



Maple Nature Reserve and Adjacent Lands

**Terrestrial Biological Inventory
and Assessment**

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1.0 Introduction

In 2009 the Toronto Region Conservation Authority (TRCA) was contracted by the City of Vaughan to conduct a flora and fauna inventory of the Maple Nature Reserve Lands. It was decided to extend the study area slightly so as to give additional local context to the inventory. As shown in Maps 1 and 2, the Maple Nature Reserve and Adjacent Lands are located in the upper reaches of the Don watershed, south-east of the junction of Teston Road and Dufferin Street. It is a major groundwater discharge zone for the East Don River. This study area (about 50 hectares) is part of a much larger area known as Block 12, the planning area bounded by Teston Road, Dufferin Street, Major MacKenzie Drive, and Bathurst Street. This area was the subject of fauna and flora surveys for a Master Environmental Servicing Plan (MESP) conducted by Gartner Lee limited (GLL) for the City of Vaughan in the years from 1997 to 2001 (GLL *et al.*, 2001). Where considered relevant, the results of the MESP field work are used to augment the 2009 TRCA field work in this report.

The purpose of the work conducted by the TRCA during the 2009 field season was to *provide site specific advice on management decisions* regarding improvements to an existing trail plan design and on the major restoration project involving the removal of the quonset hut in the valley at the south end of the former Ontario Ministry of Natural Resources (OMNR) office complex.

In order to provide this advice, detailed field inventories were undertaken to *characterize the terrestrial natural heritage features* of the Maple Nature Reserve and Adjacent Lands. Through the completion of this characterization, the site features can then be understood within the larger regional context provided by the Terrestrial Natural Heritage Program of the TRCA (see Section 1.1). Inventory work addresses the question “*How does the area surveyed at the Maple Nature Reserve and Adjacent Lands site fit within the regional and watershed natural system, and how should its contribution to this system be protected and maximized?*” The important underlying message presented by this question is that the health of the natural system is measured at the regional scale and specific sites must be considered together for their benefits at all scales, from the site to the larger system.

The Don Watershed Plan selected the Maple Nature Reserve Lands as one of a number of high-priority locations for restoration work (TRCA, 2009). The quonset hut project was recommended in the Block 12 MESP (GLL *et al.*, 2001) and was chosen as a Concept Site (specific restoration site). Together with other restoration efforts, the quonset hut project will significantly expand the width of the natural cover corridor across the Maple Nature Reserve Lands and therefore mitigate some of the effects of urbanization.

1.1 TRCA’s Terrestrial Natural Heritage Program

Rapid urban expansion in the TRCA jurisdiction has led to continuous and incremental loss of natural cover and species. In a landscape that probably supported 95% forest cover prior to



European settlement, current mapping shows that only 17% forest and wetland cover remains. Agricultural and natural lands are increasingly being urbanized while species continue to disappear from a landscape that is less able to support them. This represents a substantial loss of ecological integrity and ecosystem function that will be exacerbated in the future according to current urbanization trends. With the loss of natural cover, diminishing proportions of various natural vegetation communities and reduced populations of native species remain. Unforeseen stresses are then exerted on the remaining flora and fauna in the natural heritage system. They become even rarer and may eventually be lost. This trend lowers the ability of the land to support biodiversity and to maintain or enhance human society (e.g. through increased pollution and decreased space for recreation). **The important issue is the cumulative loss of natural cover in the TRCA region that has resulted from innumerable site-specific decisions.**

In the late 1990s the TRCA initiated the Terrestrial Natural Heritage Program to address the loss of terrestrial biodiversity within the jurisdiction's nine watersheds. This work is based on two landscape-level indicators: the quality distribution of natural cover and the quantity of natural cover. These indicators summarize changes that occurred within the historical natural system. The aim of the program is to create a conservation strategy that both protects elements of the natural system (vegetation communities, flora and fauna species) *before* they become rare and promotes greater ecological function of the natural system as a whole. This preventive approach is needed because by the time a community or species has become rare, irreversible damage has often already occurred. A healthy natural system capable of supporting regional biodiversity in the long term is the goal of the Terrestrial Natural Heritage Systems Strategy (TNHSS) by setting targets – both short and long-term (100 years) – for the two landscape indicators in order to provide direction in planning at all scales (TRCA, 2007a; TRCA, 2007b).

A target system that identifies a land base where natural cover should be restored is a key component of the Strategy. Although the objectives of the Strategy are based on making positive changes at all scales, the evaluation models were developed at the landscape scale using a combination of digital land cover mapping and field-collected data. Field-collected data also provides ground-level information in the application of the landscape models at the site scale. The two indicators and the targets that have been set for them are explained in Section 3.1. It is important to understand that habitat quality and distribution are interdependent. For example, neither well-distributed poor-quality natural cover nor poorly-distributed good-quality natural cover achieves the desired condition of sustainable biodiversity and social benefits across the watershed.

2.0 Study Area Description

The site lies entirely within the Great Lakes – St. Lawrence floristic region, composed of mixed coniferous-deciduous forest, on a spur of the Oak Ridges Moraine which extends south along Dufferin Street beyond Major Mackenzie Drive. The surficial geology at this location is stratified deposits of fine sands and gravel, the core material for the Oak Ridges Moraine. The sands and gravels of this Maple spur of the Oak Ridges Moraine supported major aggregate extraction to the



southwest of the Maple Nature Reserve (west of Dufferin Street north of Major MacKenzie Drive). The gravel pit then became the huge Keele Valley landfill used by the City of Toronto, which closed in 2002. Mid-twentieth century soil mapping shows that generally the northern part of the site is Pontypool sandy loam typical of the exposed sands of the moraine, while the southern part has an overlay of Oneida clay loam (Hoffman and Richards, 1955). Topographically, the Maple Nature Reserve and Adjacent Lands are dominated by the wide valley of the East Don River, probably carved out by glacial meltwater. The slopes are steep and have complex terracing with a fairly wide bottomland. Groundwater seepage is abundant and feeds the East Don. In the northeast section of the property, there is a secondary valley without a permanent watercourse; there is a narrow ridgetop between these two valleys. The far northeast corner of the site is a high, rolling tableland.

A provincially-designated Area of Natural and Scientific Interest (ANSI) known as the Maple Uplands is located mostly west of Dufferin Street and north of Teston Road, although the boundary does extend into the upper part of the East Don Valley within the study area (Varga *et al.*, 1997). TRCA has a corresponding Environmentally Significant Area (ESA) designation which does not cross Dufferin Street into the site. In any case, the areas on the Oak Ridges Moraine to the north and west of the Maple Nature Reserve include extensive amounts of natural cover, but are separated from it by Dufferin Street and Teston Road. The Maple Nature Reserve is thus part of a major core and corridor area on the Oak Ridges Moraine and links the Moraine to the Don Valley riparian corridor. The significance of the area has been recognized since at least 1950 (Department of Planning and Development, 1950). The Maple Uplands ANSI adjacent to the Maple Nature Reserve is known to support flora and fauna species found nowhere else in the Don Watershed (TRCA, 2009), while at least two flora species in the Maple Nature Reserve and Adjacent Lands were found to be the only known occurrences for the Don Watershed (see Section 4.4.2).

The Maple Nature Reserve Lands were occupied by an office and research station for the Ontario Ministry of Natural Resources (OMNR) from the 1950s to 1990s. This station included experimental plantations, mostly of conifers and hybrid poplars on the east side of the property and a fish hatchery in the valley of the East Don. Currently, the main office buildings are used by the City of Vaughan, while the quonset hut and other facilities to the south are being decommissioned for the purposes of naturalization. The open part of the bottomland and some of the mature forest upstream are used by a summer day camp.

