

# APPENDIX C

---

## TERRESTRIAL RESOURCES REPORT DOUGAN AND ASSOCIATES (OCTOBER 2004)

**OWEN PROPERTY**  
City of Waterloo  
**ENVIRONMENTAL IMPACT STATEMENT**  
**Terrestrial Resources**  
October 15, 2004



*Prepared by:*  
Dougan & Associates  
Ecological Consulting Services

# Table of Contents

<b>1</b>	<b>INTRODUCTION.....</b>	<b>3</b>
1.1	Study Area.....	3
<b>2</b>	<b>METHODS.....</b>	<b>5</b>
2.1	Background Review.....	5
2.2	Field Methodology .....	5
2.2.1	Vegetation Resources .....	5
2.2.2	Wildlife Resources.....	7
<b>3</b>	<b>FINDINGS.....</b>	<b>9</b>
3.1	Background Review.....	9
3.1.1	Study Area Context.....	9
3.1.2	Designated Natural Areas .....	9
3.1.3	Vegetation Resources .....	10
3.1.4	Wildlife Resources.....	12
3.2	Field Survey Results.....	15
3.2.1	Vegetation Resources .....	15
3.2.2	Wildlife Resources.....	18
3.3	Interpretation of Policy.....	22
3.3.1	Environmentally Sensitive Policy Areas.....	22
<b>4</b>	<b>IMPACTS ANALYSIS .....</b>	<b>25</b>
4.1	Vegetation Resources .....	25
4.1.1	Southern Spruce Plantation (CUP3).....	25
4.1.2	Cultural Meadow (CUM1).....	29
4.1.3	Northern Plantation (CUP3/CUM1/CUT1 Complex).....	29
4.1.4	Hedgerow 2 .....	29
4.1.5	Wetland and Wetland Buffer .....	29
4.2	Wildlife Resources.....	30
4.2.1	Southern Spruce Plantation (CUP3).....	30
4.2.2	Cultural Meadow (CUM1).....	31
4.2.3	Northern Plantation (CUP3/CUM1/CUT1 Complex).....	31
4.2.4	Connectivity .....	32
<b>5</b>	<b>MITIGATION RECOMMENDATIONS.....</b>	<b>33</b>
5.1	Vegetation Resources .....	33
5.1.1	Southern Spruce Plantation (CUP3).....	33
5.1.2	Cultural Meadow (CUM).....	34
5.1.3	Northern Plantation (CUP3/CUM/CUT Complex).....	34
5.1.4	Hedgerow 2 .....	35
5.1.5	Wetland and Wetland Buffer .....	35
5.2	Wildlife Resources.....	35
5.2.1	Southern Spruce Plantation (CUP3).....	35
5.2.2	Cultural Meadow (CUM).....	36
5.2.3	Northern Plantation (CUP3/CUM/CUT Complex).....	36

5.2.4	<i>Construction Timing</i> .....	36
<b>6</b>	<b>CONCLUSIONS</b> .....	<b>37</b>
<b>7</b>	<b>REFERENCES</b> .....	<b>38</b>

**List of Figures**

Figure 1	Location Map
Figure 2	Existing Natural Heritage Features
Figure 3	Vegetation community mapping as per Scoped Subwatershed Report
Figure 4	Conceptual Linkages

**List of Appendices**

Appendix A	Vegetation Assessment Methodology
Appendix B	List of Significant Wildlife Species from background information sources
Appendix C	Vascular Plant Species List
Appendix D	Biophysical Data for Vegetation Communities
Appendix E	Checklist of Wildlife Species observed in 2003 and 2004

**OWEN PROPERTY**  
**City of Waterloo**  
**ENVIRONMENTAL IMPACT STATEMENT**  
**Terrestrial Resources**

October 15, 2004

## **1 Introduction**

---

The natural heritage resources component of the impact assessment was prepared by Dougan & Associates. The terms of reference for the impact assessment refer to a White Spruce plantation at the south end of the property, a potential seepage area in an old field to the north of the plantation, and a wetland buffer at the northwest corner of the property. Specific objectives were:

1. Prepare a synopsis of background information on the study area with respect to natural resources
2. Verify the buffer and setback determined in 2001 for the Sunfish Lake-Laurel Creek Provincially Significant Wetland/Forested Hills Environmentally Sensitive Protection Area (ESPA).
3. Conduct seasonal field inventories to document existing natural resources and identify potential impacts of the proposed development on natural heritage resources and their associated ecological functions; resources documented in this report will be updated with spring floral and faunal inventories conducted in 2004.
4. Recommend mitigation and compensation measures that could be implemented to minimize impacts to natural heritage resources

### **1.1 Study Area**

The 16.78 ha subject property is located in the southwest corner of the City of Waterloo between Erbsville Road and Wilmot Line, approximately 720 metres east of Wilmot Line and facing Wideman Road. The majority of the study area is within Subwatershed #308 of the Laurel Creek Watershed except for the southwest corner which is within Subwatershed #309 (see Figure 1). The property exists at the edge of a matrix of forested uplands and wetlands that are part of the Forested Hills ESPA (Environmentally Sensitive Policy Area) to the west and south, and Schaefer's Woods ESPA to the north of Wideman Road. In fact, almost the entire southern half of the subject property is currently designated part of the Forested Hills ESPA. To the east is the Columbia Forest II subdivision, which is under construction, and a portion of Western boundary the Owen property is bordered by agricultural fields.

The northwest corner of the property is part of the provincially significant Sunfish Lake-Laurel Creek Wetland Complex which overlaps with the Forested Hills ESPA. The boundary for the portion of the Sunfish Lake-Laurel Creek wetland on the property as staked in 2001 is visible on Figure 2. A tributary of Monastery Creek runs along the northwest boundary of the site. This tributary is visible on Figure 3. Monastery Creek is a coldwater creek that originates southwest of the Owen property and flows northeast, crossing Wideman Road near the northwest corner of the Owen property and joining Laurel Creek at a point roughly 190 m north of Wideman Road.

Historically the subject property was utilized as farmland prior to the establishment of a conifer plantation at the south end of the property approximately 40 years ago. A younger plantation exists at the north end of the property. Selective harvesting for Christmas trees occurs annually on the property

## 2 Methods

---

### 2.1 Background Review

The following resources were consulted:

#### Documents, Summaries and Contacts

- Ontario Natural Heritage Information Centre Database Natural Heritage Geographic Query – search for rare element occurrences
- Scoped Subwatershed Report. Doug Owen Construction Ltd. Wideman Road. City of Waterloo (Planning and Engineering Initiatives, Ltd., 1999).
- Final Subwatershed Management Plan. Subwatershed Plans #313 and #309. Laurel Creek Watershed City of Waterloo. (Planning and Engineering Initiatives Ltd., 1996)
- Subwatershed 314 Management Plan. Laurel Creek Watershed in the City of Waterloo. (Mark L. Dorfman, Planner Inc., 1996)
- Forested Hills Environmentally Sensitive Policy Area 19. Regional Municipality of Waterloo, 2003. Revised January 21, 2003 Draft Document provided by Chris Gosselin.
- Schaefer's Woods Environmentally Sensitive Policy Area 17. Regional Municipality of Waterloo, 2003. Revised January, 2003. Draft Document provided by Chris Gosselin.
- Columbia Street Extension: Erbsville Road to the Wilmot Line. Class Environmental Assessment and Preliminary Design Study and Appendices (Paragon Engineering Ltd, 1997).
- Wetland Data Record and Evaluation for Sunfish Lake-Laurel Creek Wetland Complex (D.P. Coulson and P. Roberts 1986, Ken Cornelisse et al 2003)
- Wood Thrush Nesting Study in Forested Hills in the City of Waterloo and Rural Control Sites in Waterloo Region, 2003. (Unpublished paper written by Lyle Friesen and Colin Zantinge.)
- Landbird Monitoring on the West Side of Waterloo 2003 Year Report Part One: Landbird Monitoring Overview and Breeding Bird Abundance and Trends. (Unpublished report for the City Of Waterloo. Prepared by Edward Cheskey. October 2003.)

### 2.2 Field Methodology

#### 2.2.1 *Vegetation Resources*

##### Vegetation Communities

Field investigations of the Southern Plantation and Cultural Meadow were conducted on Sept 4<sup>th</sup>, October 14<sup>th</sup>, and November 3<sup>rd</sup> of 2003. A spring botanical survey of both the Southern and Northern Plantations was conducted on June 10, 2004. Vegetation communities within the study area were mapped as polygons onto 1:4000 aerial black and white aerial photographs (April, 2000). These polygons were transferred onto an ortho-rectified digital base. Vegetation communities were classified according to the Southern Ontario Ecological Land Classification (ELC) system (Lee *et al.*, 1998). Provincial rarity status of plant species was determined using the *Natural Heritage Resources of Ontario: Rare Vascular Species List* (Oldham, 1999). Rarity

in the Regional Municipality of Waterloo was determined using the *Region of Waterloo Significant Species List: Native Vascular Plants* (Regional Municipality of Waterloo 1999). Nomenclature for plant species follows the *Ontario Plant List* (Newmaster *et al*, 1998).

Field data collected for habitat characterization and constraint assessment included habitat structure, drainage, soil texture, canopy cover and age, and presence of slopes, significant species habitat, and linkage functions. A detailed description of habitat parameters and constraint assessment criteria is provided in Appendix A.

#### Buffer Determination and Verification

The wetland boundary for the Monastery Creek Wetland and buffer widths for various features on the Owen property (H-11, H-22, H-23 and UF- 4) were originally determined and agreed to in the fall of 2001 as part of follow up procedures emanating from the approved Scoped Subwatershed Report for the Owen property (Planning and Engineering Initiatives Ltd., 1999). An on-site meeting was held in September of 2001 and the limits for H-22/ESPA, as well as buffers for H-23 and UF-4 were flagged and subsequently surveyed. In attendance were the property owners along with staff of the Planning Engineering Initiatives Ltd., the City of Waterloo and the Region of Waterloo.

It was stipulated in the Scoped Subwatershed Report that the limit of residential development in the northwest corner of the property would be: the edge of the 30m buffer for the Monastery Creek Wetland Complex, the edge of the buffer for the ESPA (minimum 7 metres), or the extent of the regional floodplain, whichever is greatest. The limits of the wetland were flagged by staff of the Grand River Conservation Authority and Planning and Engineering Initiatives in October, 2001 and the boundary was surveyed. The wetland buffer supersedes the ESPA buffer in the northwest corner of the property, and the regional floodline for a tributary of Monastery Creek in turn supersedes the wetland boundary at the north end of the property. The limit of development as determined by the process described above is delineated in Figure 2.

The terms of reference for the Owen property EIS included verification of the Wetland/ESPA Boundary at the northwest corner of the property. The wetland/ESPA buffer was confirmed by Dougan & Associates on Sept 4, 2003. The buffer had been staked earlier in the day by a surveyor. The stakes followed the edge of the wetland buffer to the point at the north end of the property where the regional floodline was staked to the northeast. The stakes were numbered and a plan indicating the locations of each numbered stake was provided. The limit of the wetland itself had also been flagged at periodic intervals by the surveyor with blue tape.

To confirm the boundary for the EIS, the entire length of the staked boundary was walked. Since the stakes were relatively close together, the distance to the wetland was verified at every third or fourth stake. The criterion used to define the limit of the wetland was based on the Ontario Wetland Evaluation System (OWES) definition, that is, the limit was taken where at least 50% of the plant cover consisted of wetland species (Ministry of Natural Resources, 1993).

## 2.2.2 Wildlife Resources

Wildlife resources were surveyed on July 3<sup>rd</sup>, July 10<sup>th</sup>, and November 3<sup>rd</sup> 2003, as well as April 21<sup>st</sup>, April 23<sup>rd</sup> and June 25<sup>th</sup> 2004 (see Table 1). In total, 9.75 hours were spent on site.

In accordance with the Terms of Reference and consistent with recommendations made by the Regional Municipality of Waterloo (May 27, 2003) the focus of this inventory was the White Spruce plantation south of the McNally laneway. As part of the 2003-2004 fieldwork, incidental wildlife observations were made from the remaining parts of Owen property on either side of the White Spruce plantation, as well as from the small isolated woodlot to the east, UF-5.

**Table 1: Summary of wildlife surveys.**

	Date	Observer	Time in field	Total Hours	Weather Conditions	Primary purpose
1	July 3, 2003	K. Konze	05:45 – 07:45	2.00	Sunny and calm. 14°C	Breeding Bird Survey
2	July 10, 2003	K. Konze	08:45 – 10:15	1.50	Cloudy. 20 km/hr east winds. 17°C	Breeding Bird Survey
3	November 3, 2003	K. Konze	13:00 – 15:45	2.75	Overcast and light rain. No wind. 13°C	Vegetation Survey
4	April 21, 2004	K. Konze	21:40 – 22:05	0.416	Overcast and quite breezy. 12°C	Amphibian Survey
5	April 23, 2004	K. Konze	18:55 – 19:30	0.583	Mostly sunny, 10°C and slight breeze	Breeding Bird Survey
6	June 25, 2004	K. Konze	06:00 – 08:30	2.50	Overcast then partly sunny. 10 - 12°C	Breeding Bird Survey
			TOTAL HOURS	9.75		

Wildlife surveys focused on documenting breeding birds. To this end, three comprehensive field visits were made during the breeding season. Breeding bird evidence codes followed those defined in the Ontario Breeding Bird Atlas (2001). All breeding bird observations were submitted to the Ontario Breeding Bird Atlas database. An additional visit was made in early spring 2004 to document the presence of any calling frogs or toads. Incidental observations of other wildlife species such as mammals, reptiles and insects were recorded when observed. All wildlife species were listed according to the general vegetation communities that they were encountered in.

Federal, provincial and regional conservation status of each species was reviewed by consulting the following sources:

**COSEWIC. 2003. Canadian Species at Risk, May 2003.** Committee on the Status of Endangered Wildlife in Canada.

[http://www.cosewic.gc.ca/pdf/English/CDN\\_SPECIES\\_AT\\_RISK\\_May2003\\_e.pdf](http://www.cosewic.gc.ca/pdf/English/CDN_SPECIES_AT_RISK_May2003_e.pdf)

**Ontario Ministry of Natural Resources (OMNR). 2003.** Vulnerable, Threatened, Endangered, Extirpated or Extinct Species of Ontario. List issued June 4, 2003.

[http://www.mnr.gov.on.ca/MNR/VTEEE\\_June\\_4\\_2003.pdf](http://www.mnr.gov.on.ca/MNR/VTEEE_June_4_2003.pdf)

**Regional Municipality of Waterloo, 1985a.** Appendix 3: Reptiles and Amphibians in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.

**Regional Municipality of Waterloo, 1985b.** Appendix 4: Mammals in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.

**Regional Municipality of Waterloo, 1996.** Revisions to Waterloo Region's Significant Species List: Breeding Birds Component. Report to Planning and Culture Committee PC-96-021. Approved by Council: April 25, 1996.

## 3 Findings

---

### 3.1 Background Review

#### 3.1.1 Study Area Context

##### Physiography

The subject property is on the eastern flank of the Waterloo Moraine, which is a series of rolling hills composed of primarily sand and gravel with some glacial till layers. Elevation in the study area ranges from 374 m above mean sea level (masl) at the boundary between Subwatersheds #308 and 309 in the southeast corner of the property, to 350 masl at Wideman Road, a change in elevation of 24 m. The land slopes generally to the north with some rolling topography toward the south end of the property.

##### Hydrology and Soils

The Waterloo Moraine acts as a groundwater recharge area due to the presence of permeable sand deposits in the moraine. Water from some of these sand layers infiltrates to the regional aquifer. Where glacial deposits are less permeable, water tends to accumulate in low-lying areas and wetlands develop. In the study area the dominant soils consist mainly of fine sand and very fine sandy loams. Data from previous studies indicate that the southern areas of Subwatersheds #308 and #309 is a recharge area consisting of a surface sand layer that extends at depth to the regional aquifer system. This may include part of the Owen property that is within the Forested Hills ESPA (Planning and Engineering Initiatives Ltd., 1999).

A local groundwater recharge system has been identified in the northern portion of the site between Wideman road and the mature White Spruce plantation, where shallow groundwater is confined by underlying layers of silt and/or clay. Recharge to this local groundwater flow system results in groundwater discharge to Monastery Creek and its tributaries, although there may be some slow recharge to regional aquifers at depth (Planning and Engineering Initiatives, Ltd. 1999).

#### 3.1.2 Designated Natural Areas

##### Forested Hills ESPA

The south end and parts of the northern boundary of the 16.78 ha study area are coincident with the Forested Hills ESPA (see Figure 1). The ESPA is a 133 ha natural area consisting of upland Beech-Maple (*Fagus grandifolia-Acer saccharum*) forests on a series of steep hills and ridges, interspersed with small wetlands between the topographic features. The hills and ridges are up to 10 metres in elevation and the differences in elevation have led to the development of different microhabitats associated with the slopes. The vegetation community has been described as a complex of Upland Deciduous Forest, Mesic/Intermediate forest and Lowland or Floodplain Forest.

The presence of the wetlands within the ESPA (i.e. not in the area proposed for development) was attributed to pooling of spring runoff in the Subwatershed Plan for Subwatershed #313 and #309 (Planning Initiatives, 1996). It is noted in this document that the lowland areas adjacent to

agricultural fields which tend to be bog-like in character with rich organic soils; it is speculated that the rich organic sediments may have developed as a result of increased runoff in the catchment area after the lands were cleared for agriculture. The northern portions of the ESPA consist of conifer swamp, ponds and a series of wet meadows along Monastery Creek.

The Forested Hills area fulfills five of the ESPA criteria in the Regional Official Policies Plan for the Regional Municipality of Waterloo (R.O.P.P. Policy 4.3). The criteria fulfilled are related to the area's representation of woodlands and landforms of the Waterloo Moraine, its size and the presence of forest interior habitat, habitat for significant species, and regional recharge functions (Regional Municipality of Waterloo, 2003a).

#### Schaefer's Woods ESPA

Schaefer's Woods is a diverse 103.8 ha complex of high quality upland and lowland forest immediately north of the Owen property, across Wideman Road. The area is an important component of the Laurel Creek corridor and contains the confluence of Monastery and Laurel Creeks. Along these creeks are wetlands, including fine examples of Tamarack (*Larix laricina*), Hemlock-Cedar (*Tsuga canadensis-Thuja occidentalis*), Balsam Fir (*Abies balsamea*) and Yellow Birch (*Betula allegheniensis*) swamps as well as deciduous swamps dominated by Silver Maple (*Acer saccharinum*). Upland areas are predominantly Sugar Maple-Beech type forests which include some trees of substantial size and a high quality stand of Hemlocks (*Tsuga canadensis*).

This natural area fulfills six ESPA criteria that led to its designation. The criteria fulfilled are related to the high quality of the habitats, presence of coldwater stream and old growth forest elements, the presence of habitat for forest interior species as well as habitat that supports nine significant bird species and fifteen significant plant species. The vital hydrological functions such as water storage, recharge and discharge areas are also recognized in this designation (Regional Municipality of Waterloo, 2003b).

