, May apple, Nannyberry, Poison ivy, Purple violet, Raspberry, Raspberry, Red trillium, Spice bush, White trillium, Trout lilly, Violet, Virginia creeper, Wild grape, Wood sorel</p>  |
| <p><b>Red pine plantation</b></p>   | <p><i>Coniferous Plantation</i></p> <p><u>Composition</u><br/>red pine &gt; 60%</p>   | <p>-sand<br/>-well drained</p>  | <p>White trillium, Virginia creeper</p>  |
| <p><b>Spruce plantation</b></p>     | <p><i>Coniferous Plantation Mixed Plantation</i></p> <p><u>Composition</u><br/>spruce &gt; 30%<br/>white and red pine &lt; 30%</p>  | <p>-sandy soils<br/>-typically lowland</p>  | <p>Canada may lilly, Cranberry, Dolls eye, Garlic mustard, Ground pine, Honey suckle, Jack in the pulpit, Nannyberry, Poison ivy, Prickley ash, Red osier dogwood, Rose, Sarsaparilla, Spice bush, Trout lilly, Virginia creeper</p>   |

# Appendix C: Summary of Forest Inventory

| StandID | Tract      | Hectares | Species Composition <sup>1</sup>                                 | Forest Type           | Age  | Height (m) | % Crown Closure | DBH <sup>2</sup> (cm) | Density <sup>3</sup> (m <sup>2</sup> /ha) | BA <sup>4</sup> (m <sup>2</sup> /ha) | %AGS <sup>5</sup> |
|---------|------------|----------|--|-----------------------|------|------------|-----------------|-----------------------|---|--------------------------------------|-------------------|
| 1a      | Atkinson   | 41.1     | Ow 2 Ms 2 Or 1 Ar 1 Tul 1 (Pc Cb Mh Aw Pw Sas Hb E Hs Pt Ba Wn)3 | Soft maple-Oak        | 67.5 | 23.2       | 83              | 24.9                  | 459.8                                     | 22.3                                 | 93                |
| 2a      | Banks      | 3.2      | Pt 10  | Red Pine Plantation   | 55.0 | 23.0       | 70              | 24.9                  | 905.6                                     | 44.0                                 | 98                |
| 2b      | Banks      | 1.9      | Sw 9 (Pt Cb)1  | Spruce Plantation     | 55.0 | 23.0       | 100             | 23.0                  | 867.0                                     | 36.0                                 | 99                |
| 2c      | Banks      | 21.3     | Ag 2 By 2 Pt 2 Mr 1 Cb 1 Ab 1 (Pw E Ba Cs He Ms Aw P6)1          | Mixed deciduous       | 57.5 | 17.0       | 54              | 18.0                  | 644.2                                     | 16.4                                 | 79                |
| 2d      | Banks      | 6.9      | Ce 3 He 2 Ag 1 Ta 1 By 1 Mr 1 (E Pw Pe)1                         | Mixed coniferous      | 60.0 | 19.5       | 73              | 20.5                  | 665.0                                     | 22.0                                 | 87                |
| 2e      | Banks      | 0.8      | Pw 9 Pt 1  | White Pine Plantation | 55.0 | 19.0       | 60              | 25.3                  | 678.4                                     | 34.0                                 | 100               |
| 2f      | Banks      | 1.9      | Pt 7 Pw 2 Le 1   | White Pine Plantation | 55.0 | 19.0       | 40              | 29.1                  | 422.3                                     | 28.0                                 | 76                |
| 3a      | Bayne      | 23.2     | Pw 8 E 1 (Pt Aw Sas)1  | White Pine Plantation | 50.0 | 22.0       | 67              | 26.5                  | 590.6                                     | 32.5                                 | 82                |
| 3b      | Bayne      | 22.4     | Mh 2 Or 2 Ow 1 Aw 1 Tul 1 Be 1 Ms 1 (Ba By Cb Hb Sas)1           | Mixed deciduous       | 90.0 | 32.0       | 92              | 43.9                  | 175.2                                     | 26.6                                 | 88                |
| 4a      | Big Swamp  | 14.6     | Pc 4 Sn 3 Le 1 Sw 1 Or 1   | Spruce Plantation     | 18.0 | 6.0        | 24              | 13.5                  | 501.1                                     | 7.2                                  | 99                |
| 4b      | Big Swamp  | 98.2     | Ms 8 (Ar E Ow Pt By Pc Sas Bw W)2                                | Soft maple            | 64.8 | 21.8       | 72              | 29.8                  | 309.7                                     | 21.5                                 | 89                |
| 4c      | Big Swamp  | 3.8      | Pw 10  | White Pine Plantation | 15.0 | 12.0       | 50              | 15.0                  | 1132.8                                    | 20.0                                 | 84                |
| 5a      | Clark      | 3.6      | Ms 3 E 2 Mh 2 Pt 1 Cb 1 Ow 1                                     | Soft maple            | 70.0 | 17.5       | 60              | 21.3                  | 394.8                                     | 14.0                                 | 68                |