3.0 Inventory Methodology

A biological inventory of the Maple Nature Reserve and Adjacent Lands was conducted at the levels of habitat patch (landscape analysis), vegetation community, and species (flora and fauna) according to the TRCA methodologies for landscape evaluation and field data collection (TRCA, 2007c; TRCA, 2007d). Habitat patch mapping was excerpted from the regional 2002 mapping of broadly-defined patch categories (forest, wetland, meadow and coastal) and digitized using ArcView GIS software.



3.1 Landscape Analysis

The quality, distribution and quantity of natural cover in a region are important determinants of the species distribution, vegetation community health and the provision of “ecosystem services” (e.g. air and water quality, recreation, aesthetics) in that region.

Base Mapping

The first step in evaluating a natural system or an individual *habitat patch* is to interpret and map land cover using aerial photographs. The basic unit for the evaluation at all scales is the habitat patch in the region, which are then combined and evaluated as a system at any scale. A *habitat patch* is a continuous piece of habitat, as determined from aerial photo interpretation. The TRCA maps habitat according to four broad categories: *forest*, *wetland*, *meadow*, and *coastal* (beach, dune, or bluff). At the regional level, the TRCA jurisdiction is made up of thousands of habitat patches. This mapping of habitat patches in broad categories is conducted through remote-sensing and is used in the evaluation of quality, distribution and quantity of natural cover. It should not be confused with the more detailed mapping of vegetation communities obtained through field surveys and that is used to ground-truth the evaluation (see Section 3.3).

Quality Distribution of Natural Cover

The quality of each habitat patch is evaluated according to three criteria: *size* (the number of hectares occupied by the patch), *shape* (edge-to-area ratio), and *matrix influence* (measure of the positive and negative impacts from surrounding land use) (TRCA, 2007c). A total score for each patch is obtained through a weighted average of the scores for the three criteria. This total score is used as a measure of the ‘quality’ of a habitat patch and is translated into a local rank (L-rank) ranging from L1 to L5 based on the range of possible total scores from three to 15 points. Of these L-ranks, L1 represents the highest quality habitat and L5 the poorest.

Species presence or absence correlates to habitat patch quality (size, shape and matrix influence) (Kilgour, 2003). The quality target is based on attaining a quality of habitat patch throughout the natural system that would support in the very long term a broad range of biodiversity, more specifically a quality that would support the region’s fauna Species of Conservation Concern (Table 1).

Table 1: Habitat patch quality, rank and species response

Size, Shape and Matrix Influence	Patch Rank	Fauna Species of Conservation Concern
Excellent	L1	Generally found
Good	L2	Generally found
Fair	L3	Generally found
Poor	L4	Generally not found
Very Poor	L5	Generally not found



In addition to the three criteria that make up the total habitat patch score, another important measure to consider in assessing habitat patch quality is forest interior, i.e. the amount of forest habitat that is greater than 100 meters from the edge of the forest patch, using 100 meter increments. A recognized distance for deep interior conditions occurs at 400 meters from the patch edge. Such conditions are a habitat requirement for several sensitive fauna species.

Quantity

The *quantity target* is the amount of natural cover which needs to exist in the landscape in order to accommodate and achieve the quality distribution targets described above. The two targets are therefore linked to each other: it will be impossible to achieve the required distribution of natural heritage quality without the appropriate quantity of natural cover. The proportion of the region that needs to be maintained as natural cover in order to achieve the desired quality has been identified as 30%.

3.2 Ranking and Scoring Communities and Species

While the targets for the natural heritage system are derived from regional-scale information, the ground-truthing surveys at the site level provide important information that can be used in conjunction with the targets to plan decisions at the site level. A key component of the ground-truthing surveys is the scoring and ranking of vegetation communities and flora and fauna species to generate local “L” ranks (L1 to L5), first developed in 1996-2000 and regularly updated (TRCA, 2010). These roughly correspond to the habitat patch ranks. For example, a species ranked L4 may be expected in habitat patches with a quality of L4 or better.

Vegetation community scores and ranks are based on two criteria: *local occurrence* and the number of *geophysical requirements* or factors on which they depend. Flora species are scored using four criteria: *local occurrence*, *population trend*, *habitat dependence*, and *sensitivity to impacts associated with development*. Fauna species are scored based on seven criteria: *local occurrence*, *local population trend*, *continent-wide population trend*, *habitat dependence*, *sensitivity to development*, *area-sensitivity*, and *patch isolation sensitivity*. With the use of this ranking system, communities or species of *regional concern*, ranked L1 to L3, now replace the idea of *rare* communities or species. Rarity (*local occurrence*) is still considered but is now one of many criteria that make up the L-ranks, making it possible to recognize communities or species of regional concern before they have become rare.

In addition to the L1 to L3 ranked species, a large number of currently common or secure species at the regional level are considered of concern in the urban context. These are the species identified with an “L” rank of L4. Although L4 species are widespread and frequently occur in relatively intact urban sites, they are vulnerable to long-term declines.



3.3 Field Work

Vegetation communities and flora species were surveyed concurrently. Botanical field-work for the site was conducted in 2009 (Table 2). Some botanical data from the Ministry of Natural Resources (Varga unpublished, collected in 1996) and by Gartner Lee Ltd. (GLL) in 1997 were included (GLL *et al.*, 2001). Vegetation community designations were based on the Ecological Land Classification (ELC) and determined to the level of vegetation type (Lee *et al.*, 1998). Community boundaries were outlined onto printouts of 2007 digital ortho-rectified photographs (ortho-photos) to a scale of 1:2000 and then digitized in ArcView. Flora regional species of concern (species ranked L1 to L3) were mapped as point data with approximate number of individuals seen.

Fauna data were collected by the TRCA in June, 2009 (Table 2). The TRCA data collection protocol requires surveys to begin in the spring, searching primarily for frog species of regional concern but recording incidentally the presence of any early-spring nocturnal bird species (owls and American woodcocks, *Scolopax minor*). However, the contract for TRCA to conduct these surveys was awarded too late in the season to capture spring breeding amphibian and early-nocturnal bird species data. Fortunately, summer surveys (botanical and fauna) managed to report several sightings of frogs in summer foraging habitat. The summer surveys were concerned primarily with the mapping of breeding bird species of regional concern. Songbirds are surveyed in June/July in order to obtain breeding bird data and to exclude migrants. The methodology for identifying confirmed and possible breeding birds follows Cadman *et al.*, (2007). Fauna species of regional and urban concern (species ranked L1 to L4) were mapped as point data with each point representing a possible breeding bird. The reason for L4 fauna being mapped but not L4 flora is the very recent presence of urban development along the east side of the reserve. Fauna tend to respond much more rapidly to urban disturbance, while a higher density of sensitive flora can persist for many years.

Table 2: Schedule of the TRCA biological surveys at the Maple Nature Reserve and Adjacent Lands

Survey Item	Survey Dates	Survey Effort (hours)
Patch / Landscape	2002 ortho-photos	21 hours
Vegetation Communities and Flora Species	15 th May; 2 nd , 3 rd , 8 th , 26 th June; 21 st July; 5 th Aug 2009.	39 hours
Breeding Songbirds	4 th and 30 th June, 2009	5 ½ hours

In addition to biological inventory work, TRCA staff in conjunction with City of Vaughan staff, reviewed several of the proposed trail alignments in the central and northern part of the Maple Nature Reserve, and attended a site meeting at the quonset hut. TRCA staff also tagged invasive woody species around the quonset hut (with yellow paint) in August 2009, including buckthorn (*Rhamnus cathartica*), shrub honeysuckle (*Lonicera x bella*), Norway maple (*Acer platanoides*), and Manitoba maple (*Acer negundo*). The plants thus identified were to be removed as part of the restoration work.