#### Sunfish Lake –Laurel Creek Provincially Significant Wetland Complex

This 449 ha wetland complex overlaps with the northern portion of the Forested Hills ESPA and most of the Schaefer's Woods ESPA. There are actually four wetland complexes which have a diversity of deciduous, coniferous, and mixed swamp habitats, as well as swamp thickets and marshes. Roughly 80 % of the wetland complex is swamp and 18 % is marsh habitat. The wetland complex scored highly in the wetland evaluation system, particularly in the special features and hydrology categories. Special features of the complex include the presence of provincially and locally significant species and habitat for colonial waterbirds, fish and breeding waterfowl (Coulson and Roberts, 1986).

### **3.1.3 Vegetation Resources**

No vulnerable, threatened, endangered or provincially significant plant species have been reported from the Owen property according to the Natural Heritage Information Database (ONHIC 2003a). Three regionally significant plants are documented in the Forested Hills Draft ESPA report: Black Huckleberry (*Gaylussacia baccata*), Tree Clubmoss or Flat-branched Ground Pine (*Lycopodium obscurum*) and Early Buttercup (*Ranunculus fascicularis*). None of

these species have been found on the Owen property study area. The upland Maple-Beech forest portions of the ESPA are noted for their impressive spring wildflower display.

The majority of the vegetation communities on the Owen property and several off-property habitats were described in the Scoped Subwatershed Report (Planning and Engineering Initiatives, Ltd. 1999), with the exception of the White Spruce plantation at the south end of the property. The plantation was mentioned in an earlier document, the Subwatershed Management Plans for Subwatershed # 313 and # 309 (Planning Initiatives, Ltd 1996). This spruce plantation and a plantation to the southeast of the Owen property were described in that document as “functional parts of the ESPA forest community.” The authors did not consider the plantations as contributing “natural forest habitat” to the ESPA, however the presence of “excellent nesting and feeding habitat for bird species, as well as shade and forest floor conditions ideal for establishment of hardwood seedlings” was noted (Planning Initiatives Ltd, 1996). An old field habitat (OF-7) on the Owen property and an adjacent hedgerow (H-11) (see Figure 3) are also briefly described in this document.

The communities described in the Scoped Subwatershed Report on the Owen property (Planning and Engineering Initiatives 1999) include two hedgerows (H-22 and H-23), an Old Field/Plantation (PT-6) and the wetland that overlaps with the northwest corner (W-21) of the Owen property boundary. Off property units include the upland forests to the east, west and south of the property (UF-5, UF-9, and UF-4, respectively), as well two constructed ponds (W-23 and W-24) on the McNally Lands that drain to the north to create the tributary to Monastery creek. A summary of the PEIL (1996, 1999) findings and comments for vegetation communities on the Owen property is presented in Table 2, including cross-references to unit numbers from the present study. A map of the previously described vegetation units has been provided in Figure 3.

**Table 2: Summary of vegetation community descriptions on the Owen property from previous reports**

Unit # in document	D&A Unit # (see Figure 2)	Source	Description and Comments in Background Document	Assigned Constraint Level*
H-11	HR1	Planning Initiatives Ltd., 1996	<ul style="list-style-type: none"> <li>• Hedgerow with Sugar Maple (<i>Acer saccharum</i>), Silver Maple (<i>Acer saccharinum</i>), White Ash (<i>Fraxinus americana</i>), and Cedar (<i>Thuja occidentalis</i>) and White Elm (<i>Ulmus americana</i>).</li> <li>• portions with steep slope towards laneway;</li> <li>• some windthrow damage</li> <li>• connects two ESPA's</li> <li>• dripline buffer adequate given current cultivation practices.</li> </ul>	2
H-22		Planning and Engineering Initiatives Ltd., 1999	<ul style="list-style-type: none"> <li>• 5m wide, mature canopy; exists on 4:1 slope draining into wetland;</li> <li>• mixture of hardwood species with some White Cedar and Hemlock;</li> <li>• subcanopy dominant Alternate-leaved Dogwood (<i>Cornus alternifolia</i>), ground cover dominant is Canada Goldenrod (<i>Solidago canadensis</i>); evidence of tree removal;</li> <li>• Graceful Sedge (<i>Carex gracillima</i>) present –infrequent in region; no significant species</li> </ul>	1
H-23		Planning and Engineering Initiatives Ltd., 1999	<ul style="list-style-type: none"> <li>• 5m wide, separated from UF-5 by logging road; penetrated by plantation where hardwoods have been removed;</li> <li>• subcanopy dominant Alternate-leaved Dogwood, ground cover dominant Canada Goldenrod (<i>Solidago canadensis</i>); no significant species documented;</li> </ul>	1

Unit # in document	D&A Unit # (see Figure 2)	Source	Description and Comments in Background Document	Assigned Constraint Level*
PT-6	Northern plantation (CUP3/CUT/CUM1)	Planning and Engineering Initiatives Ltd., 1999	<ul style="list-style-type: none"> <li>former pasture now planted with pines and spruce;</li> <li>harvesting for Christmas trees evident; subcanopy</li> <li>dominated by Balsam poplar (<i>Populus balsamifera</i>), Canada Goldenrod (<i>Solidago canadensis</i>) dominant in ground cover</li> <li>no significant species documented</li> <li>Tall white Aster (<i>Aster lanceolatus</i>) documented and noted as infrequent in Waterloo Region;</li> <li>recharge function</li> </ul>	2, except where regional floodlines exist at north end, where it is constraint level 1
W-22	SWT	Planning and Engineering Initiatives Ltd., 1999	<ul style="list-style-type: none"> <li>Isolated depression at south edge of PT-6;</li> <li>No tree canopy; Meadow Willow (<i>Salix petiolaris</i>) and Dogwoods (<i>Cornus stolonifera</i>) with Sensitive Fern (<i>Onoclea sensibilis</i>) as dominant groundcover;</li> <li>former watering hole for livestock</li> </ul>	3
OF-7	CUM1	Planning Initiatives Ltd., 1996 Planning Initiatives Ltd., 1999	<ul style="list-style-type: none"> <li>Abandoned field sloping gently to north</li> <li>15 common species documented, including one species of sedge (<i>Carex</i> sp.)</li> <li>Area has little function with respect to ESPA</li> <li><i>Carex</i> sp. indicates periodic flooding</li> <li>Recharge function mentioned in scoped Subwatershed Study for Owen property (PEIL 1999) leads to constraint level 2</li> </ul>	2
PT-4	Southern plantation (CUP3)	Planning Initiatives Ltd., 1996	<ul style="list-style-type: none"> <li>Over mature White Spruce, Red Pine plantation with gentle slopes</li> <li>Linkages with vegetation units UF-5, UF-4, H-11 and OF-7</li> <li>Plantation not maintained, some insect damage noted in Red Pine Plantation; numerous bird species including Hairy and Pileated Woodpeckers taking advantage of insects</li> </ul>	2
W -21		Planning and Engineering Initiatives Ltd., 1999	<ul style="list-style-type: none"> <li>mixed deciduous swamp with canopy dominated by Black Ash (<i>Fraxinus nigra</i>), and Eastern White Cedar, subcanopy dominated by Red Osier Dogwood (<i>Cornus stolonifera</i>), and diverse ground cover of Jewelweed, with several species of grasses, and sedges and some ferns, cattails and wetland forbs</li> <li>Tall white Aster (<i>Aster lanceolatus</i>) documented and noted as infrequent in Waterloo Region;</li> </ul>	1

\* Level 1 = protect and maintain environmental features and functions

Level 2 = protect and maintain environmental functions

Level 3 = protect and maintain environmental features and functions where possible through Best Management Practices (Planning Initiatives Ltd., 1996)

### 3.1.4 Wildlife Resources

According to the Ontario Natural Heritage Information Centre database containing information on rare element occurrences, no nationally or provincially significant wildlife species are on record for the Owen property (ONHIC, 2003a). In addition to those species officially recognized as being 'Special Concern', 'Vulnerable', 'Threatened' or 'Endangered' (COSEWIC, 2003; OMNR, 2003), the database includes those with a provincial rarity rank of S3 (rare to uncommon in Ontario; usually between 20 and 100 occurrences in the province) or lower.

The following two sources of information yielded the majority of site specific wildlife information. The first source of information came from personal communications made with Mr. Lyle Friesen, expert songbird biologist with the Canadian Wildlife Service. The Owen property falls within the boundaries of his 10 x 10 km Ontario Breeding Bird Atlas square, 17NJ31. As such, he was familiar with the Owen property and was able to contribute additional noteworthy

breeding bird records. All of his observations were made from the City of Waterloo owned laneway on the eastern boundary of the Owen property.

Mr. Friesen's most recent noteworthy breeding bird observation was that of a Blue-winged Warbler (*Vermivora pinus*) (Friesen, pers. comm., 2003). The Blue-winged Warbler is considered to be 'significant' in the Regional Municipality of Waterloo (RMW, 1996). He observed this species on one occasion in late May 2003 from along the south edge of the 'northern plantation', *i.e.* the area north of the McNally laneway that bisects the Owen property, where the habitat appears suitable for this species. Mr. Friesen also noted that 3 or 4 years ago, this species was a regular breeding species at this location.

Mr. Friesen observed three other regionally significant breeding bird species from the Owen property in 2002: Pileated Woodpecker (*Dryocopus pileatus*), Pine Warbler (*Dendroica pinus*) and Purple Finch (*Carpodacus purpureus*) (Friesen, pers. comm., 2003). The Pileated Woodpecker was nesting in a deciduous tree in the southern edge of the White Spruce plantation. The Pine Warbler was reported from the southern plantation, and the Purple Finch was observed on territory in late May and early June in the area north of the McNally laneway.

Mr. Friesen also noted that Ted Cheskey (another expert ornithologist) had observed Broad-winged Hawk (*Buteo platypterus*), another regionally significant breeding bird species off Wideman Road, back in 1997 (Friesen, pers. comm., 2003). When contacted, Mr. Cheskey indicated that the Broad-winged Hawk observations spanned a few years, and were in various parts of Forested Hills, particularly the north end. Specifically, he reported one observations a couple hundred metres west of the northern plantation, and the other just west of the southern plantation, opposite woodlot UF-5. He reported that both observations were well into June and July indicating that the birds were probably breeding locally (Cheskey pers. comm., 2004a). Nothing in the correspondence seemed to suggest the species was observed over or breeding within the Owen property.

The second source of wildlife information used in the background review was information gathered as part of an ongoing breeding bird study being conducted throughout the Forested Hills ESPA (Cheskey, 2003). One station, #8, is located just outside the Owen property boundary, along the eastern property line, immediately adjacent to the isolated woodlot UF-5 (see Figure 2). However, because bird species are documented by sampling calls and sightings from all directions, not all of the observations pertain to species from the Owen property. Of the 37 breeding bird species documented from this station over seven years, 10 species are considered significant in Regional Municipality of Waterloo (RMW, 1996). Of these significant species, he confirmed 4 from the Owen property: Red-breasted Nuthatch, Golden-crowned Kinglet, Veery and Pine Warbler (Cheskey pers. comm., 2004b). Table 3 lists all regionally significant species on record for station #8.

Information from several other nearby stations (#'s 2, 4, and 5) was also reviewed to gain a better understanding of what the breeding bird community situated around the Owen property was like (Cheskey, 2003). In total, 57 species were recorded between 1997 and 2003, of which 28 species are recognized to be significant in the Regional Municipality of Waterloo (RMW, 1996) (see Appendix B). This total is considered high for such a relatively small area and is a

clear indication of the size and quality of the adjacent ESPA Two of the species are designated as ‘Species at Risk’: Acadian Flycatcher (*Empidonax vireescens*) is designated as “Endangered” in Canada, and Hooded Warbler (*Wilsonia citrina*) is designated as “Threatened” in Canada (COSEWIC, 2003). Both species were noted from the nearby deciduous portions of the Forested Hills ESPA. The Acadian Flycatcher was last reported in 1997 and Hooded Warbler in 1998. Due to the rarity of these species, these species may only be reported sporadically over the years, assuming the habitat remains suitable. Neither species is on record for the Owen property.

**Table 3: Regionally Significant Bird species documented at station #8 from 1997 to 2003 by Mr. Cheskey**

	Common Name	Scientific Name	Recorded from Owen property	Last Reported	Area Sensitivity*
1	Pileated Woodpecker**	<i>Dryocopus pileatus</i>	---	1999	AS
2	Red-breasted Nuthatch**	<i>Sitta canadensis</i>	X	1999	AS
3	Golden-crowned Kinglet	<i>Regulus satrapa</i>	X	2002	---
4	Veery**	<i>Catharus fuscescens</i>	X	1998	AS
5	Brown Thrasher**	<i>Toxostoma rufum</i>	---	1998	---
6	Pine Warbler**	<i>Dendroica pinus</i>	X	2000	AS
7	Ovenbird**	<i>Seiurus aurocapilla</i>	---	2000	AS
8	Mourning Warbler**	<i>Oporornis philadelphia</i>	---	2001	---
9	Eastern Towhee**	<i>Pipilo erythrophthalmus</i>	---	2000	---
10	Vesper Sparrow**	<i>Pooecetes gramineus</i>	---	1998	---

\* Area sensitivity designations based on OMNR (2000).

\*\* Also recorded next to Owen property, specifically stations #'s 2, 4, 5, & 8.

The Subwatershed Management Plan (Planning Initiatives Lt., 1996) for subwatersheds #313 and #309 also provided wildlife observations specific to the Owen property, based on a breeding bird inventory conducted in July 1995. Hairy Woodpecker (*Picoides villosus*) and Pileated Woodpecker (*Dryocopus pileatus*) were described as taking advantage of the insect damage occurring in the southern plantation. Both species are considered regionally significant (RMW, 1996) and were the only regionally significant species noted from the property. Similarly, both species are resident throughout their range (Hounsell, 1989). Two additional regionally significant breeding bird species, also noted by Cheskey (2003), were observed from woodlot UF-5, immediately adjacent to the east side of the Owen property: Mourning Warbler (*Oporornis philadelphia*) and Eastern Towhee (*Pipilo erythrophthalmus*). The complete list of wildlife species observed by Planning Initiatives Limited can be viewed in their Appendix C (Planning Initiatives Ltd, 1996).

Five of the species reported from the Owen property by the various sources summarized above are considered to be ‘area sensitive’ (see Appendix B). These include: Hairy Woodpecker (*Picoides villosus*), Pileated Woodpecker (*Dryocopus pileatus*), Red-breasted Nuthatch (*Sitta canadensis*), Veery (*Catharus fuscescens*), and Pine Warbler (*Dendroica pinus*). Area sensitive species require large areas of suitable habitat in order to sustain their populations (OMNR, 2000). For more information on area sensitivity, please refer to Section 3.2.2. Four of the five species were most likely observed in the southern plantation. The Veery is reliant on deciduous forest and therefore was probably within the ESPA proper. In addition to these five species, 11 other area sensitive species were found from sites close to the Owen property. Again, this relatively high total is a reflection of the relatively large forested areas that comprise the Forested Hills ESPA

All regionally significant bird observations from within and immediately adjacent to the Owen property, and based on the above background sources, are listed in Appendix B.

## 3.2 Field Survey Results

### 3.2.1 Vegetation Resources

No plant species which are considered vulnerable, threatened, endangered, or provincially significant (COSEWIC 2003; Oldham 1999) were encountered in the fall 2003 surveys in the study area. Four species considered rare in the Region of Waterloo were documented within the Southern Spruce plantation and one regionally significant species was documented in the Northern Plantation. The significant species in the Northern Plantation is Interrupted Fern (*Osmunda claytoniana*), a fern of moist woods and swamp margins. The significant species in the Southern Plantation have affinities for sandy soils in open or partly shaded areas and occur mostly along the east side of the plantation, close to a laneway. There are two fern species, Ebony Spleenwort (*Asplenium platyneuron*) and Leathery Grape-fern (*Botrychium multifidum*), a Clubmoss known as Southern Ground Cedar or Crowfoot Club-moss (*Diphasiastrum digitatum*) and a grass, Schreber's Satin Grass (*Muhlenbergia schreberi*). A sedge was also collected from the north edge of the Southern Plantation that was identified as Burreed Sedge (*Carex sparganioides*), which is also significant in the region of Waterloo. A vascular plant species checklist for the Owen property study area appears in Appendix C.

The communities documented in detail as part of the Owen property EIS include a Cultural Meadow (labelled OF-7 in Figure 3) and a coniferous plantation (PT-4 on Figure 3). The Cultural Plantation has some open meadows and thicket-like communities (see Figure 2). The biophysical conditions of the communities are summarised in Appendix D. Brief descriptions of the vegetation communities are provided below.

#### Southern Plantation -Coniferous Cultural Plantation (CUP3) with Cultural Thicket/Cultural Meadow (CUT/CUM) communities

The Southern Plantation consists of predominantly mature White Spruce with several scattered open meadow/ thicket communities on the east side of the plantation; active Christmas tree harvesting has resulted in varied tree sizes. The open areas have likely been harvested more intensely over the years, particularly near the laneway, and have been mapped as Cultural Meadow/Cultural Thicket on Figure 2. The plantation is classified as Coniferous Plantation (CUP3) according to the ELC system and the open areas are classified as Mineral Cultural Meadow/Cultural Thicket (CUM1/CUT1) communities. The soil consists of very fine sand throughout the Plantation and some rolling topography is evident on the south, west and northern sides of the plantation.

The canopy of the main plantation area consists of mature White Spruce (*Picea glauca*) of approximately 20-40 cm in diameter with some scattered White Pines (*Pinus strobus*) and an area of planted Scotch Pine (*Pinus sylvestris*) at the north end. The largest White Spruce trees are approximately 15-20m tall, with most being relatively robust specimens. There are some forest ground cover species at the south end of the plantation such as *Dryopteris* woodferns and Wild Ginger (*Asarum canadense*), and the shadier areas throughout the plantation tend to have carpets

of mosses consisting of three to four moss species. Along the western and eastern boundaries of the plantation are some deciduous trees, including specimens of Sugar Maple, (*Acer saccharum*), Basswood (*Tilia americana*) and Black Cherry (*Prunus serotina*).

The Cultural Meadow/Cultural Thicket areas contain smaller White Spruce trees and saplings from 0.5 m and 2 m in height. The ground cover is dominated by Canada Goldenrod (*Solidago canadensis*) with Raspberry (*Rubus idaeus* ssp. *melanolasius*), and Red Elderberry (*Sambucus racemosa* ssp. *pubens*) shrubs and White Spruce seedlings. Other associates in the ground cover include Shinleaf (*Pyrola elliptica*) and Greater Celandine (*Chelidonium majus*).

A summary of the status and preferred habitats of the regionally significant plant species in the Southern Plantation is presented in Table 3. The majority of the regionally significant plants are situated on the east side of the plantation in relatively open areas, close to the roadway that separates the Plantation from the Deciduous Forest Unit (UF-5) (Figure 2). One specimen of Leathery Grape-fern was detected on the west side of the plantation, and the Schreber's Satin Grass is scattered throughout the plantation, usually where there are openings and/or old cart tracks. This species is considered regionally rare in Waterloo if it can be demonstrated that it has not been introduced. Since it is found on many of the cart tracks it is quite possible that it was introduced. Dore and McNeil (1980) indicate that Schreber's Satin Grass has historically been reported only in sandy woods along the Lake Erie shoreline and the adjacent drainage area, but it has been spreading to disturbed habitats in southwestern Ontario since the turn of the century. Whether or not Schreber's Satin grass was introduced to this plantation, evidently the sandy soils in this community are providing suitable habitat.