| 5b      | Clark      | 17.2     | Ms 4 Aw 2 Be 2 By 1 (Cb Mh Ba E Hb Or Ow Pt)1                    | Soft maple            | 80.0 | 19.8       | 81              | 29.3                  | 296.9                                     | 20.0                                 | 80                |
| 6a      | Gardiner   | 21.3     | Ms 3 Aw 3 E 2 Cb 1 Ow 1 (Bb Pt Sas)                              | Soft maple            | 65.0 | 22.0       | 83              | 24.8                  | 467.1                                     | 22.5                                 | 83                |
| 7a      | Hurdle     | 60.0     | Ms 3 Ar 2 Or 2 Ow 1 Cb 1 (E Sas Pt)1                             | Soft maple-Oak        | 57.5 | 21.0       | 84              | 24.6                  | 508.2                                     | 24.2                                 | 78                |
| 8a      | Leech      | 18.5     | Ms 4 Or 3 Ow 2 (Ar Cb Sas)1                                      | Soft maple-Oak        | 70.0 | 24.5       | 100             | 35.7                  | 294.7                                     | 29.5                                 | 91                |
| 9a      | Livingston | 21.8     | Ms 5 Mh 2 Cb 1 Aw 1 Or 1 (Ba Be Hs Ow E)                         | Soft maple            | 80.0 | 20.0       | 94              | 34.6                  | 289.5                                     | 27.2                                 | 78                |
| 10a     | Lockwood   | 2.4      | Sw 3 Sn 3 Pt 2 Ps 1 (Aw Ow Ar)1                                  | Spruce Plantation     | 37.0 | 18.0       | 90              | 22.6                  | 780.6                                     | 31.3                                 | 86                |
| 10b     | Lockwood   | 19.0     | Ow 3 Ms 3 Aw 1 Ar 1 Or 1 (Cb Wn Bb Be E 1 Pt)1                   | Soft maple-Oak        | 75.0 | 24.0       | 73              | 26.7                  | 418.9                                     | 23.4                                 | 87                |
| 11a     | McLaren    | 6.8      | Sn 5 Aw 2 Le 2 Ms 1 (Ps Sw Wn)                                   | Spruce Plantation     | 40.0 | 23.0       | 100             | 21.4                  | 813.0                                     | 29.3                                 | 90                |
| 11b     | McLaren    | 26.2     | Ms 4 Or 2 Aw 1 Ow 1 Cb 1 (Ar E Ba Be Sas)1                       | Soft maple-Oak        | 82.5 | 26.5       | 98              | 29.9                  | 340.9                                     | 24.0                                 | 73                |
| 11c     | McLaren    | 8.0      | Ms 2 E 2 Pt 2 Ow 1 Ps 1 Sas 1 (Ar Cb Sn)1                        | Mixed deciduous       | 40.0 | 20.0       | 78              | 17.5                  | 562.6                                     | 13.5                                 | 91                |
| 12a     | McMaster   | 7.9      | Pw 6 Sw 1 Ps 1 Ms 1 (Aw Pt E)1                                   | White Pine Plantation | 45.0 | 19.0       | 67              | 21.1                  | 875.8                                     | 30.5                                 | 84                |
| 12b     | McMaster   | 45.0     | Cb 2 Ms 2 Ar 1 Or 1 Ow 1 Pt 1 Aw 1 (Hb Sas Bb Ab Dog E)1         | Mixed deciduous       | 57.5 | 19.0       | 74              | 23.1                  | 630.0                                     | 26.4                                 | 84                |
| 13a     | Miller     | 5.1      | Pt 10  | Red Pine Plantation   | 24.0 | 11.0       | 65              | 17.3                  | 1869.3                                    | 44.0                                 | 97                |
| 13b     | Miller     | 34.4     | Ow 4 Or 3 Ms 2 Cb 1 (Ar)   | Oak                   | 69.3 | 23.7       | 88              | 32.8                  | 247.1                                     | 20.9                                 | 94                |
| 14a     | Misery     | 13.5     | Pw 7 Sw 1 Pt 1 (Ar Ms)1  | White Pine Plantation | 45.0 | 19.5       | 60              | 24.6                  | 717.9                                     | 34.0                                 | 89                |
| 14b     | Misery     | 19.6     | Ms 2 Ow 2 Or 2 Be 1 Ar 1 (By Cb Hs Mh)2                          | Soft maple-Oak        | 70.0 | 25.0       | 100             | 28.8                  | 369.3                                     | 24.0                                 | 85                |