4.0 Results and Discussion

Information pertaining to the Maple Nature Reserve and Adjacent Lands was collected through both remote-sensing and ground-truthing surveys. This information contains three levels of detail: habitat patch, vegetation community, and species (flora and fauna). This Section provides the information collected and its analysis in the context of the TNHS Strategy.

4.1 Regional Context

Based on 2002 orthophotography, 25% of the land area in the TRCA jurisdiction consists of natural cover but this figure includes meadow and old field. Although historically, the region would have consisted of up to 95% forest cover, today (i.e. 2002) only about 17% is covered by forest and wetland. Of the non-natural cover (i.e. the remaining 75%), 48% is urban and 27% is rural / agricultural.

The regional level analysis of habitat patches shows that the present average patch quality across the TRCA jurisdiction is “fair” (L3); forest and wetland cover is contained largely in the northern half of the TRCA jurisdiction, especially on the Oak Ridges Moraine; and the quantity is 16% of the surface area of the jurisdiction (Map 3). Thus the existing natural system stands below the quantity target that has been set for the region (30%) and also has an unbalanced distribution. The distribution of fauna species of concern is also largely restricted to the northern part of the jurisdiction; fauna species of regional concern are generally absent from the urban matrix (see Map 4). The regional picture, being the result of a long history of land use changes, confirms that **all** site-based decisions contribute to the condition of a region.

4.2 Habitat Patch Findings for Maple Nature Reserve and Adjacent Lands

The following details the study area according to the two natural system indicators used in designing the Terrestrial Natural Heritage System Strategy: the *quality distribution* and *quantity* of natural cover. Analysis was based on 2002 ortho-photos.

4.2.1 Quality Distribution of Natural Cover

The results for quality distribution are reported below under the headings of habitat patch size and shape, matrix influence and total score.

Habitat Patch Size and Shape

At the Maple Nature Reserve and Adjacent Lands, due in part to the continuation of the forest patch to the south-east beyond the study area boundary, the forest habitat patch receives a “good” (L2) score for patch size, meaning that it scores four out of a possible five points (Map 5).



Within the 2009 study area there is one slim section of habitat that can be considered forest interior since it is situated more than 100 metres from the edge of the forest patch (see Map 6). This same forest habitat patch scores “poor” (L4) for shape, due to its convoluted patch edges.

Habitat Patch Matrix Influence

Analysis based on the 2002 ortho-photos shows that the habitat in the study area is ranked as “fair” for matrix influence (i.e. scores 3 out of a possible 5 points). Maps 7 and 8 show habitat patch matrix influence scores using the 2002 data (just prior to urbanization of the lands to the east) available at the time this report was prepared. This score can be attributed to the largely agricultural landscape surrounding the site at the time of the landscape analysis (2002), and to the close proximity of other large patches of natural habitat, primarily to the west of Dufferin Street. However, residential development within the surrounding landscape will have altered the matrix influence that is acting on the study area.

The TRCA measures matrix influence at the landscape level by assigning set values; positive, neutral and negative, to the type of landscape use occurring within two km of the subject site. It is important, however, to also understand and consider the matrix influence that occurs at the site and patch level. Such influences include those transferred to an otherwise remote natural habitat patch from a distant urban or suburban development, for example via a trail system.

Habitat Patch Total Score

The combination of “fair” matrix influence on the site and the overall “good” habitat patch size, results in an overall “fair” (L3) habitat patch quality (Map 9). The implication of this patch ranking is that the forest habitat at the Maple Nature Reserve and Adjacent Lands should accommodate a good population of L3 fauna and flora species.

4.2.2. Quantity of Natural Cover

The total area of the Don watershed is approximately 35,806 hectares, containing 16.5% natural cover (2002), including 3212 hectares as forest/successional habitat (9%), 2603 hectares as meadow (7.3%) and 81 hectares as wetland (0.2%). The surveyed area makes up 50.6 hectares of which 43.8 hectares are natural cover including 33.1 hectares of forest, 2.4 hectares of successional, 3.0 hectares of wetland and 5.2 hectares of meadow. This amounts to 0.74 % of the total natural cover in the Don watershed.

4.3 Vegetation Community Findings for Maple Nature Reserve and Adjacent Lands

4.3.1 Vegetation Community Representation

A total of 40 different ELC vegetation community types were described for the site (listed in Appendix 1). There were 23 forest communities (10 natural forest, 13 plantation), 7 successional



communities, 7 wetlands (including a non-vegetated aquatic), and 3 meadows. Two successional communities were recorded solely as complexes and/or inclusions within other communities. The range of community types reflects the topography and geology of the reserve, as well as the extensive plantings on the grounds for forestry research in the mid 20th century.

Mature forest covers the slopes of the East Don headwater valley, with a large extension onto tableland at the southeast end of the reserve. The upper west-facing slopes and the tableland to the southeast are covered by variants of sugar maple deciduous forest: Dry-Fresh Sugar Maple Deciduous Forest (FOD5-1) and Dry-Fresh Sugar Maple – Beech Deciduous Forest (FOD5-2). Fresh-Moist Sugar Maple – Hemlock Mixed Forest (FOM6-1) dominates the lower slopes and terraces of the valley feature. Smaller patches of Fresh-Moist White Cedar – White Pine Coniferous Forest (FOC4-A), Dry-Fresh White Pine – Sugar Maple Mixed Forest (FOM2-2), Dry-Fresh Hemlock – Sugar Maple Mixed Forest (FOM3-2), and Fresh-Moist Sugar Maple – Ash Deciduous Forest (FOD6-1) also occur on the slopes and terraces. The dry secondary valley has some younger Fresh-Moist Basswood Deciduous Forest (FOD7-F) and Fresh-Moist Poplar Deciduous Forest (FOD8-1). The site has 33 hectares of forest (including plantation), about two-thirds of the whole land base.

Plantations dating from the 1950s and 1960s dominate much of the northern and eastern parts of the reserve. They are approximately equally divided between Hybrid Poplar Deciduous Plantation (CUP1-4) and various coniferous plantations (CUP3-1, CUP3-2, CUP3-H, etc.) Intensive research and seed sourcing was undertaken to find fast-growing, disease-resistant trees (Miladinovic, 1999). At time of survey, many of the tree tags identifying species and seed source were still intact for the conifers and could be referenced. High mortality and subsequent suckering characterized the poplar plantations. There is also a serious infestation of Asiatic bittersweet (*Celastrus orbiculatus*), which is a highly invasive alien vine, that is threatening some of the plantation trees and which is likely to spread to more natural areas.

Seven types of successional semi-woody habitat cover 2.4 hectares (6.8% of the natural cover). These lie mostly along the eastern fringe of the reserve, particularly in the lower reaches of the secondary valley. Meadow areas covering 5.2 hectares are also mostly along the eastern fringe of the site. Exotic species are prominent in these more disturbed areas.

Wetlands cover 2.8 hectares. White cedar headwater swamps line the East Don River, with a White Cedar – Hardwood Mineral Mixed Swamp (SWM1-1) near Dufferin Street to the north of the old OMNR offices, and a White Cedar – Hardwood Organic Mixed Swamp (SWM4-1) to the south. Two small patches of disturbed Common Reed Mineral Meadow Marsh (MAM2-a) lie adjacent to Dufferin Street. Two pothole wetlands located within the forest can be found at the southeast end of the reserve near the old quonset hut that is scheduled for removal and site restoration. These include a Broad-leaved Cattail Mineral Shallow Marsh (MAS2-1A) and a Forb Mineral Shallow Marsh (MAS2-9). The larger pothole with the cattail marsh is fairly diverse floristically and has been known in the recent past to be (and likely still is) an important amphibian breeding site (see Section 4.5). Another wetland, sometimes referred to as the Castan wetland, lies just off-site to the east of the southern forest block (GLL *et al.*, 2001).