**Table 3. Rarity status and preferred habitat of regionally significant plant species documented in the Southern Plantation of the Owen property.**

Species Name	Waterloo Status	Ontario Status	Habitat and Distribution
Burreed Sedge ( <i>Carex sparganoides</i> )	R*	S5	Rich deciduous woods and borders common in Ontario, protected in some New England states
Crowfoot Club-moss ( <i>Diphasiastrum digitatum</i> )	R*	S5	endemic in North America, found in sandy woods and clearings in southeastern Canada
Leathery Grape Fern ( <i>Botrychium multifidum</i> )	R	S5	sandy places, borders of woods, open fields, and open pastures, dry hillsides
Ebony Spleenwort ( <i>Asplenium platyneuron</i> )	R	S4	partial shade in open woods, grown over areas, clearings apparently expanding range northward since 1960's
Schreber's Satin grass ( <i>Muhlenbergia schreberi</i> )	R+	S4	sandy woods along shores of Lake Erie and adjacent drainage area, spreading to disturbed habitats elsewhere in southern Ontario.

R = Rare in the Regional Municipality of Waterloo

R+ = significant but only if demonstrably indigenous-most populations in Waterloo are thought to be of non-indigenous origin

R\* = significant but with the expectation that additional research may prove otherwise (Region of Waterloo, 1999)

S4 = Common and apparently secure in Ontario; usually with more than 100 occurrences in the province.

S5 = Very common and demonstrably secure in Ontario.

Ebony Spleenwort is a fern that responds well to disturbance, and is found in dry open woods with partial shade, on sandy or rocky substrates. This is a southern species with the northern edge of its range in Bruce County and appears to have only a few stations outside of Ontario; however it was considered rare in Ontario in the 1970's (Cody and Britton 1989). Currently it ranks as S4 in Ontario, which means it is considered common and secure, usually having more than 100 occurrences in the province. Wagner and Johnson (1981) reported a northward expansion of this species in the Great Lakes region since the 1960's, in habitats such as dry forests and forest

edges, shaded steep road banks, pine plantations, and second-growth old fields, pastures, and orchards. White Pine (*Pinus strobus*) and Scotch Pine (*Pinus sylvestris*) plantations in southern Michigan commonly support small populations of Ebony Spleenwort, whereas old fields, pastures and orchards may support much larger populations. The authors also mention that the species is often found with Crowfoot Club-moss and Grape Ferns (*Botrychium* spp.). It remains unclear why this species is expanding northward. Potential explanations that have been put forth include changes in climatic warming trends, increases in the amount of disturbed habitat available, or a statistical phenomenon of population growth, i.e. the species may have existed at a low level for a much longer period of time and over a wider range than previously thought (Wagner and Johnson 1981). Ebony Spleenwort has not been documented in either the Forested Hills or the Schaefer's Woods ESPA.

Leathery Grape Fern is more widely distributed across Canada and Ontario than Ebony Spleenwort, and ranges much further north, with several stations north of Lake Superior (Cody and Britton 1989). This species also favours sandy places and borders of woods and is often found growing with other Grape Fern species (*Botrychium* spp.). Leathery Grape Fern has not been documented to date in the Forested Hills ESPA, however it was documented in Schaefer's Woods ESPA. Other *Botrychium* species in Schaefer's Woods include Daisy-leaf Moonwort (*Botrychium matricarifolium*) and Blunt-lobe Grape Fern (*Botrychium oneidense*). The latter species has a rarity status of S3 in Ontario which means it is provincially rare to uncommon, having between 20 and 100 occurrences in the province.

Crowfoot Club-moss is in a group of plants known as the "fern allies". Club-mosses are neither mosses nor ferns, but they are similar to ferns in the sense that they have a vascular system but do not produce flowers or seeds; rather dispersal is achieved via spores. The spores are produced on club-shaped structures, hence the name "club-moss". Crowfoot club-moss is documented as "endemic" in North America, found in clearings and sandy woods in southeastern Canada, from Ontario to the Maritime Provinces (Cody and Britton 1989). The plant is also known as Southern Ground Cedar because the small flattened branches resemble those of Eastern White Cedar trees. Although there are two different species of regionally rare Club-mosses in Schaefer's woods (*Lycopodium clavatum* and *Lycopodium annotinum*), and one regionally significant species in the Forested Hills ESPA (*Lycopodium obscurum*), Crowfoot Club-moss (*Diphasiastrum digitatum*) has not been reported in either of the ESPAs. This plant is listed as regionally rare, however it is indicated in the *Region of Waterloo Significant Species List: Native Vascular Plants* (Regional Municipality of Waterloo 1999) that there is an expectation that additional research may prove otherwise. This suggests that this species is suspected to be under-reported in the Region, although its preference for sandy woods may place some limits on its distribution.

#### Mineral Cultural Meadow (CUM1)

The Cultural Meadow is between the two plantations on a gentle north-facing slope. The meadow has vegetation typical of old field habitats such as Canada Goldenrod (*Solidago canadensis*) and Kentucky Bluegrass (*Poa pratensis*), with some species tolerant of wetter conditions situated in a depression at the north end of the meadow such as Dudley's Rush (*Juncus dudleyi*), New England Aster (*Aster novae-angliae*) and occasional Boneset (*Eupatorium perfoliatum*) and Spotted Joe Pye Weed (*Eupatorium maculatum* ssp. *maculatum*), mixed in with the old field species. There are scattered Pine saplings and Gray Dogwood

(*Cornus foemina* ssp *racemosa*) shrubs also in this field. The soil at the base of the slope where the pocket of wetland species is located is a clay loam with a “moderately moist” moisture regime based on the Ecological Land Classification system (ELC). The presence of plants with affinities for wetter habitats at the base of a slope suggests either a seepage area or a poorly drained area where runoff collects.

#### Northern Plantation (Coniferous Cultural Plantation/Mineral Cultural Thicket Complex / Mineral Cultural Meadow -CUP3/CUT1/CUM1)

This area is dominated by planted conifers which are less mature than those in the Southern Plantation. Canopy cover varies, with a relatively mature Red Pine (*Pinus resinosa*) and Black Pine (*Pinus nigra*) Coniferous Cultural Plantation on the west side (greater than 60 % cover of trees), and a mixture of coniferous plantation and Cultural Thicket habitat toward the east (Cultural Thicket habitat consists of less than 25% cover of trees but greater than 25% cover of shrubs-size trees). The east side a much larger component of White spruce (*Picea glauca*) trees of varying sizes. Both of these areas are interspersed with areas of open Cultural Meadow (less than 25% cover of trees and shrubs). The open meadows are heavily dominated by Canada Goldenrod (*Solidago canadensis*). The soils in this area are more complex and less sandy than in the Southern Plantation, with a higher component of silt and some clay at depths of greater than 70cm. The moisture regime is very fresh.

There is a small Swamp Thicket (approximately 0.02ha) in a depression on the west side of the Northern Plantation that is dominated by Willow (*Salix petiolaris*, *Salix discolor*) and Dogwood (*Cornus stolonifera*) shrubs. The ground cover has abundant Sensitive Fern (*Onoclea sensibilis*) with scattered sedges and Soft Rush (*Juncus effusus*). At the centre of the unit the substrate consists of a 30-40cm deep mixture of organic and mineral soils and water. Just west of the Swamp Thicket is a patch of Interrupted Fern, (*Osmunda claytoniana*) which is a significant species in the Region of Waterloo. This Swamp Thicket likely corresponds to vegetation unit W-22 in the Scoped Subwatershed Report (Planning and Engineering Initiatives, Ltd. 1999). In this report it was described as a former watering hole for livestock.

#### Hedgerow 2

This is a row of White Pines planted at the south end of the Cultural Meadow, approximately 20-30 cm in diameter. The form and aesthetic qualities of the trees have been compromised by pruning to accommodate electrical wires, and this may affect their health in the long term.

#### Buffer Determination

The wetland buffer as previously staked and surveyed in 2001 is appropriate. A buffer of 30m is appropriate for the northwest corner of the property, except where the regional floodline veers to the east at the north end of the property (see Figure 2).

### **3.2.2 Wildlife Resources**

A total of 59 species of wildlife were documented by Dougan and Associates from within and immediately adjacent to the study area during the summer of 2003 and spring of 2004. This included seven species of insects, two species of herpetofauna (amphibians and reptiles), 45 species of birds, and four species of mammals (see Appendix E).

### Breeding Birds

Of the 50, up to eight species were considered migrants. Two potential migrant species were Red-shouldered Hawk (*Buteo lineatus*) and Broad-winged Hawk (*Buteo platypterus*). Red-shouldered Hawk is currently designated as “Special Concern” in Canada (COSEWIC, 2003) and “Vulnerable” in Ontario (OMNR, 2003). Both hawk species were observed within 5 minutes of each other on April 23<sup>rd</sup> 2004 above the north end of the southern plantation. While the Red-shouldered Hawk was only observed once circling overhead, the Broad-winged Hawk appeared twice about a minute apart. It is possible two birds were sighted. Neither species was observed on June 25<sup>th</sup> 2004. Furthermore, the Owen property does not offer suitable breeding habitat for either species, which is interior conditions within areas of extensive forest. Hounsell (1989) states that the Red-shouldered Hawk’s preferred habitat is “woodlands, wooded rivers, timbered swamps, well-watered woodlands scattered through open country or agricultural lands, and wooded river bottoms.” It is possible that some of the above described habitats may be present on the Forested Hills ESPA immediately to the west. The Broad-winged Hawk also prefers forested areas near water. Its habitat matrix may include aspen-poplar-birch, upland hardwood or upland mixed (Hounsell, 1989). Neither is present on the Owen property.

All of the remaining species are recognized to be “very common” in Ontario (ONHIC, 2003 b,c,d,e,f); none are currently designated “Special Concern”, “Vulnerable”, “Threatened” or “Endangered” in Ontario or Canada (OMNR, 2003; COSEWIC, 2003) (see Appendix E).

Silver Spotted Skipper (*Epargyreus clarus*) was observed from two different openings within the mature White Spruce plantation. Cooper’s Hawk (*Accipiter cooperii*) was observed flying west over the site, but did not demonstrate any breeding evidence. Lastly, a female Blue-winged Warbler was observed feeding at least one young in the shrub layer under the grove of Scots Pine, adjacent to the north end of woodlot UF-5. All three species are recognized as “common” in Ontario (ONHIC, 2003 c,e).

Twelve of the 58 wildlife species observed are recognized to be significant in the Regional Municipality of Waterloo (RMW 1985a; RMW 1985b; RMW, 1996) (see Appendix E). The 12 species were all birds and included the following:

1. Cooper’s Hawk (*Accipiter cooperii*)
2. Red-shouldered Hawk (*Buteo lineatus*)
3. Broad-winged Hawk (*Buteo platypterus*)
4. Pileated Woodpecker (*Dryocopus pileatus*)
5. Red-breasted Nuthatch (*Sitta canadensis*)
6. Golden-crowned Kinglet (*Regulus satrapa*)
7. Blue-winged Warbler (*Vermivora pinus*)
8. Nashville Warbler (*Vermivora ruficapilla*)
9. Pine Warbler (*Dendroica pinus*)
10. Mourning Warbler (*Oporornis philadelphia*)
11. Scarlet Tanager (*Piranga olivacea*)
12. White-throated Sparrow (*Zonotrichia albicollis*)

As mentioned above, Cooper's Hawk was not considered to be a breeding species on the Owen property. Similarly, habitat conditions on the Owen property are unsuitable for breeding of Red-shouldered Hawk or Broad-winged Hawk; these two species may have been spring migrants. No evidence of breeding was documented for the Pileated Woodpecker although recent drillings were observed suggesting that the species was utilizing the property to forage. An active nest was observed at the south end of the southern plantation in 2002 by Mr. Lyle Friesen (Songbird biologist, Canadian Wildlife Service). It was his opinion that this particular pair moved closer to Wilmot Line in 2003 (Friesen pers. comm., 2003). Lastly, one other regionally significant species, the Scarlet Tanager, is not considered to be a resident on the Owen property. This species was heard singing from the ESPA west of the Owen property.

Red-breasted Nuthatch was confirmed breeding in 2003 when an individual was observed carrying food in a grove of Scots Pine just south of the laneway that bisects the Owen property. A Red-breasted Nuthatch was also present in the conifers opposite the northern end of woodlot UF-5 on April 23<sup>rd</sup> and June 25<sup>th</sup> 2004. Golden-crowned Kinglets were observed on both midsummer visits in 2003. Fledged young were heard and observed actively foraging in the center of the mature White Spruce trees, opposite the south end of woodlot UF-5. As mentioned above, a female Blue-winged Warbler was observed carrying food to at least one young in the Scots Pine grove opposite woodlot UF-5 on June 25<sup>th</sup> 2004. Slightly west of this location, a female Nashville Warbler was also observed carrying food to a young one on the same date. A Pine Warbler was heard singing from the Scots Pine grove immediately opposite the north end of woodlot UF-5, only on the first of the two summertime visits. This species was also observed in the same vicinity on April 23<sup>rd</sup> 2004. Although the habitat conditions are suitable for breeding, the 2004 spring observation could represent a migrant. This species was not noted on June 25<sup>th</sup> 2004. Territorial behaviour was documented for the Mourning Warbler in 2003 from within the regional floodline, immediately west of the cultural meadow and north of the laneway that bisects the Owen property. It was also heard singing from the same location on June 25<sup>th</sup> 2004. A single White-throated Sparrow was heard singing halfway up the northern plantation on July 3<sup>rd</sup> 2003. Territorial behaviour could not be established on the July 10<sup>th</sup> follow-up visit; therefore breeding evidence remains as "possible." No White-throated Sparrows were documented from the northern plantation on June 25<sup>th</sup> 2004.

The overall quality and wildlife habitat value of the southern plantation warrants some commentary. Many plantations have been planted and managed such that they ultimately provide little value as wildlife habitat as they are tightly-spaced monocultures that block out most light from reaching the ground. The southern plantation is dominated by White Spruce, but what sets this plantation apart from most others is the size and varied character of the plantation. The majority of the trees are large, mature and open-grown. This character, coupled with the overall extent of cover, has made it more attractive to wildlife species than most plantations, including several regionally significant breeding bird species such as Golden-crowned Kinglet, Red-breasted Nuthatch, Blue-winged Warbler, Nashville Warbler, and Pine Warbler. All of these species, except for the Golden-crowned Kinglet, are also known to occur in the Forested Hills ESPA.

Six of the bird species documented by Dougan and Associates staff are recognized to be 'area-sensitive': Cooper's Hawk (*Accipiter cooperii*), Red-shouldered Hawk (*Buteo lineatus*), Broad-

winged Hawk (*Buteo platypterus*), Pileated Woodpecker (*Dryocopus pileatus*), Red-breasted Nuthatch (*Sitta canadensis*), and Pine Warbler (*Dendroica pinus*). However, only Red-breasted Nuthatch and Pine Warbler demonstrated breeding evidence on the Owen property in 2003-04. Both the Red-breasted Nuthatch and Pine Warbler are also known to occur in the adjacent Forested Hills ESPA.

Area sensitive species are those that require large areas of suitable habitat in order to sustain their populations (OMNR, 2000). Area sensitive species are more susceptible to habitat loss and fragmentation than generalist species and therefore of greater conservation concern. Individuals from various wildlife groups may be considered area sensitive (e.g. amphibians, reptiles, birds and mammals), but most discussions related to area sensitive species usually refer to birds. Area sensitive bird species generally fall under 3 categories, depending on their habitat association: 'grasslands', wetlands and woodlands. Although in reality area sensitive species probably fit along a gradient with respect to their level of sensitivity, the *Significant Wildlife Habitat Technical Guide* (OMNR, 2000), specifically Appendices C and G, was used as the definitive source for species considered to be area sensitive.

An unidentified owl species was noted during the November 3<sup>rd</sup> 2003 field visit, based on the alarm calls of other bird species. Although several attempts were made to view the bird none were ultimately successful. The presence of an owl on the Owen property was not surprising given ample suitable roosting and foraging habitat. The individual noted on this occasion may have been a migrant heading south or a potential winter resident.

#### Amphibians

On April 21<sup>st</sup> 2004, a night-time visit was made to the property to document calling frogs and toads, in particular, those species that will not be heard calling later in the season. The area north of the laneway that bisects the property was the focus of the visit since it contains part of the provincially significant Sunfish Lake –Laurel Creek Wetland Complex. Areas to the south of the laneway were not investigated since no wetland habitat is present. Two species of frogs were calling: Spring Peeper (*Pseudacris crucifer*) and Wood Frog (*Rana sylvatica*). The majority of individuals were heard calling from just off the property boundary, from dug ponds on the McNalley lands. Approximately eight Spring Peepers and two Wood Frogs were heard. It is likely that the portion of wetland on the Owen property support foraging by these two species. The only other species of herpetofauna observed on the Owen property during the field visits was a single Eastern Gartersnake (*Thamnophis sirtalis sirtalis*). It was discovered under a discarded board close to the south end of the 'southern' plantation.

#### Linkages and Buffers

The plantations on the Owen property provide a physical link 660 m long between ESPA 19 (Forested Hills) and ESPA 17 (Schaefer's Woods) to the north of Wideman Road (see Figure 4). The plantations represent a significantly different habitat type than what is found to the immediate south in ESPA 19, where deciduous forest predominates. The different habitat type may render the linkage less inviting for species moving north. Differences in habitat type are less pronounced between ESPA 17 and the Owen property plantations. Immediately north of Wideman Road there is a dense swamp dominated by Black Ash, Eastern White Cedar and Paper Birch (PIL, 1996). Another wider linkage between ESPA 17 and 19 occurs just west of the Owen

property; therefore the Owen property provides supplementary linkage potential (see Figure 4). Other linkages such as hedgerows, are much smaller in width.

Due to their coniferous cover, the plantations will provide effective visual separation and noise screening between the Forested Hills ESPA and the approved Columbia Forest II development to the east. This value can be partially maintained if extensive tree preservation occurs on the subject property (see Mitigation). For more information on the significance of spatial buffers, please refer to Section 4.2.1.

### **3.3 Interpretation of Policy**

#### **3.3.1 Environmentally Sensitive Policy Areas**

Policy 4.3.6 of the Regional Municipality of Waterloo Regional Official Policies Plan (R.O.P.P.) (1998) states that:

*Given the generalized boundaries of Environmentally Sensitive Policy Areas shown on Map 1 of this Plan, it may be necessary to interpret these boundaries more precisely prior to the approval of development applications for contiguous lands. The interpretation of the boundaries of Environmentally Sensitive Policy Areas will be achieved through the completion of Environmental Impact Statements or other appropriate study in accordance with Section 3.2.*

Consistent with this policy, Regional Municipality staff recommended that a breeding bird survey be conducted in the southern plantation during the summer of 2003 (RMW letter dated May 27, 2003 [File Code: D04-20019/DA]). The Region indicated that based on the findings of this survey, the ESPA boundary and buffer may need to be re-evaluated. To this end, Table 4 was created, detailing which ESPA criteria were met and which ones were not.

According to the R.O.P.P. Policy 4.3.2, in order to qualify for designation as an ESPA, a natural area must:

- fulfill one primary criteria, or
- fulfill at least two secondary criteria, or
- fulfill one secondary criteria and two tertiary criteria

A review of available background information determined that the plantation does not fulfil the primary criterion.