# Appendix C: Summary of Forest Inventory

| StandID | Tract     | Hectares | Species Composition <sup>1</sup>                     | Forest Type           | Age  | Height (m) | % Crown Closure | DBH <sup>2</sup> (cm) | Density <sup>3</sup> (m <sup>2</sup> /ha) | BA <sup>4</sup> (m <sup>2</sup> /ha) | %AGS <sup>5</sup> |
|---------|-----------|----------|--|-----------------------|------|------------|-----------------|-----------------------|---|--------------------------------------|-------------------|
| 15a     | Moore     | 13.1     | Ow 3 Or 2 Ms 2 Ar 1 Cb 1 E 1 (Pt)                    | Oak                   | 50.0 | 18.0       | 82              | 21.6                  | 466.0                                     | 17.0                                 | 83                |
| 16a     | Newbury   | 2.0      | Pw 4 Sw 4 Cb 1 Pt 1                                  | White Pine Plantation | 38.0 | 17.5       | 100             | 21.8                  | 698.8                                     | 26.0                                 | 93                |
| 16b     | Newbury   | 123.4    | Ms 4 Or 3 Cb 1 Ar 1 Ow 1 (Ab)                        | Soft maple-Oak        | 75.0 | 26.0       | 94              | 28.2                  | 412.0                                     | 25.8                                 | 73                |
| 17a     | Patterson | 9.7      | Pw 6 Sw 1 E 1 Pt 1 Ms 1                              | White Pine Plantation | 51.7 | 21.0       | 59              | 30.0                  | 350.0                                     | 24.7                                 | 97                |
| 17b     | Patterson | 21.6     | Ms 5 Or 2 Ow 1 Cb 1 Aw 1 (Pw Pt Bgun)                | Soft maple-Oak        | 60.0 | 22.5       | 82              | 32.3                  | 347.6                                     | 28.5                                 | 60                |
| 18a     | Plaine    | 3.4      | Pw 7 Sn 1 Ms 1 (Or Aw Cb E Mh Pc Sw)1                | White Pine Plantation | 47.0 | 23.0       | 83              | 27.9                  | 539.1                                     | 33.0                                 | 84                |
| 18b     | Plaine    | 31.7     | Ms 4 Be 2 By 1 Mh 1 Cb 1 (Aw Or Ow Bb E Hb Tul)1     | Soft maple            | 70.0 | 23.0       | 100             | 28.0                  | 365.0                                     | 22.4                                 | 88                |
| 19a     | Purdy     | 3.4      | Pw 10  | White Pine Plantation | 38.0 | 17.0       | 60              | 22.4                  | 758.6                                     | 30.0                                 | 100               |
| 19b     | Purdy     | 17.8     | Ms 4 Or 2 Ar 1 Cb 1 Ow 1 Pt 1 (E 1)                  | Soft maple-Oak        | 70.0 | 22.5       | 60              | 23.2                  | 388.9                                     | 16.5                                 | 87                |
| 20a     | Ritchie   | 2.1      | Pt 10  | Red Pine Plantation   | 35.0 | 19.0       | 100             | 13.7                  | 2734.7                                    | 40.0                                 | 100               |
| 20b     | Ritchie   | 33.6     | Ms 3 Ar 2 E 2 Or 2 Cb 1 (Ow W)                       | Soft maple-Oak        | 35.0 | 19.0       | 63              | 26.5                  | 321.3                                     | 17.7                                 | 81                |