A small on-line pond on the East Don River headwaters near the office was turbid and is probably contributing to warmer water conditions.

4.3.2 Vegetation Communities of Concern

The vegetation communities that occur in the TRCA jurisdiction are scored and given a local rank from L1 to L5 based on the two criteria mentioned in Section 3.2. The area to the east of the Maple Nature Reserve has only very recently been undergoing urbanization; therefore the vegetation is still largely reflective of a rural environment where L3 is the threshold of conservation concern for communities as well as individual flora species. On the other hand, community ranks do not take into account the intactness or quality of individual examples of communities; thus, a common type of vegetation community may be of conservation concern at a particular site because of its age, intact native ground layer, or other considerations aside from rank.

Two communities, both lying within the Maple Nature Reserve proper, have a rank of L3: Fresh-Moist White Cedar – White Pine Coniferous Forest (FOC4-A), and White Cedar – Hardwood Organic Mixed Swamp (SWM4-1). These are both located in the East Don headwater valley at the south end of the site and are characterized by cool ground water flows, lower slope-to-bottomland location and northeast facing topography (communities with ranks shown in Appendix 1; location and boundaries shown on Map 10). In addition, the White Cedar – Hardwood Mineral Mixed Swamp (SWM1-1) further upstream beside Dufferin Street and also within the Nature Reserve proper is also part of the headwater swamp complex and has a high diversity of sensitive native flora. The natural, mature forests that make up about 18 hectares of the site as a whole have an intact ground layer with few exotic species and many older trees. Therefore, all of the mature forest as well as headwater swamp areas should be considered to be of conservation concern at the Maple Nature Reserve and Adjacent Lands.

4.4 Flora Findings for Maple Nature Reserve and Adjacent Lands

4.4.1 Flora Species Representation

Maple Nature Reserve and Adjacent Lands had a total of 399 species of vascular plants recorded, mostly in 2009 with some records from 1996-1997 (Appendix 2). These included 378 naturally-occurring species and at least 21 planted species (undoubtedly there were some tree species in the research plantations that were unlabeled and not identified). Of the non-planted species, 245 are native (65%). The high biodiversity of this site is related to the presence of intact mature forest and headwater swamp, even with the history of disturbance and planting of some parts of the reserve.

Invasive Species

Several invasive exotic plants occur in the area. Asiatic bittersweet and dog-strangling vine (*Cynanchum rossicum*) are probably the most serious threats. These two vines (the first one



woody and the second one herbaceous) occur in the dry valley in the northeast part of the site, in the successional areas and adjoining plantations. Some trees are being choked by dense growths of Asiatic bittersweet. Some smaller plantations and forest edges near the south end of the site have populations of periwinkle (*Vinca minor*), lily-of-the-valley (*Convallaria majalis*), and goutweed (*Aegopodium podagraria*). Garlic mustard (*Alliaria petiolata*) occurs in scattered disturbed areas, mostly near the office buildings including the vicinity of the quonset hut. A few woody invasive species were also evident around the quonset hut: for example, buckthorn, Manitoba and Norway maples, and shrub honeysuckle.

Arboretum Plantings

The plantations at the Maple Nature Reserve and Adjacent Lands are of great interest as an arboretum, being one of the most extensive genotype collections in North America (Hough Woodland Naylor Dance and GLL, 1997). For example, individuals of every known 5-needled species of pine are included. Another interesting tree noted by Vaughan staff and confirmed by TRCA biologists, was a single bald cypress (*Taxodium distichum*) planted in the cedar headwater swamp. This southern tree was healthy and of the same size as the neighbouring native cedars. While many of these trees are exotics, they do not show evidence of being invasive. Those which could be identified in 2009 on the basis of identification tags and features are included in Appendix 2.

4.4.2 Flora Species of Concern

Sixty species of vascular plant at the Maple Nature Reserve and Adjacent Lands are of regional conservation concern (rank L1 to L3, Section 3.2) (Appendix 2). Of these, 44 occur within the Maple Nature Reserve proper. Map 11 shows locations of flora of regional concern. The ranks are based on sensitivity to human disturbance associated with development; and habitat dependence, as well as on rarity (TRCA, 2010). In most cases, the species are not currently rare but are at risk of long-term decline due to the other criteria.

Six of these plants are regionally rare (found in six or fewer of the 44 10 x 10 km grid squares that cover the TRCA jurisdiction). Of particular interest is the grove chickweed (*Moehringia lateriflora*), a forest-floor species. This is the first and so far only record of this species ever noted in the TRCA jurisdiction. Garber's sedge (*Carex garberi*) is usually associated with Great Lakes coastal fens; but was found in an opening in the upper headwater swamp in 2009. The only other record for this species in the TRCA jurisdiction is Toronto Island. The other regionally-rare species are Back's sedge (*Carex backii*), northern bedstraw (*Galium boreale*), smooth aster (*Aster laevis*), and black spruce (*Picea mariana*). It is possible that the black spruce had seeded in from forestry plantings, but a few trees were found in the headwater swamp that appeared to be naturally-occurring. Black spruce does occur naturally in kettle peatlands at Oak Ridges Moraine Corridor Park and West Gormley about 7.5 - 9 km away.

All but one of the flora of concern are sensitive to development, being vulnerable to at least one kind of disturbance that is associated with land use changes. Their scores for sensitivity to



development are overlaid on 2002 habitat matrix influence as shown on Map 7. Many of the species associated with seepage swamps or cool mixed forests such as beech fern (*Phegopteris connectilis*), naked miterwort (*Mitella nuda*), and balsam fir (*Abies balsamea*) are vulnerable to hydrological changes. Nutrient and salt inputs also can affect the wetlands; invasive species such as common reed (*Phragmites australis*) are displacing natives along parts of the seepage wetland adjacent to Dufferin Street.

Habitat fragmentation can lead to increased populations of herbivores such as white-tailed deer (*Odocoileus virginianus*); the Canada yew (*Taxus canadensis*) observed in 1996 is a species often heavily browsed and was not seen in 2009.

Increased human traffic into a natural area results in disturbance caused by trampling and the incursion of invasive species that compete with the existing native flora. Many of the forest floor species, such as wild columbine (*Aquilegia canadensis*), rose twisted-stalk (*Streptopus roseus*), and white-fruited mountain-rice (*Oryzopsis asperifolia*), are prone to these impacts.

All of the 60 flora species of concern are associated with specific vegetation communities; thus, they are highly susceptible to changes in these communities and will not readily recolonize. They score relatively high in *habitat dependence*. Roughly, they are found in seven or fewer vegetation cohorts (groupings of vegetation types with similar floristic characteristics) (TRCA, 2010). Habitat dependence scores for flora are shown on Map 12. The two main groupings of habitat specialists are in the seepage headwater swamps and mature forests (mixed and deciduous). Examples of the former include naked miterwort (*Mitella nuda*), woodland horsetail (*Equisetum sylvaticum*), and swamp buttercup (*Ranunculus hispidus* var. *caricetorum*). Examples of the latter include leatherwood (*Dirca palustris*), broad-leaved sedge (*Carex platyphylla*), maple-leaved viburnum (*Viburnum acerifolium*), and the spring ephemerals broad-leaved spring beauty (*Claytonia caroliniana*), and squirrel-corn (*Dicentra canadensis*).