The southern White Spruce plantation clearly fulfils one secondary criterion related to habitats that support regionally significant species. Although four species of birds recognized to be forest interior species were noted from the southern plantation, the size and configuration of the plantation does not fit the arbitrary guidelines for defining forest interior. Besides, all four species are also already recognized to be regionally significant, thereby helping fulfil Secondary criterion (iv).

**Table 4: Analysis of criteria met for Environmentally Sensitive Policy Area designation in the ‘southern plantation’ (from ROPP Policy 4.3.2, RM Waterloo, 1998)**

ESPA Criteria	Decision Code	Comments
<b>Primary Criteria (section 4.3.2a):</b>		
Be identified by the Province as Provincially Significant Life Science Area of Natural and Scientific Interest, Regionally Significant Life Science Area of Natural and Scientific Interest, or a Provincially Significant Earth Science Area of Natural and Scientific Interest	No	
<b>Secondary Criteria (section 4.3.2b):</b>		
i) comprise ecological communities deemed unusual, of outstanding quality or particularly representative regionally, provincially or nationally;	No	
ii) contain critical habitats which are uncommon or remnants of once extensive habitats such as old growth forest, forest interior habitat, Carolinian forest, prairie-savanna, bogs, fens, marl meadows, and cold water streams;	No	Forest interior habitat has been typically defined as forested lands at least 100 m away from outside edges (Riley and Mohr, 1994; Landowner Resource Centre, 2000). However, others suggest that forest interior conditions require a spatial separation of at least 200 m (Gore and Storrie, 1992). Based on these definitions, the plantations do not contain forest interior habitat (i.e. the property is only 140 m wide). However, 4 of the bird species documented as breeding in the plantation (Pileated Woodpecker, Red-breasted Nuthatch, Golden-crowned Kinglet and Pine Warbler) are considered forest interior species (Freemark and Collins 1992).
iii) provide a large area of natural habitat of at least twenty hectares which affords habitat to species intolerant of human intrusion; or	No	While the southern plantation on the Owen property does not meet the 20 ha size criterion on its own, it did support 3 area sensitive breeding bird species. They were Pileated Woodpecker, Red-breasted Nuthatch and Pine Warbler (OMNR, 2000). The Owen property is contiguous with the 133 ha ESPA 19, which may help explain the presence of these species.
iv) provide habitat for organisms indigenous to the Region recognized as nationally, provincially, or regionally significant; or	Yes	<u>Plants</u> – 3 species considered significant by Region (Ebony Spleenwort, Leathery Grape Fern and Crowfoot Club-moss) <u>Wildlife</u> – 6 species considered significant by Region (Pileated Woodpecker, Red-breasted Nuthatch, Golden-crowned Kinglet, Blue-winged Warbler, Nashville Warbler, and Pine Warbler)
<b>Tertiary Criteria (4.3.2c):</b>		
i) contain an unusual diversity of native life forms due to varied topography, contain microclimates, soils, and/or drainage regimes;	No	
ii) perform a vital ecological function such as maintaining the hydrological balance over a widespread area by acting as a natural water storage discharge or recharge area;	No	
iii) provide a linking system of relatively undisturbed forest or other natural habitat for the movement of wildlife over a considerable distance;	Poss	The plantations on the Owen property provide a physical link 660 m long between ESPA 19 (Forested Hills) and ESPA 17 (Schaefer’s Woods) to the north of Wideman Road (see Figure 4). However, the plantations represent a significantly different habitat type than what is present immediately south in ESPA 19. While it may not negate the overall function of this potential linkage, the change in habitat type may make the linkage less inviting for species moving north. Differences in habitat type are less pronounced between ESPA 17 and the plantations. Immediately north of Wideman Road is a dense swamp dominated by Black Ash, Eastern White Cedar and Paper Birch (PIL, 1996). The only other link between ESPA 17 and 19 occurs slightly west of the Owen property (see Figure 4). The Owen property is 140 m wide and 660m long (an area of approximately 9.2 ha). As such, its value as a potential linkage is heightened. Many linkages such as hedgerows, are much smaller in width.
iv) serve as major migratory stop-overs; or	No	
v) contain landforms deemed unusual or particularly representative at the regional scale.	No	There is over 20 m change in elevation from the south end of the White Spruce plantation and the north end of the property. However, the fact that this area was not included in the original ESPA designation indicates that the local topography was not considered to meet this criterion.

The single tertiary criterion that is possibly fulfilled relates to linkage function. The linkage role of the plantation is difficult to assess accurately from brief site visits; evidence of utilization of the Owen property habitats as a corridor would require that a comprehensive and year long monitoring program be implemented, something beyond the reasonable expectations of such an EIS. The plantations offer substantial vegetation cover relative to open meadow or agricultural habitats; however there are abrupt changes in habitat types and canopy cover across the Owen property. The changes in habitat likely influence the use of this area as a corridor by wildlife; they may be important for some wildlife species, but less suitable to others. Vegetation removal and development of the area can be expected to reduce the existing linkage function. The degree to which linkage functions are impaired is also relative to the overall importance and long-term viability of the other major connection between the two ESPAs, namely the area west of the Owen property.

The rolling topography that presumably led to fulfilment of this criterion for the Forested Hills ESPA is less pronounced in the plantation area. Therefore this tertiary criterion (v), which is somewhat subjective, was considered not to apply.

Based on the assessment of criteria, the remaining Owen property lands do not merit ESPA designation in isolation. However, no specific guidelines exist when parcels of land are being considered for inclusion with existing and adjacent ESPAs. That is, there is no clear formula that states how many secondary or tertiary criteria need to be satisfied. Therefore, depending on how the criteria are valued, it may be that the remaining portions of the Owen property warrant inclusion in the existing Forested Hills ESPA, as one secondary criterion and possibly one tertiary criterion were met. However, any decision regarding these lands (i.e. the two plantations and cultural meadow) should consider the future landscape context. That is, the merits of the property need to be considered with respect to the ongoing approved development that is taking place immediately to the east, the Columbia Forest II subdivision. When the negative impacts of the Columbia Forest II subdivision are factored into the equation, it is likely that the majority of regionally significant and ‘forest interior’ wildlife species will be displaced, given what is known of these species and their response to past developments in the vicinity. Therefore, the one secondary criterion that is satisfied is already in jeopardy post development of this subdivision. For a more detailed discussion on the potential negative impacts of the subdivision, please refer to the following Section 4.2.1.

Another factor related to ESPA designation is the cultural origin of the features on site i.e. plantations. Although the Region does not normally include such features in ESPAs as a matter of practice, there are instances where they have been included. The active use of the plantations for Christmas tree harvesting would need to be part of this consideration.

## 4 Impacts Analysis

---

### 4.1 Vegetation Resources

#### 4.1.1 *Southern Spruce Plantation (CUP3)*

Because of grading requirements, the development will likely result in some modification of the existing topography in the Southern Plantation. In addition, the sandy soils and uneven terrain make this area susceptible to erosion, especially after vegetation disturbance and removal. Attention to grading and erosion will form part of the mitigation strategy. Any linkage function this area is currently performing will be affected by the presence of residences within the plantation.

Another impact is the loss of habitat for the regionally significant plant species, which are currently finding suitable habitat in the sandy soil. The area for potential expansion of the current population will be reduced as the sandy soils in portions of the plantation are graded and a greater proportion of the area becomes occupied by buildings, paved surfaces, and manicured turf. These species have not been documented within the Forested Hills ESPA, and among the species considered regionally significant, only the Leathery Grape Fern (*Botrychium multifidum*) has been documented in the Schaefer's Woods ESPA. A 15 m conservation easement that is being proposed (see Mitigation, section 5.1) should protect most of the existing population, although they would be vulnerable to trampling and encroachment impacts from adjacent backyards and recreational trails. A summary of the impacts and mitigation recommendations to significant species on the Owen property is provided in Table 5.

**Table 5: Summary of anticipated impacts and mitigation recommendations for Regionally Significant species documented from the Owen property**

	Common Name	Scientific Name	Highest Breeding Status	Highest Breeding Evidence	Last Observed	Impact Assessment and Mitigation Strategy
<b>Flora</b>						
1	Ebony Spleenwort	<i>Asplenium platyneuron</i>	N/A	N/A	2003	A 15 m conservation easement should encompass most of the existing plants of these species, however there will be a loss of habitat for future expansion of these populations as the sandy soils are replaced with buildings, paved surfaces, and manicured turf. Impacts from the adjacent residential developments (i.e. the Columbia Forest II subdivision and the Owen property) include trampling and potential displacement by exotic species. The only way to help mitigate for this would be to restrict access to the conservation easement area. Installing or planting a living fence, formalizing recreational trails and educating the local residents through signage and pamphlets that certain rare species are present are the recommendations for mitigating these impacts. Whether or not these species will persist in this habitat as the trees mature and the environment becomes shadier is unknown. The area may require management for these species to persist in the long term. Ideally these mitigation recommendations would be implemented or underway before people take up residence in the Columbia Forest II subdivision.
2	Crowfoot Club-moss (Southern Ground Cedar)	<i>Diphasiastrum digitatum</i>	N/A	N/A	2003	
3	Leathery Grape Fern*	<i>Botrychium multifidum</i>	N/A	N/A	2003	
4	Schreber's Satin Grass	<i>Muhlenbergia schreberi</i>	N/A	N/A	2003	
5	Interrupted Fern	<i>Osmunda claytoniana</i>	N/A	N/A	2004	
6	Burreed sedge	<i>Carex sparganioides</i>	N/A	N/A	2004	
<b>Fauna</b>						
1	Cooper's Hawk*	<i>Accipiter cooperii</i>	X	X (observed in breeding season but no evidence of breeding)	2003	The Cooper's Hawk was observed flying west over the site and across the open fields towards the ESPA 19 in 2003. No evidence of breeding on the site was detected. It is possible that it is breeding nearby, possibly in either ESPA 19 or ESPA 17. As a result, the proposed development will not directly impact this species. Indirect impacts are also expected to be negligible.
2	Red-shouldered Hawk*	<i>Buteo lineatus</i>	X	X	2004	One individual was observed on April 23, 2004 circling above the southern Owen plantation. However, there does not seem to be suitable breeding habitat for this species on the Owen property. Assuming that this species nested immediately adjacent to the northern plantation, indirect impacts from the proposed development and Columbia Forest II subdivision are unclear. Hounsell (1989) found conflicting results with regard to sensitivity to buildings and roads.
3	Broad-winged Hawk*	<i>Buteo platypterus</i>	X X	X X	1997 2004	In 1997 this species was observed by Ted Cheskey during the breeding season from the northern end of the Forested Hills ESPA. However, suitable breeding habitat is not present on the Owen property. On April 23, 2004 1 or 2 birds were observed over the southern plantation on the Owen property. While it was not clear whether or not they were migrants, there likely still is suitable habitat in the adjacent Forested Hills ESPA. It is not clear what impact the proposed

	Common Name	Scientific Name	Highest Breeding Status	Highest Breeding Evidence	Last Observed	Impact Assessment and Mitigation Strategy
						development or Columbia Forest II subdivision would have on this potential breeder. The Toronto Region Conservation Authority (TRCA 2003) has characterized its sensitivity to development as "slight negative impact from urbanization."
4	Pileated Woodpecker*	<i>Dryocopus pileatus</i>	Confirmed Possible	FY (Fledged young) H (Observed in breeding season in suitable nesting habitat)	2003 2004	This species was confirmed breeding from the south end of the southern plantation in 2002 (Friesen pers. com., 2003). Evidence of recent drillings was also noted in 2003 from the same area. The proposed development will eliminate the possibility of future breeding. However, the adjacent Columbia Forest II subdivision may have relegated the habitat unsuitable anyways. In addition, there will also be a loss of foraging habitat. It is unlikely these changes can be mitigated.
5	Red-breasted Nuthatch*	<i>Sitta canadensis</i>	Confirmed	CF (Carrying food for young)	2004	One individual was observed carrying food to young in a grove of Scots Pine just south of the laneway in 2003. Even though this species is still regarded to be area-sensitive, if enough pine trees can be preserved (preferably in groups and minimum d.b.h of 30.5 cm) it is possible that this species may not be displaced. The proposed 15m conservation easement and tree saving on individual lots will provide opportunities in this regard.
6	Golden-crowned Kinglet	<i>Regulus satrapa</i>	Confirmed	FY	2003	At least 2 young were observed on both visits moving about the central portion of the open-grown White Spruce plantation, south of the laneway that cuts across to the McNally lands. The resulting habitat loss and habitat fragmentation will almost certainly result in the displacement of this species. The preservation of large, mature spruce trees may help lessen the probability of this outcome. The proposed 15m conservation easement and tree saving on individual lots will provide opportunities in this regard. Although it is not clear, the Columbia Forest II subdivision could have had negative impacts on the breeding birds even if the proposed development were not to proceed.
7	Veery*	<i>Catharus fuscescens</i>	Possible	S (Singing ♂ present in breeding season in suitable nesting habitat)	1998	During the past 7 years, this species has only been reported once from the Owen property. A single bird was recorded from station 8 on one visit it 1998. However, based on its habitat requirements, this species could only have been present in the southern part of the Owen property where the deciduous forest dominates and is recognized to be part of the Forested Hills ESPA. The proposed development is not planned for this area. Furthermore, a 7 m buffer at the southern margin of the plantation should help mitigate any potential indirect impacts associated with the development. In fact, the Columbia Forest II subdivision will likely have the greater negative impact on this species than will the proposed development. Many more home will back onto the deciduous forest as part of the subdivision than the proposed development.
8	Blue-winged Warbler*	<i>Vermivora pinus</i>	Confirmed	CF (Adult carrying food for young)	2004 & 2003	A female was observed carrying food to a fledged young was noted on June 25 <sup>th</sup> 2004 from the Scots Pine grove opposite woodlot Uf-5. A single observation was also made at the end of May 2003 by Mr. Lyle Friesen from north of the McNalley laneway. According to Mr. Friesen, this species was a regular breeder at the north end of this site as recently as 3 or 4 years ago. It is possible that the habitat is becoming increasingly unsuitable as the shrubs and trees continue to mature and close in. The proposed development plan would result in the displacement of the species. Nevertheless, it is quite likely that this species would have been displaced as result of the adjacent development. The TRCA scored the Blue-winged Warbler's 'Sensitivity to Development' as a 4, or "moderate negative impact from urbanization." Perhaps the fact it is a

	Common Name	Scientific Name	Highest Breeding Status	Highest Breeding Evidence	Last Observed	Impact Assessment and Mitigation Strategy
						ground nester may help explain its sensitivity. Certainly, the number of domestic and free-roaming cats would increase as a result of the adjacent development. No mitigation measures could likely offset the impacts of the adjacent development and thus no mitigation strategy is proposed.
9	Nashville Warbler*	<i>Vermivora ruticapilla</i>	Confirmed	CF	2004	The proposed development would result in the loss of breeding habitat and displacement of the species. It is unlikely that any mitigation measures could avoid this outcome.
10	Pine Warbler*	<i>Dendroica pinus</i>	Possible Possible	S S	2003 2004	One individual was observed singing from the Scot's Pine grove adjacent to UF-5 on July 3, 2003 and April 23, 2004. This area-sensitive species only nests in pines. As such, this species will probably be displaced as a result of the proposed development. It is unlikely that any mitigation strategies will result in a contrary outcome.
11	Mourning Warbler*	<i>Oporornis philadelphia</i>	Possible	S	2004	One individual was heard singing from an area north of the McNally laneway. It was likely coming from close to the edge of the wetland, opposite the cultural meadow. It is possible that the proposed development will not result in the direct loss of its breeding habitat, since the required wetland buffer may encompass its nest site. Nevertheless, this ground-nesting species is known to be sensitive to the effects of urban development which will likely result in this species displacement. Maintaining a vegetated buffer to the wetland could yield positive results, but will likely not be enough to prevent its displacement. Regardless of whether the Owen property is developed, the close proximity of the Columbia Forest II subdivision may result in negative impacts on this species.
12	White-throated Sparrow*	<i>Zonotrichia albicollis</i>	Possible	S	2003	One individual was heard singing from an area in the northern plantation relatively close to Wideman Road. The proposed development will likely result in the displacement of this species through habitat loss or the indirect effects of urban development. No effective mitigation strategies are available. It is also quite likely that even if development did not occur on the Owen property, the close proximity of the Columbia Forest II subdivision would lead the species to abandon the area.
13	Purple Finch*	<i>Carpodacus purpureus</i>	Probable	T (Permanent territory presumed)	2002	Mr. Friesen observed a territorial bird in late May and early June 2002 from the northern plantation. If this species was regular nester in the area, the proposed development could result in the loss of its nesting habitat. However, even if the proposed development does not result in the direct loss of its breeding habitat, this species would still likely be displaced as a result of the close proximity of the development. The Toronto Region Conservation Authority rates this species' sensitivity to development as a '2', or "species that show partial tolerance," but the presence of the Columbia Forest II subdivision would also likely lead to its displacement.

\* Species also known to occur elsewhere in the adjacent Forested Hills or Schaefer's Woods ESPA.

#### **4.1.2 Cultural Meadow (CUM1)**

The vegetation in the Cultural Meadow is not considered particularly sensitive or difficult to re-establish or replace, however the meadow and part of the plantation area to the north has been identified as a local groundwater recharge area; changes in the hydrological functions of these habitats could impact the vegetation in the Provincially Significant Wetland. A constraint level 2 as assigned in the Scoped SWSS is therefore appropriate. According to the Laurel Creek Subwatershed study, the functions of Constraint Level 2 features must be preserved (Planning and Engineering Initiatives, Ltd, 1999). In this case it is primarily the recharge functions which must be maintained. Development of this habitat and the plantation to the north could impact the quality, quantity, and temperature of the water that reaches the wetland and tributary to Monastery Creek. These issues are addressed elsewhere in this report.

#### **4.1.3 Northern Plantation (CUP3/CUM1/CUT1 Complex)**

Most of the Northern plantation area will be cleared to accommodate residential lots and stormwater management ponds. As a result impacts to this habitat include the loss of coniferous trees and Cultural Thicket habitat as well as the loss of a very small Swamp Thicket, and a clump of a regionally significant fern species, Interrupted Fern (*Osmunda claytoniana*). There will also be some loss of buffer function as this habitat currently complements the 30m staked wetland buffer. Together with the mature White Spruce plantation to the south, the Northern Plantation enhances connectivity between the Forested Hills, Schaefer's Woods ESPAs and the Upland Forest to the east (UF-5) so there will be some loss of connectivity function (see Figure 4) as this area is developed. Hedgerow 1 will remain intact and a roadway will exist between the Hedgerow 1 and the residential space (Figure 2).

#### **4.1.4 Hedgerow 2**

Some or all of the White Pine trees in Hedgerow 2 may be impacted by grading requirements to accommodate development of the Cultural Meadow. This represents a loss of planted coniferous trees of a species that is native to the region, however the trees are in poor form currently and it may be a number of years before these trees recover from recent pruning to accommodate hydro wires.