| 20c     | Ritchie   | 1.2      | Pw 10  | White Pine Plantation | 40.0 | 16.0       | 70              | 21.8                  | 966.3                                     | 36.0                                 | 100               |
| 21a     | Robinson  | 19.1     | Ms 3 Tul 2 Aw 1 Cb 1 Ow 1 Be 1 (Hb Pg Ba Bb E I Or)1 | Soft maple            | 65.0 | 28.0       | 94              | 25.2                  | 453.2                                     | 22.6                                 | 93                |
| 22a     | Sayler    | 5.9      | Pw 7 Ms 2 Pt 1 (E)                                   | White Pine Plantation | 33.0 | 16.0       | 100             | 22.0                  | 1001.8                                    | 38.0                                 | 94                |
| 22b     | Sayler    | 36.1     | Or 2 Ow 2 Cb 2 Ms 2 Ar 1 (Pt By Hb Sas)1             | Oak                   | 90.0 | 22.0       | 96              | 29.6                  | 331.2                                     | 22.8                                 | 74                |
| 23a     | Squire    | 18.9     | Ms 4 Ar 3 Ow 1 Or 1 Cb 1 (Bw Pt)                     | Soft maple-Oak        | 65.0 | 22.0       | 100             | 27.9                  | 449.3                                     | 27.5                                 | 88                |
| 24a     | Steele    | 2.3      | Pt 9 (Cb Ms)1  | Red Pine Plantation   | 80.0 | 22.0       | 89              | 17.5                  | 1621.7                                    | 39.0                                 | 87                |
| 24b     | Steele    | 14.5     | Ms 5 Ow 2 Ar 1 Tul 1 Aw 1 (Ab Cb E Be Pc I Mh W)     | Soft maple-Oak        | 80.0 | 22.0       | 89              | 25.2                  | 522.8                                     | 26.0                                 | 89                |
| 25a     | Taylor    | 3.7      | Pw 7 (Ms Pc)3  | White Pine Plantation | 34.0 | 21.0       | 100             | 24.4                  | 901.4                                     | 42.0                                 | 96                |
| 25b     | Taylor    | 17.2     | Ms 4 Ow 2 Aw 2 (Ar Ba Be By Cb E Hb Syc Or)2         | Soft maple-Oak        | 90.0 | 21.5       | 90              | 26.6                  | 388.8                                     | 21.6                                 | 89                |
| 26a     | Tunks     | 4.0      | Pw 9 (E Or Ar)1                                      | White Pine Plantation | 38.5 | 18.0       | 75              | 18.6                  | 1290.0                                    | 35.0                                 | 95                |
| 26b     | Tunks     | 37.2     | Ow 3 Ms 2 Ar 2 Pt 1 E 1 Or 1 (Cb Bw Aw)1             | Oak                   | 75.0 | 21.0       | 81              | 26.1                  | 410.3                                     | 22.0                                 | 88                |
| 27a     | Vey       | 28.6     | Ms 3 Ow 2 Or 2 Cb 1 Pt 1 (Ar Aw Hs)2                 | Soft maple-Oak        | 90.0 | 24.5       | 94              | 28.0                  | 438.1                                     | 27.0                                 | 64                |

<sup>1</sup> Refer to key to species abbreviations.

<sup>2</sup> DBH = Diameter measured at Breast Height, 1.3 m above ground.

<sup>3</sup> Density = trees per hectare  $\geq$  4 cm DBH.

<sup>4</sup> BA = Basal Area. The area in square metres per hectare, of the cross-section of all trees  $\geq$  4 cm DBH.

<sup>5</sup> AGS = Acceptable Growing Stock. Trees with no major health or quality defects. For example, in Stand 1a, 93% of the trees are healthy with no major quality defects.