4.5 Fauna Findings for the Maple Nature Reserve and Adjacent Lands

4.5.1 Fauna Species Representation

The TRCA fauna surveys at the site in 2009 documented a total of 32 bird species, 3 mammals, and 5 herpetofauna species, bringing the total number of possible breeding fauna species identified by the TRCA to 40. This total compares rather unfavourably with other L3 quality sites within the middle and upper reaches of the TRCA jurisdiction such as the Nashville Tract and Boyd Conservation Area. More locally, the patch of forest cover to the west of Dufferin Street, which likewise scores as L3 for total patch score, supports considerably higher numbers of fauna species (40 bird species were recorded in the 2001 inventory). Refer to Appendix 3 for a list of the fauna species in the Maple Nature Reserve and Adjacent Lands and their corresponding L-ranks.

It is also worth considering the results from the GLL surveys conducted in the period 1997 to 2001. Where the areas surveyed by both the TRCA and by GLL coincided, the surveys conducted by GLL did not map as many species of concern (or individual territories) as were mapped by the



more recent TRCA inventory. Within the area of overlap, GLL found just one additional bird species of regional concern – wood duck (*Aix sponsa*). The study area for the earlier surveys conducted by GLL extended to the larger block of forest habitat to the south-east, where several sensitive species were recorded which were not found within the current 2009 study area. Of these species both ovenbird (*Seiurus aurocapillus*) and veery (*Catharus fuscescens*) were also reported from the patch of forest to the west of Dufferin Street surveyed by the TRCA in 2001. The most important avian species mapped by GLL was barred owl (*Strix varia*), observed in both summer 1998 and summer 2001. The presence of this species indicates that the forest habitat was functioning at a particularly high level with respect to fauna. Although the same section of the forest was not surveyed in 2009 it is expected that this species is no longer present within the Block 12 area since this species appears to be particularly sensitive to disturbance and reduction of forest cover.

Perhaps the most significant fauna observation made by GLL within the section of forest surveyed by both GLL and TRCA was that of spotted salamander (*Ambystoma maculatum*) larvae netted in the pond that is located just to the east of the old OMNR buildings (June 13th, 2001). As stated in the Master Environmental Servicing Plan and Environmental Impact Statement (GLL *et al.*, 2001) this species “only occurs where there is high quality upland forest in close proximity to a suitable forest breeding pond”. In the period 1997 to 2001, wood frogs (*Rana sylvatica*) were reported in two ponds within the overlapping study area; an additional breeding pond contained “a high density of wood frog tadpoles” just to the east of the south-eastern corner of the Maple Nature Reserve and Adjacent Lands study area (Castan wetland) in June 2000 and June 2001. Since spring frog surveys were not conducted by the TRCA in 2009, neither of these species was specifically searched for, however wood frogs were observed in summer foraging habitat in three locations throughout the Maple Nature Reserve and Adjacent Lands in May and June, 2009.

None of the additional fauna species reported by GLL have been included in either the mapping or the fauna lists in this report.

4.5.2 Fauna Species of Concern

Fauna species, like vegetation communities and flora species are considered of regional concern if they rank L1 to L3 based on their scores for the seven criteria mentioned in Section 3.2. As the urban landscape continues to envelop and encroach on sites such as the Maple Nature Reserve Lands, it is important to also document the status of L4 species, i.e. those species that are of concern within the urban portions of the region. As with flora, this is a proactive, preventive approach, identifying where conservation efforts need to be made before a species becomes rare.

Fauna surveys at the Maple Nature Reserve and Adjacent Lands reported a total of 14 L1 to L4 bird species including five L3 species. In addition, there were five herpetofauna and two mammal species ranked L1 to L4, bringing the total to 21 fauna species of urban and regional concern. Of these, 12 occur within the Maple Nature Reserve proper. Locations of these breeding fauna are depicted on Map 13. In a similar sized section of forest to the west of Dufferin Street, surveys



conducted in 2001 recorded a total of eight L3 ranked bird species (Table 3); the 2001 survey did not map L4 species.

Table 3: Bird Species compared at two similar size forest blocks at Dufferin and Teston

Species	Scientific name	Maple Nature Reserve and Adjacent Lands (2009)	West of Dufferin (40 hectares section) (2001)
brown creeper	<i>Certhia americana</i>	1	3
black-throated green warbler	<i>Dendroica virens</i>		2
ovenbird	<i>Seiurus aurocapillus</i>		5
pileated woodpecker	<i>Dryocopus pileatus</i>	1	
pine warbler	<i>Dendroica pinus</i>	5	5
scarlet tanager	<i>Piranga olivacea</i>		1
sharp-shinned hawk	<i>Accipiter striatus</i>		1
veery	<i>Catharus fuscescens</i>		1
wild turkey	<i>Meleagris gallopavo</i>	2	
wood thrush	<i>Hylocichla mustelina</i>	2	5
Total # of mapped points		11	23

Local occurrence is one of seven scoring criteria for fauna species and is based on TRCA data and information from the Natural Heritage Information Centre (NHIC) of the OMNR (NHIC, 2008). Using local occurrence as a measure of regional rarity, any species that is reported as a probable or confirmed breeder in fewer than 10 of the 44 10x10 km grid squares in the TRCA jurisdiction is considered regionally rare (i.e. scores three to five points for this criterion) (TRCA, 2010). At the Maple Nature Reserve and Adjacent Lands the 2009 inventory reported just one species of urban and regional concern that is considered regionally rare. This species, northern red-bellied snake (*Storeria occipitomaculata*), is probably somewhat under-recorded within the TRCA jurisdiction since the TNH fauna inventory protocol is geared primarily to birds and frogs. Nevertheless, northern red-bellied snake has been reported from only six locations in the region over the past decade. The GLL survey confirmation of spotted salamander as a breeding species in the Maple Nature Reserve and Adjacent Lands in 2001 was a very significant sighting since the TRCA fauna database shows that this species has been found in only nine grid squares within the region to date. As is the case with flora, most regionally rare fauna species have other associated factors that explain their vulnerability and need to be taken into account in conservation strategies.

Sensitivity to development is another criterion used to determine the L-rank of fauna species. A large number of impacts that result from local land use, both urban and agricultural, can affect the local fauna. These impacts – considered separately from the issue of actual habitat loss – can be divided into two distinct categories. The first category involves changes that arise from local urbanization that directly affect the breeding habitat of the species in question. These changes alter the composition and structure of the vegetation communities; for example, the clearing and



manicuring of the habitat (e.g. by removal of dead wood and clearance of shrub understorey). The second category of impacts involves changes that directly affect individuals of the species in question. Examples include increased predation from an increase in the local population of predator species that thrive alongside human developments (e.g. blue jays, *Cyanocitta cristata*; American crows, *Corvus brachyrhynchos*; squirrels, raccoons and house cats); parasitism (from facilitating the access of brown-headed cowbirds, *Molothrus ater*, a species which prefers more open, edge-type habitat); competition (for nest-cavities with bird species such as house sparrows, *Passer domesticus*; and European starlings, *Sturnus vulgaris*); flushing (causing disturbance and abandonment of nest) and, sensitivity to pesticides.