#### **4.1.5 Wetland and Wetland Buffer**

Wetlands exist on poorly drained soils and the vegetation and fauna are sensitive to changes in local hydrology and water quality. Stormwater management facilities will be designed in such a manner that no warm or contaminated water is released into the wetland or creek. The stormwater facility will have limited ability to mitigate the release of road salt to the receiving system; this can be addressed through the City's salt management strategy.

Construction activities such as vegetation removal, filling and grading can lead to sedimentation and erosion into wetlands and drainage features that can negatively impact their functions and values. Measures will be put in place to avoid these impacts.

Residential lots will not be backing onto the wetland buffer, so this reduces the likelihood of encroachment impacts coming from residences such as dumping, lawn extensions, cutting, etc. Adjacent to the wetland buffer will be stormwater management ponds to the north and south with a maintenance path running between them (Figure 2). Impacts to the Wetland Buffer area will

therefore be related primarily to potential recreational use and would include disturbance and trampling of vegetation by residents and their pets. These impacts will be addressed through fencing, education, and careful placement of trails.

## **4.2 Wildlife Resources**

### **4.2.1 Southern Spruce Plantation (CUP3)**

The proposed development would see the loss of a major portion of the southern plantation, directly displacing five of the six regionally significant bird species (Pileated Woodpecker, Golden-crowned Kinglet, Blue-winged Warbler, Nashville Warbler, and Pine Warbler). However, this displacement needs to be considered in the context of the probable negative indirect impacts from the Columbia Forest II subdivision. All species, except the Red-breasted Nuthatch, are considered to have a “slight” to “moderate negative impact from urbanization” (TRCA, 2003a & b). Therefore, it is fully feasible that the complement of species will suffer displacement despite any development on the Owen property.

The Red-breasted Nuthatch is scored as a “species that show partial tolerance” that it may still be present post development. The fact that the proponent is setting aside two 15 m conservation easements on the eastern and western margins of the property, as well as a 7 m buffer at the south end adjacent to the ESPA, will help ensure that this species remains in the vicinity.

The degree to which an indirect impact manifests itself depends on a species’ sensitivity to development. The Toronto Region Conservation Authority (TRCA) has identified numerous factors that influence a species’ sensitivity to development (TRCA, 2003b). Ongoing research within the Forested Hills ESPA suggests that 10 to 15 m buffer widths have been insufficient to protect sensitive breeding birds found in forest fragments (Cheskey, 2003; Odell and Knight, 2001). The landbird monitoring study in the ESPA is indicating that long-distance migrants, considered most sensitive to urban pressures, are declining in numbers as compared with the control sites (Cheskey, 2003). The Forested Hills data also revealed that the changes are occurring unequally and that these changes appear to be in direct response to development. The stations situated closest to new houses experienced the greatest declines, whereas the sites more distant from the development changed little in composition. This result speaks to the impact of proximity of a development.

Another local study on Wood Thrush in the Forested Hills ESPA also suggests that not enough spatial separation is present between breeding habitat and the adjacent developments (Friesen and Zantinge, 2003). While many factors can contribute to local population declines, it was the author’s (L. Friesen) opinion that for whatever reason, the southern half of the Forested Hills ESPA is being abandoned or bypassed by breeding birds. This conclusion was supported by the dramatic declines in the number of nests present. While the nest parasitism by Brown-headed Cowbird (*Molothrus ater*) was thought to partially explain the declines, other factors such as predation, changes in vegetation structure, and weather conditions were more or less ruled out. The dramatic increase in nest parasitism by Brown-headed Cowbirds is largely a function of the adjacent development.

Odell and Knight (2001) studied the relationship between bird density and distance to development. They found that densities of human-sensitive bird species decreased significantly as development distances decreased from 180 m to 30 m from nesting habitat. This study shows that even developments with 30 m of spatial separation can have negative effects on local bird communities.

Lastly Friesen et al. (1995) found that there appears to be a negative relationship with respect to the number of homes surrounding woodlots (Friesen et al., 1995). The more homes that are situated around its margins, the less diverse the breeding bird community, regardless of the size of the woodlot. The Columbia Forest II subdivision represents a moderately dense development. Approximately 120 homes will be situated within 100 m of the portions of the Owen property planned to be developed. In addition, many more homes will be present on the remaining subdivision lands.

These investigations support the contention that the approved developments to the east of the Owen property will impact forest bird populations on the Owen property; any supplementary effects from further development on that property will likely be minor in comparison.

#### **4.2.2 Cultural Meadow (CUM1)**

Field surveys made in this unit in 2003 and 2004 by Dougan & Associated staff revealed the presence of at least one regionally significant species along its western margin, Mourning Warbler (*Oporornis philadelphia*). Although the proposed residential development will not result in the direct loss of its breeding habitat, this ground-nesting species will likely be displaced due to its known sensitivity to adjacent development. The approved Columbia Forest II subdivision will probably lead to the displacement of this species. Another regionally significant species, the Blue-winged Warbler (*Vermivora pinus*) was observed in this area or the adjacent Northern Plantation by Mr. Lyle Friesen in 2003. Mr. Friesen is an expert songbird biologist with the Canadian Wildlife Service. This ground-nesting species will also likely be displaced as a result of the adjacent Columbia Forest II subdivision.

#### **4.2.3 Northern Plantation (CUP3/CUM1/CUT1 Complex)**

Wildlife observations made in the northern plantation in 2003 and 2004 by Dougan & Associates staff did reveal one regionally significant breeding species, the White-throated Sparrow (*Zonotrichia albicollis*). The proposed development will likely result in the displacement of this ground-nesting species through habitat loss or the indirect effects of urban development. No effective mitigation strategies are available. Even if this development were not to proceed, it is likely that the species would be displaced as a result of the Columbia Forest II subdivision. The Toronto Region Conservation Authority describes the White-throated Sparrow as having a “moderate negative impact from urbanization” (TRCA, 2003a,b).

Mr. Friesen noted another regionally significant breeding bird species in this location in 2002, the Purple Finch (*Carpodacus purpureus*). As in the case of the White-throated Sparrow, even if no development were to occur on the Owen property and the nesting habitat of the Purple Finch remained intact, it is doubtful that the species itself would remain on the Owen property because of its sensitivity to the impacts of the Columbia Forest II development.

#### **4.2.4 Connectivity**

The plantations on the Owen property provide a physical link between ESPA 19 (Forested Hills) and ESPA 17 (Schaefer's Woods) to the north of Wideman Road. However, the value of this connection is not clear since the plantations represent a significantly different habitat type than what is present immediately south in ESPA 19. Differences in habitat type are less pronounced between ESPA 17. In addition, another wider connection between the two ESPAs occurs slightly west of the Owen property (Figure 4).

The proposed development plan would reduce the linkage across the southern and northern portions of the Owen property. Depending on the extent that wildlife utilize this eastern linkage, losses in local connectivity may range from negligible to moderate. The two 15 m conservation easements, situated on the eastern and western sides of the southern plantation are recommended to help reduce this potential loss, especially between the woodlot UF-5 and the Forested Hills ESPA (see Figure 2).

## 5 Mitigation Recommendations

---

A strategy is presented to develop the Owen property and retain some existing ecological functions. The recommendations are aimed at preserving the regionally rare plant habitat, some of the bird habitat, and retention of treed linkages throughout the property. These goals can be achieved by placing a conservation easement in the Southern Plantation coupled with a tree preservation plan, and homeowner education.

### 5.1 Vegetation Resources

#### 5.1.1 Southern Spruce Plantation (CUP3)

Given the impacts of ongoing and proposed development to both vegetation and wildlife in the vicinity of the Owen property, a strategy is presented with the primary goal of preserving as much of the coniferous forest habitat as possible. This will be achieved by incorporating a 15 m 'conservation easement' along the east and west boundaries of the plantation. The easement will be contiguous with a 7m buffer to the deciduous forest at the south end of the plantation (Figure 2). This arrangement of natural space would allow retention of some of the linkage function of the Southern plantation.

Development and clearing within the plantation will be restricted to the front portion of the lots along a cul-de-sac with an entrance at the north end of the plantation. In accordance with City requirements, a 6 m access lane would be incorporated to join a cul-de-sac at the end of White Cedar Avenue in Columbia Forest II subdivision with the south end of the cul-de-sac that traverses the Southern Plantation area (Figure 2). Tree preservation efforts will be maximized and tree clearing and grubbing minimized. A lot-by-lot tree preservation plan will be prepared and grading plans carefully reviewed to ensure that Pine and White Spruce trees are preserved wherever possible. Trees selected for preservation should appear on detailed plans and should be clearly protected with a temporary fence at the dripline during the construction period. The area behind the fence would be off limits for vehicles, personnel, and storage of materials. This will help to prevent damage to the trees and soil compaction in the root zone. The fence should be inspected regularly and repaired as necessary. Trimming of damaged roots and limbs should be carried out under direction of a certified arborist.

Vegetation removal must be carried out in such a manner that there is minimal damage to adjacent vegetation. For example if a tree or shrub must be removed, it should be felled away from natural areas or other trees that have been targeted for preservation. Debris from vegetation removal (i.e. slash) activities should be removed from the site and not stored in adjacent habitats.

The measures discussed above will help to mitigate erosion impacts, allow for remnants of coniferous forest to exist on the site and will afford reasonable protection for the regionally significant plant species

#### Management of Regionally Significant Plant Species in the Southern Plantation

A review of the available literature and the clustering of the regionally significant plant species at the forest edge suggest their presence is likely related to three factors: sandy soils, previous disturbance, and open/partly shaded conditions. The habitats that these species are colonizing

suggests they may be successional opportunistic species, however little information is available to indicate the likelihood of persistence in disturbed habitats as the surrounding canopy fills in. The affinity of the regionally significant plant species for conditions of partial shade suggests that canopy management will be necessary to keep the canopy partly open in order for these species to persist.

In a study of factors that influence the distribution of ferns and fern allies in hardwood forests of south-eastern Ohio, canopy cover was a less important factor than moisture and nutrient levels in fern communities that included the species *Asplenium platyneuron*, *Botrychium dissectum*, *Botrychium virginianum* and *Polystichum acrostichoides* (Greer et al. 1997). These species occurred predominantly in dry to moderately moist, low nutrient habitats and did not appear to respond to variations in canopy cover (i.e. light levels). It was suggested that the relatively minor influence of canopy cover in the fern community might be attributed to the ability of many of these species to alter their photosynthetic response depending on light conditions, and their production of evergreen fronds. Evergreen fronds allow the plants to photosynthesise in spring prior to tree leaf emergence and after leaf drop in fall. The Owen plantation, however, is dominated by mostly coniferous trees so the canopy is present year round, and the understorey in some areas is filling in with more White Spruce trees. It may be advisable to keep the roadway adjacent to the plantation relatively open, that is, any plantings in this area should avoid the creation of a dense tree canopy. The significant plants may be best protected from trampling impacts by planting a living fence consisting of low to medium-sized shrubs, particularly if the roadway is being considered as a potential recreational trail. Signage and education of local residents will also help to mitigate impacts. Ideally, these recommendations would be implemented in anticipation of impacts from the Columbia Hills Forest II subdivision as opposed to waiting until development of the Owen property is nearly completed. The sandy, well-drained conditions of this habitat must be maintained. Grading activities must not impact the hydrology, drainage patterns and soil conditions of the conservation easement zones.

It is recommended that prior to the commencement of construction, the conservation easement in the Southern Plantation is field flagged and the locations of regionally significant plant species are reviewed to determine if there are specimens that are outside of the conservation easement that could be transplanted. Special emphasis should be placed on openings, roadways and clearings in the plantation.

### **5.1.2 Cultural Meadow (CUM)**

Mitigation of impacts/preservation of recharge functions of the Cultural Meadow on the Owen property will be a vital component of protecting the Provincially Significant Wetland and the tributaries of Monastery Creek. This may be achieved through appropriate grading and stormwater management plans designed to prevent alterations in local drainage and groundwater recharge functions, as well as changes in water quality.

### **5.1.3 Northern Plantation (CUP3/CUM/CUT Complex)**

The southern portion of this habitat has been included in the identified recharge area, so care must be taken to prevent alterations in drainage and changes to the quality of the water that will ultimately be entering the wetland and creek tributaries. Loss of coniferous trees can be mitigated by preserving conifers where possible and through plantings in the stormwater

management areas and maintenance pathway. This will also help to retain some of the buffer and connectivity functions. A naturalized design for the stormwater management facility will also help maintain these functions. The soil of the Swamp Thicket in the Northern Plantation is a source of seeds for a number of native wetland species and could be salvaged and incorporated into stormwater management facilities.

Where it is possible to preserve some of the trees, prior to the time of construction a temporary fence should be erected to help visually delineate the limit of the area to be cleared so that trees behind the fence can be protected. The fence should accommodate the dripline of the trees as described in the mitigation recommendations for the northern White Spruce plantation.

#### **5.1.4 Hedgerow 2**

Mitigation of the loss of hedgerow 2 can be accomplished through plantings of White Pine trees in suitable habitat.

#### **5.1.5 Wetland and Wetland Buffer**

A 30 m buffer for the provincially significant wetland has been previously established as the limit of development for the northwest corner of the Owen property. This will help to protect the wetland vegetation from construction related impacts, however sediment and erosion control measures such as silt fences are recommended as there is potential for erosion and sedimentation into the wetland and the Monastery Creek tributary. During construction, these protection systems should be inspected regularly and repaired as necessary. After construction, slopes should be stabilized and revegetated promptly so that the time that bare soils are exposed to erosive forces is kept to a minimum.

Post construction related impacts related to water quality and quantity can be mitigated through appropriate stormwater management. Given that the area to the east of the wetland has been identified as a recharge zone, it is likely that considerable infiltration will be required to maintain existing hydrological conditions. Techniques to consider for pre-treatment and overall targets for stormwater management have been outlined in the Scoped Subwatershed Study for the Owen property (Planning and Engineering Initiatives Limited, 1999).

## **5.2 Wildlife Resources**

### **5.2.1 Southern Spruce Plantation (CUP3)**

Two 15 m conservation easements have been proposed (one each for the east and west sides of the southern plantation) (see Figure 2) to help:

- Ensure that the regionally significant Red-breasted Nuthatch remains on site
- Maintain connectivity with the deciduous woodlot, UF-5, as well as
- Maintain connectivity between ESPA #19 and ESPA #17.

In addition, a concerted effort will be made to preserve as many trees at the rear portions of each lot as possible. The added tree cover should enhance the viability of the conservation easements and potentially provide additional breeding and/or foraging habitat for the Red-breasted

Nuthatch. A cul-de-sac arrangement will serve to minimize vegetation removal and reduce noise and traffic disturbance in the area where considerable effort will be expended to preserve trees.

### **5.2.2 Cultural Meadow (CUM)**

The development plan for this area is depicted in Figure 2 and will result in the conversion of this land to residential space and stormwater management facilities. No mitigation, save for the preservation of as many trees as possible, can replace this lost habitat. However, the placement of the storm water management pond between the Forested Hills Environmentally Sensitive Area (ESPA)/Sunfish Lake-Laurel Creek Provincially Significant Wetland (PSW) and the development will help buffer the visual and auditory disturbance associated with the residential block.

### **5.2.3 Northern Plantation (CUP3/CUM/CUT Complex)**

The development plan for this area is depicted in Figure 2 and will result in the conversion of this land to residential space and stormwater management facilities. No mitigation, save for the preservation of as many trees as possible on site, can replace this lost habitat. However, the placement of the southern storm water management (SWM) pond between the Forested Hills Environmentally Sensitive Area (ESPA)/Sunfish Lake-Laurel Creek Provincially Significant Wetland (PSW) and the development will help buffer the visual and auditory disturbance associated with the residential block. In addition, the southern and northern SWM ponds will also buffer the functional integrity of the largest linkage between the Forested Hills ESPA and Schaefer's Woods ESPA, which is mostly west of the Owen property (see Figure 4).

### **5.2.4 Construction Timing**

Impacts on wildlife communities can be mitigated by undergoing proposed construction works outside of the breeding season. In particular, careful attention must be given to ensure that the federal 1994 Migratory Birds Convention Act (MBCA) is not being contravened. Section 6 of the Migratory Birds Regulations (MBRs) made under the federal 1994 MBCA makes it an offence to “disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird.” To this end, it is recommended that habitat removal and/or construction works take place outside the breeding season for migratory birds so as not to “disturb” their nesting.

Environment Canada (EC) normally recommends restrictions on vegetation clearing during core breeding periods. To provide some guidance in this matter, the core breeding period has been chosen to roughly correspond with the period when 75% of the individuals of each species complete their nesting cycle. In the Regional Municipality of Waterloo, this roughly corresponds with the following dates: April 15<sup>th</sup> to August 15<sup>th</sup> for forested habitats, April 1<sup>st</sup> to September 1<sup>st</sup> for open habitats, and April 10<sup>th</sup> to August 8<sup>th</sup> for wetland habitats. Dates are based on the “Earliest egg dates and latest young dates” by Peck, et al., (2000). Nevertheless, nesting activity outside of these ‘core’ periods is possible, and therefore caution must be exercised if proposed construction activities are planned outside of the listed dates. The dates are simply guidelines and cannot predict what will take place on any particular site. The nest record summary prepared for EC by the Royal Ontario Museum provides an excellent summary of which species are likely to be nesting outside the “normal” nesting periods indicated above. Special attention should be paid to these species to ensure that they will not be impacted. If vegetation removal must be undertaken during the core breeding season, it is recommended that Environment Canada be

contacted so that a strategy can be developed to ensure nesting birds are not disturbed. It is helpful to note that it is always the proponent's responsibility to ensure "due diligence" has been shown when demonstrating compliance with the MBCA. This applies equally to periods inside and outside the core breeding area.