## Key To Species Abbreviations

| Species<br>Abbrev. | Species<br>Name            |
|--------------------|----------------------------|
| Ab                 | Black ash                  |
| Ag                 | Green ash                  |
| Ar                 | Red ash                    |
| Aw                 | White ash                  |
| Ba                 | Basswood                   |
| Bb                 | Blue beech                 |
| Be                 | American beech             |
| Bgum               | Black gum                  |
| Bw                 | White birch                |
| By                 | Yellow birch               |
| Cb                 | Black cherry               |
| Ce                 | Eastern white cedar        |
| Dog                | Dogwood                    |
| E                  | White elm                  |
| Hb                 | Bitternut hickory          |
| He                 | Eastern hemlock            |
| Hs                 | Shagbark hickory           |
| I                  | Ironwood                   |
| Le                 | European larch             |
| Lp                 | London plane tree/Sycamore |
| Mh                 | Sugar (hard) maple         |
| Mr                 | Red (soft) maple           |
| Ms                 | Silver maple               |
| Or                 | Red oak                    |
| Ow                 | White oak                  |
| Pb                 | Balsam poplar              |
| Pc                 | Carolina poplar            |
| Pg                 | Largetooth aspen           |
| Pr                 | Red pine                   |
| Ps                 | Scots pine                 |
| Pt                 | Trembling aspen            |
| Pw                 | White pine                 |
| Sas                | Sassafras                  |
| Sn                 | Norway spruce              |
| Sw                 | White spruce               |
| Ta                 | Tamarack                   |
| Tul                | Tulip tree                 |
| W                  | Willow                     |
| Wn                 | Black walnut               |

## Appendix D: Public Consultation

Comments and suggestions regarding the future of the Middlesex County Forest were received from the following County residents, forest users, and representatives from technical agencies:

Greg Balch, Wellington Street Sportsmen's Club, Dorchester

Chad Barry

Vance Blackmore, Newbury

Jane Bowles, University of Western Ontario

Cathy Budd, 4-H Trail Club & Highriders Trail Club

Ken Burke, Kent County Bowhunters

Donald Craig, St. Clair Region Conservation Authority

Tony DeMattia, Chatham Jeep Club

Cheryl deVries, Bothwell

John deVries, Bothwell

Kee Dewdney, Bothwell

Ken Elliott, Ontario Ministry of Natural Resources, London

Donald Eyles

Robert Fennell, Newbury

Gordon Gallant, Ontario Federation of Anglers & Hunters

Wayne Groom, Northern Lights 4x4 Trailriders Association

Craig Hillman, Four County Trail Blazers Association

Michelle Kanter, Nature Conservancy of Canada

Jay Liddiard, Ontario Federation of All Terrain Vehicle Clubs (OFATV), Mattawa

Alphonse E. Mailloux, Tilbury

Charlie E. Mailloux, Tilbury

Chris Mailloux, Tilbury

Trevor Mailloux, Chatham

Tricia Mailloux, Tilbury

Ron and Barb Mailloux, Tilbury

Alan Marr, Dorchester

Dave Martin, Acadian Flycatcher-Hooded Warbler Recovery Team

John Milligan, Strathroy

Tom May, Four County Trail Blazers ATV Club, Wardsville

Jack McLean, Trapper & Wood Buyer

R. Lee McLean, Farmer & Friends Conservation Club

Len Moore, Newbury

Levi Moore, Ontario Ministry of Natural Resources, London

Don Nisbett, St. Johns Presbetyrian Church, Wardsville

Marjorie and William Preiksaitis, West Elgin Nature Club, West Lorne

Peter Read, McIlwraith Field Naturalists of London

Ed Reid, Ontario Federation of Anglers & hunters, Peterborough

Nadine Robinson, Ontario Ministry of Natural Resources, London

Dan Schaefer, Middlesex County Stewardship Committee  
Sue-Ellen Smith, Tilbury  
Barry Smith, Tilbury  
Fred C. Staels, Newbury  
Janice Telfer, Mosa Public School  
Harold Thompson, Wardsville  
Wally Swain, landowner and Kent Cloverleaf Conservation Club of Kent, Newbury  
Paul Vanderzwart, Newbury  
Robert Waites, Comber  
Winifred Wake  
Gordon Walker, Glencoe Snowmobile Club  
Valerie Welsh, Lower Thames Valley Conservation Authority  
Steve Williams, Ontario Ministry of Natural Resources, Aylmer District