Fauna species are considered to have a high sensitivity to development if they score three or more points (out of a possible five) for this criterion. At the Maple Nature Reserve and Adjacent Lands, 15 of the species that are ranked L1 to L4 receive this score and are therefore considered sensitive to one or more of the impacts associated with development (see Map 8). These species are currently at this site because until recently, the largely agricultural and natural matrix did not produce any of the negative impacts associated with more urban or suburban matrices. However, currently there is a high degree of intense urban development ongoing on the eastern and southern boundaries of the site. Again, comparison with a survey conducted in 2001 on the neighbouring forest patch to the west of Dufferin Street indicates what the fauna diversity and population may have been until the current development was initiated. The 2001 survey on the land to the west of Dufferin Street reported over 20 species of urban and regional concern that were considered sensitive to development, but perhaps more importantly several of these sensitive species were present in good numbers (e.g. five pairs of ovenbird (*Seiurus aurocapillus*), and five pairs of wood thrush (*Hylocichla mustelina*).

It is important to understand that negative matrix influences are not solely associated with the proximity of urban and suburban developments; many of the negative influences can be transferred deep within an otherwise intact natural matrix by extensive trail networks used by large numbers of people originating from quite distant urban and suburban centres. Extensive public use of a natural habitat can have substantial negative impact through the cumulative effects of hiking, dog-walking and biking on the site. The Maple Nature Reserve Lands have been fairly extensively used by people associated with the day-camp and outdoor education camp, run by the City of Vaughan, located in the southern part of the subject property. This fairly intensive activity may have influenced the current rather low bird diversity and the overall low number of territories held by more sensitive species on the site. Likewise, the more recent advent of a large amount of heavy machinery activity associated with the adjacent residential development would likely have had some impact on sensitive breeding species.

Many of the bird species that might be expected to occur in such an extensive patch of forest nest low in the ground vegetation and as such are highly susceptible both to increased predation from ground-foraging predators that are subsidized by local residences (house cats, raccoons) and to repeated flushing from the nest (by pedestrians, off-trail bikers and dogs) resulting in abandonment and failed breeding attempts. Such sensitive bird species include ovenbird, veery and American woodcock all of which were reported as holding territories in the forest patch to the



west of Dufferin Street in 2001 but all of which were apparently absent from the Maple Nature Reserve and Adjacent Lands in 2009. There were however, two sightings of wild turkey (*Meleagris gallopavo*) on the Maple Nature Reserve and Adjacent Lands in 2009. This is a ground-nesting and ground-foraging species and as such is sensitive to disturbance, but it is also a species that is apt to wander considerable distances once the young have left the nest, and as such its presence in the study area in late June may not indicate on-site nesting.

Various studies have shown that many bird species react negatively to human intrusion (i.e. the mere presence of people) to the extent that nest-abandonment and decreased nest-attentiveness lead to reduced reproduction and survival. One example of such a study showed that abundance was 48% lower for hermit thrushes (a ground-nesting/foraging species) in intruded sites than in the control sites (Gutzwiller and Anderson, 1999). Elsewhere, a recent study reported that dog-walking in natural habitats caused a 35% reduction in bird diversity and a 41% reduction in abundance, with even higher impacts on ground-nesting species (Banks and Bryant, 2007).

The tendency for local urbanization to be accompanied by the tidying and manicuring of woodlands and thickets in the vicinity (removal of dead wood, clearance of leaf-litter, control of understorey shrub growth) dramatically disrupts any species that is dependent on such cover for nesting or foraging. Several such species that might be expected to breed at the subject site such as grey catbird (*Dumetella carolinensis*) and mourning warbler (*Oporornis philadelphia*) were not reported during the 2009 inventory.

Area sensitivity is a scoring criterion that can be closely related to the issue of a species' need for isolation. Fauna species are scored for area sensitivity based on their requirement for a certain minimum size of preferred habitat. Species that require large tracts of habitat (> 100 hectares in total) score the maximum five points, while species that either show no minimum habitat requirement, or require < 1 hectare in total, score one point. Species scoring three points or more (require 5+ hectares in total) are deemed area sensitive species. Researchers have shown that for some species of birds, area sensitivity is a rather fluid factor, dependent and varying inversely with the overall percentage forest cover within the landscape surrounding the site where those species are found (Rosenburg *et al.*, 1999).

Species' patch-size constraints are due to a variety of factors including foraging requirements and the need for isolation within a habitat block during nesting. In the latter case, regardless of the provision of a habitat patch of sufficient size, if that block is seriously and frequently disturbed by human intrusion such species will be liable to abandon the site. Such a variety of habitat needs are more likely satisfied within a larger extent of natural cover. The Maple Nature Reserve and Adjacent Lands comprise approximately 40 hectares of a larger 70-hectare forest patch. Eleven of the fauna species of urban and regional concern that were identified on the Maple Nature Reserve and Adjacent Lands are considered area sensitive; of these there are three species that require in excess of 20 hectares: pileated woodpecker (*Dryocopus pileatus*), wild turkey (*Meleagris gallopavo*), and pine warbler (*Dendroica pinus*).



It should be noted here that the concept of interior forest is tied very closely to *area sensitivity*. Referring to Map 6, it is clear that the forest patch to the west of Dufferin Street has considerably more interior forest habitat than is available at the Maple Nature Reserve and Adjacent Lands. This difference no doubt plays a part in explaining why the diversity and population of sensitive forest fauna is so much higher in the forest block west of Dufferin Street. Likewise, the forest patch to the south-east of the current study area has a large area of interior forest (see Map 6), and this again may be part of the reason why the majority of sensitive forest species mapped by GLL were restricted to this more southerly portion of the Block 12 forest .

Patch isolation sensitivity in fauna measures the overall response of fauna species to fragmentation and isolation of habitat patches. One of the two main aspects of this scoring criterion is the physical ability or the predisposition of a species to move about within the landscape and is related to the connectivity of habitat within a landscape. The second main aspect is the potential impact that roads have on fauna species that are known to be mobile. Thus most bird species score fairly low for this criterion (although they prefer to forage and move along connecting corridors) whereas many herpetofauna score very high (since their life cycle requires them to move between different habitat types which may increase likelihood of roadkill). One example of how this criterion affects species populations is the need for adult birds to forage for food during the nestling and fledgling stage of the breeding season. By maintaining and improving the connectivity of natural cover within the landscape (e.g. by reforestation of intervening lands) we are able to positively influence the populations of such species, improving their foraging and dispersal potential.

Seven of the species of urban or regional concern that were inventoried for the study area scored three or more points for this criterion. The majority of these species are herpetofauna, including the L2 ranked wood frog and L3 ranked northern leopard frog (*Rana pipiens*). These two species, together with the spotted salamanders found by GLL, are particularly mobile during the course of their life-cycle: wood frogs and spotted salamanders undertake annual migrations to and from local breeding ponds, while leopard frogs utilize a fairly large terrestrial foraging range during their non-breeding period. All three species are therefore particularly susceptible to fragmentation of the various habitat types that they require for completing their life-cycles. Care should be taken to maintain safe passages and habitat corridors between habitat patches. The study area is surrounded by relatively busy roads which, to some extent, result in isolation of sensitive species within this block. However, the natural habitat within this block is still fairly extensive and the species are persisting because the species' habitat needs are met within that block.

Fauna species that score greater than three points under the **habitat dependence** criterion are considered habitat specialists (see Map 14). These species exhibit a combination of very specific habitat requirements that range from their microhabitat (e.g. decaying logs, aquatic vegetation) and requirements for particular moisture conditions, vegetation structure or spatial landscape structures, to preferences for certain community series and macro-habitat types. Four of the fauna species that occur in the Maple Nature Reserve and Adjacent Lands are considered habitat specialists: three bird species (pileated woodpecker, wild turkey and pine warbler) and one herptile species, the wood frog. This latter species is considered habitat dependent due to its



absolute need for a combination of both upland foraging habitat and wetland breeding habitat. The three bird species show a common requirement for relatively extensive mature forest.