## 6 Conclusions

---

The following are the key conclusions:

1. *Terrestrial resources outlined in the Terms of Reference for the Owen property were subject to seasonal inventories, and the provincially significant wetland/ESPA buffer boundary was verified and is considered appropriate.*
2. *Urban expansion is taking place at the western limits of the City of Waterloo where the subject property is located. The Columbia Forest II subdivision, located immediately east of the property has been approved and construction activities are underway. Various indirect negative impacts from this development (e.g. increased disturbance, increased numbers of urban predators etc.) will extend onto the Owen property resulting in the inevitable displacement of several regionally significant bird species.*
3. *The majority of the existing regionally significant plant species in the southern plantation can be preserved within a 15 m conservation easement. Impacts from recreational use can be mitigated by planting a living fence of small to medium size shrubs adjacent to the laneway where most of the plants are located, and educating local residents about the presence of significant species in the area. The easement and detailed tree preservation plans for lots, along with plantings of coniferous trees within the proposed townhouse block and stormwater management areas north of the McNally Laneway will help to ensure that the Red-breasted Nuthatch will remain in the area.*
4. *Some of the connectivity between Forested Hills ESPA, Schaefer's Woods ESPA, and Upland Forest Unit 5 (UF-5) can be retained through the conservation easement and through preservation or replacement plantings in the northern plantation area. Stormwater management plans will address recharge functions of this area and the quality, quantity and temperature of the water entering the wetland/creek. Naturalization and plantings of coniferous trees in the stormwater management areas and maintenance path will help to preserve some of the connectivity functions of the Northern Plantation.*
5. *The data collected in 2003 and 2004 revealed ecological functions on the Owen property that were not previously identified. This information was analysed in the context of existing Regional Policy. Although it was determined that the southern plantation fulfils one secondary criteria and possibly one tertiary criteria required for ESPA designation, the approved Columbia Forest II subdivision could negate this interpretation based on available scientific studies of the species involved. The Region does not routinely include plantations in ESPAs; on this site trees are being actively harvested. On these grounds the consideration of the extension of the ESPA boundary would not be justifiable.*

## 7 References

---

- Owen Sound Field Naturalists (Bruce-Grey Plant Committee ). 1999.** Ferns of Grey and Bruce. Stan Brown Printers Ltd., Owen Sound, Ontario. 119pp.
- Chapman, L.J. and D. F. Putnam. 1984.** The Physiography of Southern Ontario. Third Edition. Ontario Geological Survey, Special Volume 2, 270 p. Accompanied by Map P.2715 (coloured), scale 1:600,000.
- Cody, W.J. and D. Britton. 1989.** Ferns and Fern Allies of Canada. Publication 1829/E, Research Branch, Agriculture Canada. Minister of Supply and Services, Ottawa, Ontario;
- Coulson, D.P. and P. Roberts, P. 1986.** Wetland data record and evaluation for the Sunfish Lake-Laurel Creek wetland Complex. Updated March 2003 by Ken Cornelisse, Art Timmerman and Ron Drabick.
- COSEWIC. 2003. Canadian Species at Risk, May 2003.** Committee on the Status of Endangered Wildlife in Canada. [http://www.cosewic.gc.ca/pdf/English/CDN\\_SPECIES\\_AT\\_RISK\\_May2003\\_e.pdf](http://www.cosewic.gc.ca/pdf/English/CDN_SPECIES_AT_RISK_May2003_e.pdf)
- DeGraaf, R.M. and J.H. Rappole. 1995.** Neotropical Migratory Birds: Natural History, Distribution and Population Change. Comstock Publishing Associates, Ithaca, NY. 676pp.
- Dore, W.G. and J. McNeill. 1980.** Grasses of Ontario. Biosystematics Research Institute, Research Branch, Agriculture Canada. Monograph 26. Minister of Supply and Services Canada. Hull, Quebec.
- Downes, C.M. and B.T. Collins. 2003.** The Canadian Breeding Bird Survey, 1967-2000. Canadian Wildlife Service Progress Note No. 219. Ottawa, Ontario: Environment Canada. 40pp.
- Ehrlich, P.R., D.S. Dobkin and D. Wheye. 1988.** The Birders Handbook; A Field Guide to the Natural History of North American Birds. Simon and Schuster Inc., New York. 785pp
- Freemark, K. and B. Collins. 1992.** Landscape ecology of birds in temperate forest fragments. pp 443 – 454, In, J.M. Hagan III and D.W. Johnston, editors, *Ecology and Conservation of Neotropical Migrant Landbirds*. Smithsonian Institution Press, Washington D.C. 609pp.
- Friesen, L.E., P.F.J. Eagles, and R.J. MacKay. 1995.** Effects of Residential Development on Forest Dwelling Neotropical Migrant Songbirds. *Conservation Biology*. **9(6)**: 1408-1414.
- Friesen, L. and C. Zantinge. 2003.** Wood Thrush nesting study in Forested Hills in the City of Waterloo and rural control sites in Waterloo Region, 2003. Unpublished manuscript.
- Greer, G.K., Lloyd, R.M., and B.C. McCarthy. 1997.** Factors influencing the distribution of pteridophytes in a southeastern Ohio hardwood forest. *Journal of the Torrey Botanical Society*. **124 (1)**: 11–21.
- Gore and Storrie Ltd. 1992.** Forest Wildlife Monitoring Program – Year 4. Prepared for the Technical Services Department, Ontario Hydro.
- Hounsell, S.W. 1989.** Methods for assessing the sensitivity of forest birds and their habitats to transmission line disturbances. Ontario Hydro, Land Use and Environmental Planning Department, stations and Transmission Programs Group, Toronto, Ontario. 616pp.

**Landowner Resource Centre. 2000.** Conserving the Forest Interior: A Threatened Wildlife Habitat. "Extension Notes" Series. Ontario Ministry of Natural Resources. 12 pp.

**Lee, H., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998.** Ecological Land Classification for Southern Ontario: First Approximation and Its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

**Long Point Bird Observatory and Environment Canada (LPBO & EC). 1997.** Marsh Monitoring Program: Training Kit and Instructions for Surveying Marsh Birds, Amphibians and their Habitats. 1997 revised edition. Long Point Bird Observatory and Environment Canada. 40pp.

**Naylor Engineering Associates Ltd. 2003.** Hydrogeological Site Evaluation. Greyerbiehl Lands. Waterloo, Ontario. 6 pp + Figures

**Newmaster, S.G., A. Lehela, P.W.C. Uhlig, S. McMurray and M.J. Oldham. 1998.** Ontario Plant List. Ontario Ministry of Natural Resources, Ontario Forest Research Institute, Sault Ste. Marie, Ontario, Forest Research Information Paper No. 123, 550 pp. + appendices.

**Odell, E.A. and R.L. Knight. 2001.** Songbird and medium-sized mammal communities associated with exurban development in Pitkin County, Colorado. *Conservation Biology* **15(4)**: 1143–1150.

**Oldham, M.J. 1999.** Natural Heritage Resources of Ontario: Rare Vascular Plants. Third Edition. Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario. 53 pages. <http://www.mnr.gov.on.ca/MNR/nhic/species/rarevascular.pdf>

**Ontario Breeding Bird Atlas (OBBA). 2001.** Guide for Participants. Atlas Management Board, Federation of Ontario Naturalists, Don Mills. 34pp.

**Ontario Ministry of Natural Resources (OMNR). 1993.** Ontario Wetland Evaluation System. Southern Manual. NEST Technical Manual TM-002 .178pp.

**Ontario Ministry of Natural Resources (OMNR). 2000.** Significant wildlife habitat technical guide. 151pp.

**Ontario Ministry of Natural Resources (OMNR). 2003.** Vulnerable, Threatened, Endangered, Extirpated or Extinct Species of Ontario. List issued June 4, 2003. [http://www.mnr.gov.on.ca/MNR/VTEEE\\_June\\_4\\_2003.pdf](http://www.mnr.gov.on.ca/MNR/VTEEE_June_4_2003.pdf)

**Ontario Natural Heritage Information Centre (ONHIC). 2003a.** – Geographic Query of rare element occurrences database. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/>.

**Ontario Natural Heritage Information Centre (ONHIC). 2003b.** NHIC List of Ontario Insects: Odonata. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/>

**Ontario Natural Heritage Information Centre (ONHIC). 2003c.** NHIC List of Ontario Insects: Lepidoptera. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/>

**Ontario Natural Heritage Information Centre (ONHIC). 2003d.** NHIC List of Ontario Reptiles. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/>

**Ontario Natural Heritage Information Centre (ONHIC). 2003e.** NHIC List of Ontario Birds. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/>

**Ontario Natural Heritage Information Centre (ONHIC). 2003f.** NHIC List of Ontario Mammals. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/>

**Peck, M.K., C.E. Ayley and W.R. King. 2000.** Earliest egg and latest young dates for Ontario birds extracted from the Ontario Nest Records Scheme 1956 – 1997. Centre for Biodiversity and Conservation Biology, Royal Ontario Museum, Queen's Park, Toronto.

**Planning and Engineering Initiatives. 1999.** Scoped Subwatershed Report. Doug Owen Construction Ltd. Wideman Road. City of Waterloo. 93 pp + Appendices.

**Planning Initiatives Limited. 1996.** Final Subwatershed Management Plan: Subwatershed Plans #313 and #309, Laurel Creek Watershed, City of Waterloo. April 1996. 259 pp + Appendices

**Regional Municipality of Waterloo (RMW). 1999.** Significant species List. Native vascular plants component. PC-99-028.1 Appendix A.

**Regional Municipality of Waterloo (RMW). 1985a.** Appendix 3: Reptiles and Amphibians in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.

**Regional Municipality of Waterloo (RMW). 1985b.** Appendix 4: Mammals in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.

**Regional Municipality of Waterloo (RMW). 1996.** Revisions to Waterloo Region's Significant Species List: Breeding Birds Component. Report to Planning and Culture Committee PC-96-021. Approved by Council: April 25, 1996.

**Regional Municipality of Waterloo (RMW). 2003a.** Forested Hills Environmentally Sensitive Policy Area 19. Draft document provided by Chris Gosselin. Revised January 21, 2003.

**Regional Municipality of Waterloo (RMW). 2003b.** Schaefer's Woods Environmentally Sensitive Policy Area 17. Draft document provided by Chris Gosselin. Revised January 2, 2003.

**Riley, J.L. and P. Mohr. 1994.** The natural heritage of southern Ontario's settled landscapes. A review of conservation and restoration ecology for land-use and landscape planning. Ontario Ministry of Natural Resources, Southern Region, Aurora, Science and Technology Transfer, technical report TR-001. 78pp.

**Toronto Region Conservation Authority (TRCA). 2003a.** Revised Fauna Scores and Ranks, February 2003.

**Toronto Region Conservation Authority (TRCA). 2003b.** Fauna Species Scoring and Ranking System – Draft March 2003.

**Wagner, W.H., and D.M. Johnson. 1981.** Natural History of Ebony Spleenwort, *Asplenium platyneuron*, (Aspleniaceae) in the Great Lakes Area. The Canadian Field Naturalist 95 (2): 156-166.

## **Appendix A: Vegetation Assessment Methodology**

The following biological factors were evaluated and rated for vegetation features present within the study area. These factors are known to contribute to overall biological functions of any given community or habitat connection. Vegetation community data are summarised in Appendix D of this Report.

### **Vegetation Unit Category**

Vegetation features were assigned following the ELC protocol: Ecological Land Classification for Southern Ontario methodology (Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig, and S. McMurray. 1998. Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.) If necessary, Wetland Communities may be assessed by qualified evaluators of the Ontario Wetland Evaluation System: Southern Manual.

### **Structural Diversity**

This is a measure of the age distribution and stratum representation (e.g., mosses, herbaceous, groundcovers, low shrubs, tall shrubs, saplings (< 10cm dbh), subcanopy, canopy, emergents) of the plant community. Communities containing a broad representation of old-growth as well as immature and sapling trees, combined with extensive seedling and shrub growth, and prolific development of ground covers, provide optimum conditions for plant and animal diversity.

CLASS 1 = only 1-2 strata represented

CLASS 2 = 2 - 3 strata well represented

CLASS 3 =  $\geq$  4 strata (high structural diversity ("old-growth" characteristics))

### **Average Canopy Tree Diameter / Relative Age**

This reflects the average diameter range of trees in the dominant tree canopy measured at 1.4 metres (DBH) above the ground.

CLASS 1 = < 15 cm (immature)

CLASS 2 = 15-30 cm (immature)

CLASS 3 = > 30 cm (mature)

### **Canopy Closure**

Communities with a greater degree of canopy closure are more sensitive to disturbance and environmental stresses such as those caused by clearing, grading and future pedestrian traffic.

CLASS 1 = <25% closure

CLASS 2 = 25-50% closure

CLASS 3 = >50% closure

### **Topography**

Communities located on complex topographic features contain greater habitat structure, are more sensitive to disturbance than those on flat or uniformly variable topographic features.

CLASS 1 = flat - undulating/regular hummocks, <10%

CLASS 2 = gentle to average slope topography, 10 - 25%

CLASS 3 = complex/steep to very steep topography, >25%

### **Slope**

Communities located on steeper slopes are more sensitive to disturbance.

CLASS 1 = flat to gentle slope (<10%)

CLASS 2 = moderate slope (10-25%)

CLASS 3 = steep slope (>25%)

### **Seepage/Drainage Conditions**

Communities with poor drainage, or subject to groundwater discharge conditions, are more sensitive to disturbance and environmental stresses such as those caused by clearing, grading and future pedestrian traffic. In addition, they frequently contribute moisture that sustains adjoining communities.

CLASS 1 = well-drained without evidence of seasonal water tables or seepage; water table never within top 30cm for less than 1 month, if at all.

CLASS 2 = imperfectly-drained; water table within top 30 cm of soil for 1-3 month(s) of the year, or with evidence of intermittent groundwater discharge; includes perched conditions.

CLASS 3 = poorly-drained; water table within top 30 cm of soil for at least 3 months of the year; and/or with evidence of relatively continuous groundwater discharge; includes perched conditions.

## Appendix B: List of significant wildlife species observations based on background information sources only\*

Common Name	Scientific Name	Conservation Status				Life History Information				Last Reported		Observation Source <sup>9</sup>	
		National	Provincial	Regional	Area Sensitivity <sup>5</sup>	Sensitivity to Development <sup>6</sup>	Migration Strategy <sup>7</sup>	Nest Strategy <sup>8</sup>	Within Study Area	Outside Study Area <sup>†</sup>			
		COSEWIC <sup>1</sup>	MNR <sup>2</sup>	SRank <sup>3</sup>							RMW <sup>4</sup>		
<b>BIRDS</b>													
1	Cooper's Hawk	Accipiter cooperii	NAR	NIAC	S4B	RS	AS	2	SDM	OC;c	---	2003	1
2	Broad-winged Hawk	Buteo platypterus	---	---	S5B	RS	---	3	LDM	OC;sc-c	1997	1997	2
3	Long-eared Owl	Asio otus	---	---	S4	RS	---	3	PR	OC;sc-c	---	1997	1
4	Hairy Woodpecker	Picoides villosus	---	---	S5	RS	AS	2	PR	C	1995	2003	1,3
5	Pileated Woodpecker	Dryocopus pileatus	---	---	S4S5	RS	AS	3	PR	C	2002	2003	1,3,4
6	Acadian Flycatcher	Empidonax virescens	END	---	S2B	RS	AS	3	LDM	OC;sc	---	1997	1
7	Alder Flycatcher	Empidonax alnorum	---	---	S5B	RS	---	4	LDM	OC;s	---	2000	1
8	Blue-headed Vireo	Vireo solitarius	---	---	S5B	RS	AS	3	SDM	OC;sc	---	1997	1
9	Red-breasted Nuthatch	Sitta canadensis	---	---	S5B	RS	AS	2	SDM	C	1999	2003	1
10	White-breasted Nuthatch	Sitta carolinensis	---	---	S5	---	AS	2	PR	C	---	2003	1
11	Brown Creeper	Certhia americana	---	---	S5B	RS	AS	3	SDM & PR	C	---	2003	1
12	Winter Wren	Troglodytes troglodytes	---	---	S5B	RS	AS	3	SDM	C	---	1999	1
13	Golden-crowned Kinglet	Regulus satrapa	---	---	S5B	RS	---	3	SDM	P&G;sc-c	2002	---	1
14	Ruby-crowned Kinglet	Regulus calendula	---	---	S5B	RS	---	3	SDM	P&G;sc-c	---	1999	1
15	Eastern Bluebird	Sialia sialis	NAR	NIAC	S4S5B	RS	---	2	SDM	C	---	2001	1
16	Veery	Catharus fuscescens	---	---	S4B	RS	AS	5	LDM	OC;g	1998	2003	1
17	Brown Thrasher	Toxostoma rufum	---	---	S5B	RS	---	4	SDM	OC;s	1998	---	1
18	Blue-winged Warbler	Vermivora pinus	---	---	S4B	RS	---	4	LDM	OC;g	2003	1999	1,4
19	Nashville Warbler	Vermivora ruficapilla	---	---	S5B	RS	---	4	LDM	OC;g	---	2003	1
20	Chestnut-sided Warbler	Dendroica pensylvanica	---	---	S5B	RS	---	4	LDM	OC;s	---	2003	1
21	Black-throated Green Warbler	Dendroica virens	---	---	S5B	RS	AS	4	LDM	OC;sc	---	2002	1
22	Pine Warbler	Dendroica pinus	---	---	S5B	RS	AS	3	SDM	OC;c	2002	2000	1,4
23	American Redstart	Setophaga ruticilla	---	---	S5B	RS	AS	3	LDM	OC;sc	---	2002	1
24	Ovenbird	Seiurus aurocapilla	---	---	S5B	RS	AS	4	LDM	OC;g	---	2003	1
25	Northern Waterthrush	Seiurus noveboracensis	---	---	S5B	RS	---	5	LDM	OC;g	---	1997	1
26	Mourning Warbler	Oporornis philadelphia	---	---	S5B	RS	---	4	LDM	OC;g	---	2003	1,3
27	Hooded Warbler	Wilsonia citrina	THR	---	S3B	RS	---	4	LDM	OC;s	---	1998	1
28	Canada Warbler	Wilsonia canadensis	---	---	S5B	RS	AS	4	LDM	OC;g	---	1998	1
29	Scarlet Tanager	Piranga olivacea	---	---	S5B	RS	AS	3	LDM	OC;c	---	2003	1
30	Eastern Towhee	Pipilo erythrophthalmus	---	---	S4B	RS	---	4	SDM	OC;g	---	1997	1,3
31	Vesper Sparrow	Poocetes gramineus	---	---	S4B	RS	---	4	SDM	OC;g	---	1998	1
32	Swamp Sparrow	Melospiza georgiana	---	---	S5B	RS	---	5	SDM	OC;s	---	2002	1
33	White-throated Sparrow	Zonotrichia albicollis	---	---	S5B	RS	---	4	SDM	OC;g	---	2003	1
34	Purple Finch	Carpodacus purpureus	---	---	S5B	RS	---	2	SDM	OC;c	2002	---	4

\* All observations pertain to breeding birds only

† Information from Cheskey (2003) is based on stations 2, 4, 5 and 8 only

## LEGEND

### General

--- = not significant

### Conservation Status

**1. Federal (COSEWIC) Conservation Status:** Status assigned by the Committee on the Status of Endangered Wildlife in Canada. (COSEWIC, 2003)

EXT Extinct. A species that no longer exists.

EXP Extirpated. A species no longer existing in the wild in Canada, but occurring elsewhere in the wild.

END Endangered. A species facing imminent extirpation or extinction throughout its range.

THR Threatened. A species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

VUL or SC Vulnerable or Special Concern. A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events, but does not include an extirpated, endangered or threatened species.

IND Indeterminate. A species for which there is insufficient information to support a status designation.

NAR Not At Risk. A species that has been evaluated and found to be not at risk.

**2. Provincial (MNR) Conservation Status:** Status assigned by the Ontario Ministry of Natural Resources (OMNR, 2003).

EXT Extinct. Any species formerly native to Ontario that no longer exists.

EXP Extirpated. Any native species no longer existing in the wild in Ontario, but existing elsewhere in the wild.

END Endangered. Any native species that, on the basis of the best available scientific evidence, is at risk of extinction or extirpation throughout all or a significant portion of its Ontario range if the limiting factors are not reversed. Endangered species are protected under the province's Endangered Species Act.

THR Threatened. Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its Ontario range if the limiting factors are not reversed.

VUL Vulnerable. Any native species that, on the basis of the best available scientific evidence, is a species of special concern in Ontario, but is not a threatened or endangered species.

IND Indeterminate. Any native species for which there is insufficient scientific information on which to base a status recommendation.

NIAC Not In Any COSSARO Category. Any native species evaluated by COSSARO which does not currently meet criteria for assignment to a provincial risk category.

**3. Provincial rarity ranks (SRANKS)** are evaluated and assigned by the Ontario Natural Heritage Information Centre (2003a,b,c,d,e)

S5 = Very common and demonstrably secure in Ontario.