Representation is essentially the presence or absence of a species at a site. However, beyond mere representation of single species is the idea that a natural system can be considered as a healthy functioning system if there is an association of several species thriving within that system. Each habitat type supports particular species associations. As the quality of the habitat patch improves so will the representation of flora and fauna species within that habitat. In this way representation biodiversity is an excellent measure of the health of a natural system.

Despite the presence of the three habitat sensitive species - pine warbler, wild turkey and pileated woodpecker – several associated species that are likewise dependent on extensive mature forest are absent, e.g. ovenbird and black-throated green warbler (*Dendroica virens*). Such species associations were very much in evidence in the neighbouring forest block to the west of Dufferin Street when that site was surveyed in 2001. The GLL surveys conducted in the Maple Nature Reserve Lands in the years 1998, 2000 and 2001 suggest that these species were not present in this northern section of the forest (although these species were reported in low numbers in the forest further to the south-east). Their absence from the site in 2009 (and during the earlier GLL surveys) despite the maintenance of the extensive mature forest suggests that some other factor is influencing the fauna diversity on site. It is possible that topography of the site is a limiting factor since a large proportion of the forest sits on a steep ravine slope which is perhaps less conducive to the nesting of species such as ovenbird, however, the absence of species, as illustrated in the comparison with the site to the west of Dufferin Street, points to additional factors.

5.0 Recommendations

The recommendations for the Maple Nature Reserve and Adjacent Lands are given in relation to the regional targets for natural heritage in the TRCA jurisdiction. To reach the regional targets for quality distribution and quantity of natural cover, every site within the TRCA jurisdiction will require its own individualized plan of action. Following is a short summary of the study area highlights, followed by specific recommendations. Finally, there is a set of recommendations that apply to current trail proposals and the quonset hut restoration site at the south end adjacent to the amphibian breeding ponds.

5.1 Study Area Highlights

- Major source region for the Don River and connection of the Don watershed to the Oak Ridges Moraine and its natural heritage system
- Three hundred and seventy eight naturally-occurring flora species observed, sixty of which are of regional concern
- Six regionally-rare plants found, including a new record for the TRCA jurisdiction: grove chickweed
- Mature deciduous and mixed forests on the valley slopes with diverse ground cover
- Seepage headwater swamps in the bottomland, and two ephemeral ponds to the south



- Plantations comprise a high-quality arboretum with numerous tree genotypes documented
- Invasive species infestations include dog-strangling vine and bittersweet in the eastern dry valley, common reed beside Dufferin Street, and a few patches of lily-of-the valley, goutweed, and periwinkle in some of the plantations and forest edge
- Total of 40 vertebrate fauna species observed
- One regionally rare vertebrate fauna species found – northern red-bellied snake
- Archival report of spotted salamander breeding on site is very significant (GLL *et al.*, 2001)
- Ponds at southern end of site supported healthy wood frog populations as recently as 2001 (GLL *et al.*, 2001)
- Five pairs of pine warbler distributed through the site
- Site ranks as “fair” for habitat patch total score
- 42.96 hectares of natural cover present (0.73% of Don watershed natural cover)
- Fauna species of regional concern, ranked L1 to L3, are under-represented, given the quality and extent of forest habitat on the site

5.2 Study Area Recommendations

Recommendations concerning management or stewardship that apply to lands adjacent to the Maple Nature Reserve are intended to identify opportunities for improving the ecological functions of the whole natural feature, of which the Maple Nature Reserve is a significant part. Some of the following recommendations are already embedded in the MESP document and are included here – with updates, to re-iterate the importance of such management. Recommendations are organized according to the objectives of the study stated in the Introduction.

Protect and Maximize Contribution of Maple Nature Reserve to Wider Natural System

Recommendations based on this objective address the landscape ecology indicators of patch size/shape and matrix influence, as well as connections to the larger system.

Optimize Patch Size and Shape, Forest Interior

The more that natural cover is retained at the study area and vicinity, the better it can support a healthy level of biodiversity. The increase of natural cover through strategic plantings and restoration will improve the patch size and shape and facilitate in reducing negative matrix influences. Restoration of the quonset hut site together with increasing forest along the east edge of the Maple Nature Reserve will result in a significant increase in patch size and forest interior (GLL *et al.*, 2001).

- The open meadow at the extreme south-east corner of the study area (part of adjacent lands – see Map 2) should be restored to forest in order to improve the forest patch size, and also to create a secure connection between the forest and the Castan wetland, which is being relocated on site as recommended by the MESP (GLL *et al.*, 2001).



- Timing of any restoration work at the Maple Nature Reserve or adjacent lands needs to be planned so as to accommodate seasonal amphibian movements; this is especially critical in the proposed enhancement project at the quonset hut site as well as the relocation of the Castan wetland habitat.
- The strip of disturbed successional habitat toward the north-east corner of the site should be restored with the appropriate forest cover, thereby considerably increasing the size of forest habitat and providing a larger area of forest interior. Control of dog-strangling vine and Asiatic bittersweet will be a necessary part of reforestation here. A combination of thorough digging and spot herbicide application might be most effective (TRCA, 2008).

Minimize Negative Matrix Influence

The larger a habitat block, the more resilient the associated fauna and flora communities are to developments within the landscape or to increased user pressure. With the establishment of extensive high density residential developments right up against the eastern and southern edges of this forest block the increase in negative matrix influence is going to be enormous. The negative matrix influence that is typically associated with residential development include a considerable increase in the number of subsidized predators (free-roaming domestic cats, raccoons, opossums, rats, blue jays, red squirrels and eastern chipmunks) that will take a heavy toll on local bird nests. In addition, there is usually a high degree of forest floor disturbance from various human activities such as the creation of bike-courses, forts and paint-ball arenas. Following this type of impact there is quite often an increase in the spread and populations of invasive non-native plant species which dramatically alter the vegetative composition of the forest.

- The only possible way in which to address these issues – and they need to be addressed as early as possible – is through a campaign of education and awareness, seeking to instil values of responsible natural heritage stewardship in the new local residents and in visitors to the forest.
- Invasive species present on site should be removed, with Asiatic bittersweet, dog-strangling vine, and common reed being the most urgent issues.
- Invasive species management should also be part of specific projects such as the trail design and quonset hut restoration project (see below for details).
- Issues of trail design are addressed under Site-Specific Advice below.

Improve Connectivity to Nearby Habitat

Connectivity to the larger portions of the Oak Ridges Moraine terrestrial natural heritage system is severely compromised by Dufferin Street and Teston Rd. Suburban development also contributes to fragmentation of habitat within Block 12, including to the adjacent Castan wetland.



- A viable connection between wood frog summer/winter habitat on site and the breeding pond (Castan wetland) just off-site needs to be maintained.
- Opportunities for dispersal of flora and fauna across Dufferin Street and Teston Rd., including amphibian tunnels, should be pursued (at least whenever the next round of road work is anticipated). These tunnels should be designed to prevent road kill of amphibians, i.e. they should be equipped with retaining walls to funnel migrating amphibians away from the road surface and toward the tunnels and should lead at both ends into suitable habitat for migration and foraging.

The more natural cover retained at the study area and vicinity, the better it can support a healthy level of biodiversity, but only if the public use of the area is properly managed.

Site-specific Advice Regarding Trail Realignment and Restoration Activities

Two initiatives are underway at the Maple Nature Reserve: the construction of a trail system and an ecological restoration project at the quonset hut site at the south end of the former OMNR office complex and beside the amphibian breeding pond. The following are recommendations based upon site visits and discussions with staff from the City of Vaughan and TRCA that addressed these particular proposals.