S4 = Common and apparently secure in Ontario; usually with more than 100 occurrences in the province.

S3 = Rare to uncommon in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.

\_\_B = Breeding migrants (i.e. S5B). Those without any suffixes are considered resident species.

SE = Exotic; not believed to be a native component of Ontario's flora.

**4. Regional Conservation Status.** Significant Wildlife species in the Regional Municipality of Waterloo (RMW, 1985a; RMW, 1985b; RMW, 1996)

RS = Regionally significant wildlife species

### Life History Information

**5. Area sensitivity** designations based on OMNR (2000) (See Appendix C & G)

AS = Area Sensitive

**6. Sensitivity to Development** designations based on the Toronto Region Conservation Authority (TRCA, 20031 & 2003b).

0 = species that benefit from urbanization

1 = species that receive slight benefit from urbanization/ unknown

2 = species that show partial tolerance

3 = slight negative impact from urbanization

4 = moderate negative impact from urbanization

5 = severe negative impact from urbanization

NR = Not Ranked

**7. Migration Strategy** designations based on Hounsell (1989) and Cheskey (2003). Where differences occurred, Hounsell (1989) was used.

PR = Permanent Resident

SDM = Short Distant Migrant

LDM = Long Distant Migrant

**8. Nest Strategy** designations based on Cheskey (2003), Hounsell (1989), and Ehrlich et al. (1988).

Nest type

C = Cavity

NP = Nest parasite

P = Platform

P & G = Pensile and globular

OC = Open cup

S = Saucer

Location

b = building

c = canopy

cl = cliff

g = ground

s = shrub

sc = subcanopy

## 9. Observation Source

- 1 = Cheskey (2003)
- 2 = Cheskey (2004a)
- 3 = Friesen (2003)
- 4 = Planning Initiatives Limited (1996)

## REFERENCES

- Cheskey, E. 2003.** Landbird Monitoring on the West Side of Waterloo 2003 Year Report: Part One, Landbird Monitoring Overview and Breeding Bird Abundance and Trends. October 2003. 19pp.
- Cheskey, E. 2004a.** Wildlife expert and author of landbird monitoring report for West Side of Waterloo (2003). Personal communication on January 8, 2004.
- Cheskey, E. 2004b.** Wildlife expert and author of landbird monitoring report for West Side of Waterloo (2003). Personal communication on April 18, 2004.
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2003.** Canadian Species at Risk. May 2003. Committee on the Status of Endangered Wildlife in Canada.  
[http://www.cosewic.gc.ca/pdf/English/CDN\\_SPECIES\\_AT\\_RISK\\_May2003\\_e.pdf](http://www.cosewic.gc.ca/pdf/English/CDN_SPECIES_AT_RISK_May2003_e.pdf)
- DeGraaf, R.M. and J.H. Rappole. 1995.** Neotropical Migratory Birds: Natural History, Distribution and Population Change. Comstock Publishing Associates, Ithaca, NY. 676pp.
- Ehrlich, P.R., D.S. Dobkin and D. Wheye. 1988.** The Birders Handbook; A Field Guide to the Natural History of North American Birds. Simon and Schuster Inc., New York. 785pp
- Friesen, L. 2003.** Canadian Wildlife Service, Songbird Biologist. Personal communication during fall 2003.
- Hounsell, S.W. 1989.** Methods for assessing the sensitivity of forest birds and their habitats to transmission line disturbances. Ontario Hydro, Land Use and Environmental Planning Department, stations and Transmission Programs Group, Toronto, Ontario. 616pp.
- LPBO & EC (Long Point Bird Observatory and Environment Canada). 1997.** Marsh Monitoring Program: Training Kit and Instructions for Surveying Marsh Birds, Amphibians and their Habitats. 1997 revised edition. Long Point Bird Observatory and Environment Canada. 40pp.
- Ontario Breeding Bird Atlas. 2001. Guide for Participants. Atlas Management Board, Federation of Ontario Naturalists, Don Mills. 34pp.**
- OBBA (Ontario Breeding Bird Atlas). 2001.** Guide for Participants. Atlas Management Board, Federation of Ontario Naturalists, Don Mills. 34pp.
- OMNR (Ontario Ministry of Natural Resources). 2000.** Significant Wildlife Habitat Technical Guide. 151pp.
- OMNR (Ontario Ministry of Natural Resources). 2003.** Vulnerable, Threatened, Endangered, Extirpated or Extinct Species of Ontario. List issued June 4, 2003. [http://www.mnr.gov.on.ca/MNR/VTEEE\\_June\\_4\\_2003.pdf](http://www.mnr.gov.on.ca/MNR/VTEEE_June_4_2003.pdf)
- ONHIC (Ontario Natural Heritage Information Centre). 2003a.** NHIC List of Ontario Insects: Odonata. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/queries/listout.cfm?el=iiodo>
- ONHIC (Ontario Natural Heritage Information Centre). 2003b.** NHIC List of Ontario Insects: Lepidoptera. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/queries/listout.cfm?el=iilep>
- ONHIC (Ontario Natural Heritage Information Centre). 2003c.** NHIC List of Ontario Reptiles. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/species/listout.cfm?el=ar>
- ONHIC (Ontario Natural Heritage Information Centre). 2003d.** NHIC List of Ontario Birds. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/queries/listout.cfm?el=ab>
- ONHIC (Ontario Natural Heritage Information Centre). 2003e.** NHIC List of Ontario Mammals. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/queries/listout.cfm?el=am>
- Planning Initiatives Limited. 1996.** Final Subwatershed Management Plan: Subwatershed Plans #313 and #309, Laurel Creek Watershed, City of Waterloo. April 1996. 259 pp + Appendices
- RMW (Regional Municipality of Waterloo). 1985a.** Appendix 3: Reptiles and Amphibians in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.
- RMW (Regional Municipality of Waterloo). 1985b.** Appendix 4: Mammals in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.
- RMW (Regional Municipality of Waterloo). 1996.** Revisions to Waterloo Region's Significant Species List: Breeding Birds Component. Report to Planning and Culture Committee PC-96-021. Approved by Council: April 25, 1996.
- TRCA (Toronto Region Conservation Authority). 2003a.** Revised Fauna Scores and Ranks, February 2003.
- TRCA (Toronto Region Conservation Authority). 2003b.** Fauna Species Scoring and Ranking System – Draft March 2003.

## Appendix C: Owen property plant species list

Scientific Name	Common Name	cc	cw	srank	Family	Native Status	Waterloo Status
<i>Acer rubrum</i>	Red Maple	4	0	S5	ACERACEAE	N	
<i>Acer saccharum</i> ssp. <i>saccharum</i>	Sugar Maple			S5	ACERACEAE	N	
<i>Achillea millefolium</i> ssp. <i>millefolium</i>	Common Yarrow		3	SE?	ASTERACEAE	I	
<i>Actaea pachypoda</i>	White Baneberry	6	5	S5	RANUNCULACEAE	N	
<i>Agrostis gigantea</i>	Redtop		0	SE5	POACEAE	I	
<i>Anaphalis margaritacea</i>	Pearly Everlasting	3	5	S5	ASTERACEAE	N	
<i>Anemone acutiloba</i>	Sharp-lobed Hepatica	6	5	S5	RANUNCULACEAE	N	
<i>Anemone canadensis</i>	Canada Anemone	3	-3	S5	RANUNCULACEAE	N	
<i>Anemone quinquefolia</i> var. <i>quinquefolia</i>	Wood Anemone	7	0	S5	RANUNCULACEAE	N	
<i>Antennaria neglecta</i>	Field Pussytoes	3	5	S5	ASTERACEAE	N	
<i>Arisaema triphyllum</i> ssp. <i>triphyllum</i>	Jack-in-the-pulpit	5	-2	S5	ARACEAE	N	
<i>Asarum canadense</i>	Wild Ginger	6	5	S5	ARISTOLOCHIACEAE	N	
<i>Asclepias syriaca</i>	Common Milkweed	0	5	S5	ASCLEPIADACEAE	N	
<i>Asplenium platyneuron</i>	Ebony Spleenwort	6	3	S4	ASPLENIACEAE	N	R
<i>Aster lateriflorus</i> var. <i>lateriflorus</i>	Calico Aster	3	-2	S5	ASTERACEAE	N	
<i>Aster novae-angliae</i>	New England Aster	2	-3	S5	ASTERACEAE	N	
<i>Athyrium filix-femina</i> var. <i>angustum</i>	Lady-fern	4	0	S5	DRYOPTERIDACEAE	N	
<i>Botrychium multifidum</i>	Leathery Grape-fern	6	3	S5	OPHIOGLOSSACEAE	N	R
<i>Carex bebbii</i>	Bebb's Sedge	3	-5	S5	CYPERACEAE	N	
<i>Carex blanda</i>	Woodland Sedge	3	0	S5	CYPERACEAE	N	
<i>Carex deweyana</i>	Short-scale Sedge	6	4	S5	CYPERACEAE	N	
<i>Carex gracillima</i>	Graceful Sedge	4	3	S5	CYPERACEAE	N	
<i>Carex retrorsa</i>	Retorse Sedge	5	-5	S5	CYPERACEAE	N	
<i>Carex rosea</i>	Rosy Sedge	5	5	S5	CYPERACEAE	N	
<i>Carex spicata</i>	Spiked Sedge		5	SE5	CYPERACEAE	I	
<i>Carex sparganiodes</i>	Burreed Sedge	5	0	S5	CYPERACEAE	N	R*
<i>Caulophyllum thalictroides</i>	Blue Cohosh	6	5	S5	BERBERIDACEAE	N	
<i>Centaurea maculosa</i>	Spotted Knapweed		5	SE5	ASTERACEAE	I	
<i>Chelidonium majus</i>	Greater Celadine		5	SE5	PAPAVERACEAE	I	
<i>Chrysanthemum leucanthemum</i>	Oxeye Daisy		5	SE5	ASTERACEAE	I	
<i>Circaea lutetiana</i> ssp. <i>canadensis</i>	Enchanter's Nightshade	3	3	S5	ONAGRACEAE	N	
<i>Clinopodium vulgare</i>	Field Basil	4	5	S5	LAMIACEAE	N	
<i>Cornus foemina</i> ssp. <i>racemosa</i>	Gray Dogwood	2	-2	S5	CORNACEAE	N	
<i>Cornus stolonifera</i>	Red-osier Dogwood	2	-3	S5	CORNACEAE	N	
<i>Daucus carota</i>	Queen Anne's Lace			SE5	APIACEAE	I	
<i>Diphasiastrum digitatum</i>	Fan Clubmoss	5	5		LYCOPODIACEAE	N	R*
<i>Dryopteris carthusiana</i>	Spinulose Wood Fern	5	-2	S5	DRYOPTERIDACEAE	N	
<i>Dryopteris intermedia</i>	Evergreen Wood Fern	5	0	S5	DRYOPTERIDACEAE	N	
<i>Epilobium ciliatum</i> ssp. <i>ciliatum</i>	Hairy Willow-herb	3	3	S5	ONAGRACEAE	N	
<i>Equisetum arvense</i>	Field Horsetail	0	0	S5	EQUISETACEAE	N	
<i>Erigeron strigosus</i>	Daisy Fleabane	0	1	S5	ASTERACEAE	N	
<i>Eupatorium maculatum</i> ssp. <i>maculatum</i>	Spotted Joe-pye Weed	3	-5	S5	ASTERACEAE	N	
<i>Eupatorium perfoliatum</i>	Common Boneset	2	-4	S5	ASTERACEAE	N	
<i>Fragaria virginiana</i> ssp. <i>virginiana</i>	Virginia Strawberry	2	1	SU	ROSACEAE	N	
<i>Fraxinus americana</i>	White Ash	4	3	S5	OLEACEAE	N	
<i>Galium triflorum</i>	Sweet-scent Bedstraw	4	2	S5	RUBIACEAE	N	
<i>Geranium robertianum</i>	Herb-robert		5	SE5	GERANIACEAE	I	
<i>Geum canadense</i>	White Avens	3	0	S5	ROSACEAE	N	
<i>Hieracium aurantiacum</i>	Orange Hawkweed		5	SE5	ASTERACEAE	I	
<i>Hieracium caespitosum</i> ssp. <i>caespitosum</i>	Field Hawkweed		5	SE5	ASTERACEAE	I	

Scientific Name	Common Name	cc	cw	srank	Family	Native Status	Waterloo Status
<i>Hypericum perforatum</i>	St. John's-wort		5	SE5	CLUSIACEAE	I	
<i>Juglans nigra</i>	Black Walnut	5	3	S4	JUGLANDACEAE	N	
<i>Juncus dudleyi</i>	Dudley's Rush	1	0	S5	JUNCACEAE	N	
<i>Juncus effusus</i> ssp <i>solutus</i>	Soft Rush	4	-5	S5	JUNCACEAE	N	
<i>Juncus tenuis</i>	Slender Rush		0	S5	JUNCACEAE	N	
<i>Larix laricina</i>	American Larch	7	-3	S5	PINACEAE	N	
<i>Lathyrus tuberosus</i>	Tuberous Vetchling		5	SE3	FABACEAE	I	
<i>Leonurus cardiaca</i> ssp <i>cardiaca</i>	Common Motherwort		5	SE5	LAMIACEAE	I	
<i>Ligustrum vulgare</i>	European Privet		1	SE5	OLEACEAE	I	
<i>Lobelia inflata</i>	Indian-tobacco	3	4	S5	CAMPANULACEAE	N	
<i>Lonicera tatarica</i>	Tartarian Honeysuckle		3	SE5	CAPRIFOLIACEAE	I	
<i>Lycopus americanus</i>	American Bugleweed	4	-5	S5	LAMIACEAE	N	
<i>Lysimachia ciliata</i>	Fringed Loosestrife	4	-3	S5	PRIMULACEAE	N	
<i>Maianthemum racemosum</i> ssp <i>racemosum</i>	False Solomon's Seal	4	3	S5	LILIACEAE	N	
<i>Melilotus alba</i>	White Sweet Clover		3	SE5	FABACEAE	I	
<i>Muhlenbergia schreberi</i>	Screber's Satin Grass	1	0	S4	POACEAE	N	R <sup>+</sup>
<i>Nepeta cataria</i>	Catnip		1	SE5	LAMIACEAE	I	
<i>Oenothera biennis</i>	Common Evening-primrose	0	3	S5	ONAGRACEAE	N	
<i>Onoclea sensibilis</i>	Sensitive Fern	4	-3	S5	DRYOPTERIDACEAE	N	
<i>Osmunda claytoniana</i>	Interrupted Fern	7	-1	S5	OSMUNDACEAE	N	R
<i>Oxalis</i> sp	Wood Sorrel Species		0		OXALIDACEAE		
<i>Picea abies</i>	Norway Spruce		5	SE3	PINACEAE	I	
<i>Picea glauca</i>	White Spruce	6	3	S5	PINACEAE	N	
<i>Pinus nigra</i>	Black Pine		-5	SE2	PINACEAE	I	
<i>Pinus resinosa</i>	Red Pine	8	3	S5	PINACEAE	N	
<i>Pinus strobus</i>	Eastern White Pine	4	3	S5	PINACEAE	N	
<i>Pinus sylvestris</i>	Scotch Pine		5	SE5	PINACEAE	I	
<i>Poa alsodes</i>	Grove Meadow Grass	7	-2	S4	POACEAE	N	
<i>Poa compressa</i>	Canada Bluegrass	0	2	S5	POACEAE	N	
<i>Poa pratensis</i> ssp <i>pratensis</i>	Kentucky Bluegrass	0	1	S5	POACEAE	N	
<i>Polygonatum pubescens</i>	Downy Solomon's Seal	5	5	S5	LILIACEAE	N	
<i>Populus balsamifera</i> ssp <i>balsamifera</i>	Balsam Poplar	4	-3	S5	SALICACEAE	N	
<i>Populus tremuloides</i>	Quaking Aspen	2	0	S5	SALICACEAE	N	
<i>Prunella vulgaris</i> ssp <i>lanceolata</i>	Self-heal	5	5	S5	LAMIACEAE	N	
<i>Prunus pennsylvanica</i>	Fire Cherry	3	4	S5	ROSACEAE	N	
<i>Prunus serotina</i>	Wild Black Cherry	3	3	S5	ROSACEAE	N	
<i>Pyrola elliptica</i>	Shinleaf	5	5	S5	PYROLACEAE	N	
<i>Ranunculus abortivus</i>	Kidney-leaved Buttercup	2	-2	S5	RANUNCULACEAE	N	
<i>Ranunculus acris</i>	Tall Buttercup		-2	SE5	RANUNCULACEAE	I	
<i>Rhamnus cathartica</i>	Buckthorn		3	SE5	RHAMNACEAE	I	
<i>Ribes americanum</i>	Wild Black Currant	4	-3	S5	GROSSULARIACEAE	N	
<i>Ribes cynosbati</i>	Prickly Gooseberry	4	5	S5	GROSSULARIACEAE	N	
<i>Rubus allegheniensis</i>	Allegheny Blackberry	2	2	S5	ROSACEAE	N	
<i>Rubus idaeus</i> ssp <i>melanolasius</i>	Wild Red Raspberry		-2	S5	ROSACEAE	N	
<i>Rumex acetosella</i> ssp <i>acetosella</i>	Sheep Sorrel		0	SE5	POLYGONACEAE	I	
<i>Salix discolor</i>	Pussy Willow	3	-3	S5	SALICACEAE	N	
<i>Salix eriocephala</i>	Heart-leaved Willow	4	-3	S5	SALICACEAE	N	
<i>Salix petiolaris</i>	Meadow Willow	3	-4	S5	SALICACEAE	N	
<i>Sambucus racemosa</i> ssp <i>pubens</i>	Red-berried Elder	5	2	S5	CAPRIFOLIACEAE	N	
<i>Sanguinaria canadensis</i>	Bloodroot	5	4	S5	PAPAVERACEAE	N	

Scientific Name	Common Name	cc	cw	srank	Family	Native Status	Waterloo Status
<i>Saponaria officinalis</i>	Bouncing-bet		3	SE5	CARYOPHYLLACEAE	I	
<i>Scirpus atrovirens</i>	Woolgrass Bulrush	3	-5	S5	CYPERACEAE	N	
<i>Solanum dulcamara</i>	Climbing Nightshade		0	SE5	SOLANACEAE	I	
<i>Solidago canadensis</i>	Canada Goldenrod	1	3	S5	ASTERACEAE	N	
<i>Solidago rugosa</i> ssp <i>rugosa</i>	Rough Goldenrod	4	-1	S5	ASTERACEAE	N	
<i>Sorbus aucuparia</i>	European Mountain-ash		5	SE4	ROSACEAE	I	
<i>Thuja occidentalis</i>	Northern White Cedar	4	-3	S5	CUPRESSACEAE	N	
<i>Tilia americana</i>	American Basswood	4	3	S5	TILIACEAE	N	
<i>Tragopogon dubius</i>	Meadow Goat's-beard		5	SE5	ASTERACEAE	I	
<i>Trillium erectum</i>	Red Trillium	6	1	S5	LILIACEAE	N	
<i>Tsuga canadensis</i>	Eastern Hemlock	7	3	S5	PINACEAE	N	
<i>Verbascum thapsus</i>	Common Mullein		5	SE5	SCROPHULARIACEAE	I	
<i>Verbena urticifolia</i>	White Vervain	4	-1	S5	VERBENACEAE	N	
<i>Veronica officinalis</i>	Common Speedwell		5	SE5	SCROPHULARIACEAE	I	
<i>Viburnum opulus</i>	Guelder-rose Viburnum		0	SE4	CAPRIFOLIACEAE	I	
<i>Viola</i> sp	Violet Species		0		VIOLACEAE		
<i>Vitis riparia</i>	Riverbank Grape	0	-2	S5	VITACEAE	N	

R = Rare in the Regional Municipality of Waterloo

R+ = significant but only if demonstrably indigenous-most populations in Waterloo are thought to be of non-indigenous origin

R\* = significant but with the expectation that additional research may prove otherwise

(Region of Waterloo, 1999)

### **Explanation of Coefficient of Conservatism (cc), Coefficient of Wetness (cw), Conservation Status Ranks, and Native Status**

The information for Coefficients of Conservatism (cc), Coefficient of Wetness(cw), Srank and Native Status was obtained from Newmaster et. al. (1998) and Floristic Quality Assessment System for Southern Ontario (M.J. Oldham, W.D. Bakowsky and D.A. Sutherland) December 1995, Natural Heritage Information Centre, Ontario Ministry of Natural Resources.

#### **Coefficient of Conservatism (cc)**

Each native taxon was assigned a rank of 0 to 10 ("coefficient of conservatism") based on its degree of fidelity to a range of synecological parameters. Plants found in a wide variety of plant communities, including disturbed sites, were assigned ranks of 0 to 3. Taxa that typically are associated with a specific plant community, but tolerate moderate disturbance, were assigned ranks of 4 to 6. Rankings of 7 to 8 were applied to those taxa associated with a plant community in an advanced successional stage that has undergone minor disturbance. Those plants with high degrees of fidelity to a narrow range of synecological parameters were assigned a value of 9 to 10.

#### **Coefficient of Wetness (cw)**

The wetness index gives an indication of where plant species are typically found. Wetness values (coefficient of wetness) are between -5 and 5.

These categories are defined as follows:

- 5 Occurs almost always in wetlands under natural conditions (estimated > 99% probability).
- 4 to -2 Usually occurs in wetlands, but occasionally found in non-wetlands (estimated 67-99% probability).
- 1 to 1 Equally likely to occur in wetlands or non-wetlands (estimated 34-66% probability).
- 2 to 4 Occasionally occurs in wetlands, but usually occurs in non-wetlands (estimated 1-33 % probability).
- 5 Occurs almost never in wetlands under natural conditions (estimated < 1 % probability).

#### **Provincial Rank (Srank):**

Provincial (or Subnational) ranks are used by the Natural Heritage Information Centre to set protection priorities for rare species and natural communities. These ranks are not legal designations. Provincial ranks are assigned in a manner similar to that described for global ranks, but consider only those factors within the political boundaries of Ontario. By comparing the global and provincial ranks, the

status, rarity, and the urgency of conservation needs can be ascertained. The NHIC evaluates provincial ranks on a continual basis and produces updated lists at least annually. The NHIC welcomes information which will assist in assigning accurate provincial ranks.

- S1** **Extremely rare** in Ontario; usually 5 or fewer occurrences in the province or very few remaining individuals; often especially vulnerable to extirpation.
- S2** **Very rare in Ontario**; usually between 5 and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.
- S3** **Rare to uncommon in Ontario**; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.
- S4** **Common** and apparently secure in Ontario; usually with more than 100 occurrences in the province.
- S5** **Very common** and demonstrably secure in Ontario.
- SH** **Historically known from Ontario**, but not verified recently (typically not recorded in the province in the last 20 years); however suitable habitat is thought to be still present in the province and there is reasonable expectation that the species may be rediscovered.
- SR** **Reported for Ontario**, but without persuasive documentation which would provide a basis for either accepting or rejecting the report.
- SRF** Reported falsely from Ontario.
- SX** Apparently **extirpated** from Ontario, with little likelihood of rediscovery. Typically not seen in the province for many decades, despite searches at known historic sites.
- SE** **Exotic**; not believed to be a native component of Ontario's flora.
- C** **Captive/Cultivated**; existing in the province only in a cultivated state; introduced population not yet fully established and self-sustaining.
- S?** **Not Ranked Yet**, or if following a ranking, **Rank Uncertain** (e.g. S3?). S? species have not had a rank assigned.
- SU** **Unrankable**, often because of low search effort or cryptic nature of the species, there is insufficient information available to assign a more accurate rank; more data is needed.

#### Native Status (N or I)

---

This letter refers to the native status of a plant as defined by the Newmaster et al, 1998 and Floristic Quality Assessment System for Southern Ontario (M.J. Oldham, W.D. Bakowsky and D.A. Sutherland) December 1995, Natural Heritage Information Centre, Ontario Ministry of Natural Resources. "N" indicates that the plant is considered native to this region. "I" indicates that the plant has been introduced from another region.

## Appendix D: General biophysical conditions for vegetation communities on the Owen Property

Unit Number	CUP3 (Southern Plantation Area)	CUM/CUT inclusions in Southern Plantation (CUP3)	CUM1 (identified as "seepage area" in T.O.R.)	CUP/CUT/CUM (Northern Plantation Area)
<b>Vegetation Type</b>	Coniferous Cultural Plantation (Mature)	Cultural Meadow/Cultural Thicket	Mineral Cultural Meadow	Cultural Plantation/Thicket/Meadow Complex
<b>Overstorey Composition</b>	<i>Picea glauca</i> <i>Pinus strobus</i>	<i>Picea glauca</i> <i>Pinus sylvestris</i>		<i>Pinus resinosa</i> <i>Picea glauca</i> <i>Pinus nigra</i> <i>Populus tremuloides</i> <i>Thuja occidentalis</i>
<b>Understorey Composition</b>	<i>Picea glauca</i> <i>Sambucus racemosa</i>	<i>Rubus idaeus</i> ssp. <i>melanolasius</i> <i>Picea glauca</i> <i>Cornus stolonifera</i> <i>Cornus foemina</i> ssp. <i>racemosa</i> <i>Sambucus racemosa</i> <i>Rubus allegheniensis</i> <i>Fraxinus americanus</i>	<i>Pinus sylvestris</i> <i>Cornus foemina</i> ssp. <i>racemosa</i> <i>Cornus stolonifera</i>	<i>Fraxinus americana</i> <i>Cornus stolonifera</i> <i>Picea abies</i> <i>Sambucus racemosa</i> <i>Rubus idaeus</i> ssp. <i>melanolasius</i> <i>Ribes americanum</i> <i>Cornus alternifolia</i>
<b>Groundcover Composition</b>	mosses <i>Geranium robertianum</i> <i>Chelidonium majus</i> <i>Asarum canadense</i> Drypteris ferns	<i>Solidago canadensis</i> <i>Pyrola elliptica</i> <i>Dryopteris carthusiana</i> <i>Chelidonium majus</i>	<i>Solidago canadensis</i> <i>Juncus dudleyi</i> <i>Poa compressa</i> <i>Poa pratensis</i> <i>Agrostis gigantea</i>	<i>Solidago canadensis</i> <i>Fragaria virginiana</i> <i>Veronica officinalis</i> <i>Poa pratensis</i> <i>Solidago rugosa</i>
<b>Diameter Range</b>	2,3	2	1	1,2
<b>Structural Diversity</b>	2	1	1	2
<b>Canopy</b>	3	1,2	1	1,2,3
<b>Relative Age</b>	2	1	1	1-2
<b>Soil Texture</b>	very fine sand	very fine sand	clay loam	silty sand over silty clay loam
<b>Drainage</b>	1	1	1-2	1
<b>Slope Class</b>	1,2	1	2	1
<b>Topographic Class</b>	3	1	1	1
<b>Botanical Quality</b>	2,3	2,3	2	2,3
<b>Comments</b>	Significant species present (see section 3.2.1)	Significant species present (see section 3.2.1)		Significant species present (see section 3.2.1) Swamp Thicket inclusion (see section 3.2.1, p.17)

**Rating System for Biophysical Data:** (see also Appendix A: Vegetation Assessment Methodology for more details)

**Average Diameter** (1=<15 cm d.b.h.; 2=15-30 cm d.b.h.; 3=>30cm d.b.h.)

**Structural Diversity** (1=strata 1 & 2; 2=>2 strata; 3=> 3 strata, old growth)

**Canopy Closure** (1=<25%; 2= 25-50%; 3=>50%)

**Topography** (1=uniform; 2=uneven; 3 = high variability (hummocky))

**Slope** (1=<10%; 2=10-25%; 3=>25%)

**Drainage** (1=well-drained; 2=imperfectly drained; 3= poorly drained )

**Botanical Quality:** (1=disturbed, exotics 2= low diversity, 3=high diversity (significant species present))



## LEGEND

### General

- = not significant
- N/A = Not applicable
- ? = unclear, not known

### Federal Conservation Status

1. **Federal (COSEWIC) Status:** Status assigned by the Committee on the Status of Endangered Wildlife in Canada. (COSEWIC, 2003)

- EXT Extinct. A species that no longer exists.
- EXP Extirpated. A species no longer existing in the wild in Canada, but occurring elsewhere in the wild.
- END Endangered. A species facing imminent extirpation or extinction throughout its range.
- THR Threatened. A species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
- VUL or SC Vulnerable or Special Concern. A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events, but does not include an extirpated, endangered or threatened species.
- IND Indeterminate. A species for which there is insufficient information to support a status designation.
- NAR Not At Risk. A species that has been evaluated and found to be not at risk.

### Provincial Conservation Status

2. **Provincial (MNR) Status:** Status assigned by the Ontario Ministry of Natural Resources (OMNR, 2003).

- EXT Extinct. Any species formerly native to Ontario that no longer exists.
- EXP Extirpated. Any native species no longer existing in the wild in Ontario, but existing elsewhere in the wild.
- END Endangered. Any native species that, on the basis of the best available scientific evidence, is at risk of extinction or extirpation throughout all or a significant portion of its Ontario range if the limiting factors are not reversed. Endangered species are protected under the province's Endangered Species Act.
- THR Threatened. Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its Ontario range if the limiting factors are not reversed.
- VUL Vulnerable. Any native species that, on the basis of the best available scientific evidence, is a species of special concern in Ontario, but is not a threatened or endangered species.
- IND Indeterminate. Any native species for which there is insufficient scientific information on which to base a status recommendation.
- NIAC Not In Any COSSARO Category. Any native species evaluated by COSSARO which does not currently meet criteria for assignment to a provincial risk category.

3. **Provincial rarity ranks (SRANKS)** are evaluated and assigned by the Ontario Natural Heritage Information Centre (2003a,b,c,d,e)

- S5 = Very common and demonstrably secure in Ontario.
- S4 = Common and apparently secure in Ontario; usually with more than 100 occurrences in the province.
- S3 = Rare to uncommon in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.
- \_\_B = Breeding migrants (i.e. S5B). Those without any suffixes are considered resident species.
- SE = Exotic; not believed to be a native component of Ontario's flora.

### Regional Conservation Status

4. **Significant Wildlife species in the Regional Municipality of Waterloo** (RMW, 1985a; RMW, 1985b; RMW, 1996)

- RS = Regionally significant wildlife species

### Life History Information

5. **Area sensitivity** designations based on OMNR (2000) (See Appendix C & G)

- AS = Area Sensitive

6. **Sensitivity to Development** designations based on the Toronto Region Conservation Authority (TRCA, 20031 & 2003b).

- 0 = species that benefit from urbanization
- 1 = species that receive slight benefit from urbanization/ unknown
- 2 = species that show partial tolerance
- 3 = slight negative impact from urbanization
- 4 = moderate negative impact from urbanization
- 5 = severe negative impact from urbanization
- NR = Not Ranked

7. **Migration Strategy** designations based on Hounsell (1989) and Cheskey (2003). Where differences occurred, Hounsell (1989) was used.

- PR = Permanent Resident

SDM = Short Distant Migrant  
LDM = Long Distant Migrant

**8. Nest Strategy** designations based on Cheskey (2003), Hounsell (1989), and Ehrlich et al. (1988).

<u>Nest type</u>	<u>Location</u>
C = Cavity	b = building
NP = Nest parasite	c = canopy
P = Platform	cl = cliff
P & G = Pensile and globular	g = ground
OC = Open cup	s = shrub
S = Saucer	sc = subcanopy
SC = Scrape	

**Population Trends**

**9. Population trend information** based on the Canadian Breeding Bird Survey (BBS) (Downes and Collins, 2003), and (Ontario) Forest Bird Monitoring Program (FBMP) data from 1987- 2002 (OFBMP, 2003)

- = Statistically significant 95% of the time or more
- + = Statistically significant 90 - 95% of the time

Unavail. = Data unavailable

Note: All BBS trend data specific to 'Lower Great Lakes/St. Lawrence Plain' Bird Conservation Region (BCR) except those marked in **bold** which refer to trend data for all of Canada. Trend data for the Lower Great Lakes/St. Lawrence Plain BCR is based on field data gathered between 1969 and 2000 whereas trend data for Canada corresponds to the period between 1967 and 2000.

**Breeding Status**

**10. Highest Breeding Status** mostly based on Ontario Breeding Bird Atlas (OBBA, 2001).

M = Migrant = Species passing through during spring or fall migration only; not known to breed in Region, or breeds very rarely  
WR = Winter Resident; typically spends winter months in our region  
X = Bird observed during the breeding season – not in suitable breeding habitat  
XF = Bird observed feeding in the study area during the breeding season – not in suitable breeding habitat  
Possible = Possible Breeder  
Probable = Probable Breeder  
Confirmed = Confirmed Breeder

**10. Highest Breeding Evidence** based on the Marsh Monitoring Program (LPBO & EC, 1997) and Ontario Breeding Bird Atlas (OBBA, 2001).

*12. Breeding Evidence Codes*

**Field Observation Data**

**11. Breeding Evidence Codes** based on the Marsh Monitoring Program (LPBO & EC, 1997) and Ontario Breeding Bird Atlas (OBBA, 2001).

Breeding Evidence Codes

L1 = Level 1 = Individuals can be counted; calls not simultaneous  
L2 = Level 2 = Calls distinguishable; some calls simultaneous  
L3 = Level 3 = Full chorus; calls continuous and overlapping. A more accurate abundance estimate is not possible.  
( ) = numbers in brackets following L1 or L2 refer to estimates of individuals present  
M = Migrant = Species passing through during spring or fall migration only; typically does not breed in Region  
X = species observed in its breeding season, but no evidence of breeding (*i.e.* flyover only)  
XF = species observed feeding in the study area during breeding season, but no evidence of breeding  
H = Species observed in its breeding season in suitable nesting habitat  
S = Singing male present, or breeding calls heard, in its breeding season in suitable nesting habitat  
P = Pair observed in their breeding season in suitable nesting habitat  
T = Permanent territory presumed through registration of territorial song on at least two days, a week or more apart, at the same place.  
FY = Recently fledged young or downy young, including young incapable of sustained flight  
CF = Adult carry food for young

## REFERENCES

- COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2003.** Canadian Species at Risk. May 2003. Committee on the Status of Endangered Wildlife in Canada. [http://www.cosewic.gc.ca/pdf/English/CDN\\_SPECIES\\_AT\\_RISK\\_May2003\\_e.pdf](http://www.cosewic.gc.ca/pdf/English/CDN_SPECIES_AT_RISK_May2003_e.pdf)
- DeGraaf, R.M. and J.H. Rappole. 1995.** Neotropical Migratory Birds: Natural History, Distribution and Population Change. Comstock Publishing Associates, Ithaca, NY. 676pp.
- Downes, C.M. and B.T. Collins. 2003.** The Canadian Breeding Bird Survey, 1967-2000. Canadian Wildlife Service Progress Note No. 219. Ottawa, Ontario: Environment Canada. 40pp.
- Ehrlich, P.R., D.S. Dobkin and D. Wheye. 1988.** The Birders Handbook; A Field Guide to the Natural History of North American Birds. Simon and Schuster Inc., New York. 785pp
- Hounsell, S.W. 1989.** Methods for assessing the sensitivity of forest birds and their habitats to transmission line disturbances. Ontario Hydro, Land Use and Environmental Planning Department, stations and Transmission Programs Group, Toronto, Ontario. 616pp.
- LPBO & EC (Long Point Bird Observatory and Environment Canada). 1997.** Marsh Monitoring Program: Training Kit and Instructions for Surveying Marsh Birds, Amphibians and their Habitats. 1997 revised edition. Long Point Bird Observatory and Environment Canada. 40pp.
- Ontario Breeding Bird Atlas. 2001. Guide for Participants. Atlas Management Board, Federation of Ontario Naturalists, Don Mills. 34pp.**
- OBBA (Ontario Breeding Bird Atlas). 2001.** Guide for Participants. Atlas Management Board, Federation of Ontario Naturalists, Don Mills. 34pp.
- OFBMP (Ontario Forest Bird Monitoring Program). 2003.** Ontario Forest Bird Monitoring Program Newsletter. Volume 13, Issue 1, Spring 2003.
- OMNR (Ontario Ministry of Natural Resources). 2000.** Significant Wildlife Habitat Technical Guide. 151pp.
- OMNR (Ontario Ministry of Natural Resources). 2003.** Vulnerable, Threatened, Endangered, Extirpated or Extinct Species of Ontario. List issued June 4, 2003. [http://www.mnr.gov.on.ca/MNR/VTEEE\\_June\\_4\\_2003.pdf](http://www.mnr.gov.on.ca/MNR/VTEEE_June_4_2003.pdf)
- ONHIC (Ontario Natural Heritage Information Centre). 2003a.** NHIC List of Ontario Insects: Odonata. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/queries/listout.cfm?el=iiodo>
- ONHIC (Ontario Natural Heritage Information Centre). 2003b.** NHIC List of Ontario Insects: Lepidoptera. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/queries/listout.cfm?el=iilep>
- ONHIC (Ontario Natural Heritage Information Centre). 2003c.** NHIC List of Ontario Reptiles. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/species/listout.cfm?el=ar>
- ONHIC (Ontario Natural Heritage Information Centre). 2003d.** NHIC List of Ontario Birds. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/queries/listout.cfm?el=ab>
- ONHIC (Ontario Natural Heritage Information Centre). 2003e.** NHIC List of Ontario Mammals. Ontario Natural Heritage Information Centre Home Page. <http://www.mnr.gov.on.ca/MNR/nhic/queries/listout.cfm?el=am>
- RMW (Regional Municipality of Waterloo). 1985a.** Appendix 3: Reptiles and Amphibians in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.
- RMW (Regional Municipality of Waterloo). 1985b.** Appendix 4: Mammals in Environmentally Sensitive Policy Areas Technical Appendix. Approved by Council: 1986.
- RMW (Regional Municipality of Waterloo). 1996.** Revisions to Waterloo Region's Significant Species List: Breeding Birds Component. Report to Planning and Culture Committee PC-96-021. Approved by Council: April 25, 1996.
- TRCA (Toronto Region Conservation Authority). 2003a.** Revised Fauna Scores and Ranks, February 2003.
- TRCA (Toronto Region Conservation Authority). 2003b.** Fauna Species Scoring and Ranking System – Draft March 2003.