Trail Design Should Minimize Impacts to Natural System

- Trail system should avoid the most sensitive area within the site - the forest in the vicinity of the wetland to the east of the old quonset buildings. There are currently no trails planned in this area (including the valleylands south of the Maple Nature Reserve), which should remain as a natural core area.
- One proposed trail alignment was to cut through a sensitive area of valley slope forest with leatherwood and other flora of concern; this route had been proposed due to timing of land securement issues. The favoured alternative alignment which stays in the open land adjacent to the forest should be ensured, even if it means some delay in implementation.
- The existing side trail up the bottomland north of the buildings that is currently used by the day camp should remain a cul-de-sac with limited traffic.
- As discussed with Vaughan staff, one trail closure involves placing a “post and wire” type of fence along a section of the top-of-slope to prevent intrusions and the creation of informal trails through the mature forest with its sensitive habitat. The page-wire fence proposed should not be a wildlife barrier.
- The proposed trail going west from the quonset hut site across the East Don should follow the existing trail and bridge site to avoid disturbing any new areas; when the bridge is



replaced, there should be a boardwalk with footings set back from the stream bank. Sediment controls will be needed during construction.

- Trail design for the site should strive to avoid the creation of “dead-zones”, areas where trails run so close to each other that the intervening natural habitat cannot accommodate any fauna species.
- Trail system should be a simple loop trail with an absolute minimum of side loops and switch-backs. This is the ideal design for moving people through a forest patch with minimal disturbance to the native fauna and flora, directly effecting as little natural habitat as possible.
- Conspicuous interpretive signs should request hikers to keep dogs on-leash.
- Trail re-design should ensure that the forest canopy remains closed so as not to introduce changes in the forest microclimate (drying of the forest floor will negatively impact foraging amphibians). Asphalt should not be used.
- Limestone screenings can alter soil chemistry and encourage invasive species. Bare soil, brick chips, or wood chips are the preferred trail surfaces.
- Access to the forest should be restricted to designated trail-head locations and official access points. Measures should be taken to close any informal entrances to the forest as soon as they are discovered.
- Informal trails should be closed and discontinued as soon as they appear.
- The trail system should be re-designed for hikers only, with no cycling allowed (to protect amphibians and other slow-moving forest fauna).
- Areas disturbed by any work should be planted with competitive native species such as May-apple (*Podophyllum peltatum*), bloodroot (*Sanguinaria canadensis*), and touch-me-not (*Impatiens capensis*) to prevent invasions, especially by garlic mustard.

Maximize Benefits from Quonset Hut Restoration Project

- The quonset hut site restoration work must protect the existing amphibian pond just to the east. Design and construction of the habitat restoration needs to protect the existing hydrological regime.
- Construction work involving viewing platforms and trail loops should be restricted to the existing footprint of the quonset hut building and associated parking lot. Even the construction of new habitat features may disrupt existing delicate habitats. It is particularly



important that disturbance be kept away from the forest to the north and east of the site as well as the pond itself.

- The invasive shrubs and trees tagged by TRCA staff (with yellow paint) in August 2009 should be removed prior to construction to prevent their opportunistic colonization of the new habitat.
- Any fill, topsoil, soil amendment, and wood chips imported to the site should be verified as free of weed seed. Wood chips should be composted so as to be free of weed seed. Lighter-textured, sandy loam topsoil is to be favoured over heavier, nutrient-rich material.
- Follow-up monitoring and removal of invasive species in restoration areas will be needed indefinitely. It is especially critical during the first 3-4 years, when it will need to be done twice yearly.
- Species selected for the quonset hut site (and elsewhere on the property) should be derived from local sources and match those already existing in the vicinity. **Please refer to Appendix 4 for a recommended species list.**
- A snake hibernaculum should be installed with help and advice from TRCA. This hibernaculum should be located in the vicinity of the quonset hut site as part of restoration work at the south end of the site, providing alternative hibernating opportunities.

Additional Considerations

A few further research questions should be addressed that were beyond the scope and / or timing of this survey.

- The presence of spotted salamander should be considered in the management of the property. With this in mind, it is suggested that a full assessment of the status of amphibian species in the area, particularly *Ambystoma* salamanders, be undertaken.
- It would be beneficial to revive the breeding bird transect/point counts established by GLL – although the original route was probably downstream of the actual Maple Nature Reserve area.
- Plantation areas should be preserved as an arboretum with invasive species removed and tree labels kept intact or replaced where needed as recommended by Hough and GLL (1997) and Miladinovic (1999). Propagules from these trees should be made available for research and conservation purposes including recovery plans.



6.0 References

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Appendix 1: List of Vegetation Communities - Maple Nature Reserve (former MNR lands) and Adjacent Area

ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	area # ha	Local Occur.	Geophy. Requir.	Total Score	Local Rank (2009-03)
Forest						
FOC4-A	Fresh-Moist White Cedar - White Pine Coniferous Forest	0.5	3.0	2.0	5.0	L3
FOM2-2	Dry-Fresh White Pine - Sugar Maple Mixed Forest	1.3	2.5	1.0	3.5	L4
FOM3-2	Dry-Fresh Hemlock - Sugar Maple Mixed Forest	0.3	2.5	2.0	4.5	L4
FOM6-1	Fresh-Moist Sugar Maple - Hemlock Mixed Forest	6.0	1.5	2.0	3.5	L4
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest	5.5	1.0	0.0	1.0	L5
FOD5-2	Dry-Fresh Sugar Maple - Beech Deciduous Forest	2.7	1.5	0.0	1.5	L5
FOD5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest	0.2	1.5	2.0	3.5	L4
FOD6-1	Fresh-Moist Sugar Maple - Ash Deciduous Forest	1.6	2.0	0.0	2.0	L5
FOD7-F	Fresh-Moist Basswood Lowland Deciduous Forest	0.1	3.0	1.0	4.0	L4
FOD8-1	Fresh-Moist Poplar Deciduous Forest	0.3	1.0	0.0	1.0	L5
CUP1-4	Hybrid Poplar Deciduous Plantation	6.8	3.0	0.0	3.0	L5
CUP1-c	Black Locust Deciduous Plantation	0.5	2.5	0.0	2.5	L+
CUP2-E	Silver Maple - Conifer Mixed Plantation	0.1	3.5	0.0	3.5	L5
CUP2-f	Hybrid Poplar - Conifer Mixed Plantation	0.6	3.5	0.0	3.5	L5
CUP2-G	Ash - Conifer Mixed Plantation	1.1	3.5	0.0	3.5	L5
CUP2-h	Horticultural Mixed Plantation	0.2	3.5	0.0	3.5	L+
CUP3-1	Red Pine Coniferous Plantation	1.2	1.5	0.0	1.5	L5
CUP3-2	White Pine Coniferous Plantation	0.8	1.5	0.0	1.5	L5
CUP3-3	Scotch Pine Coniferous Plantation	0.04	2.0	0.0	2.0	L+
CUP3-C	White Spruce Coniferous Plantation	0.1	2.0	0.0	2.0	L5
CUP3-D	Black Spruce Coniferous Plantation	0.1	4.0	0.0	4.0	L5
CUP3-e	Norway Spruce Coniferous Plantation	0.1	2.5	0.0	2.5	L+
CUP3-H	Mixed Conifer Coniferous Plantation	3.1	1.5	0.0	1.5	L5
Successional						
*CUT1-5	Raspberry Deciduous Thicket		3.0	0.0	3.0	L4
CUT1-c	Exotic Deciduous Thicket	0.4	2.0	0.0	2.0	L+
CUH1-A	Treed Hedgerow	0.1	1.5	0.0	1.5	L5
CUS1-A1	Native Deciduous Successional Savannah	0.3	1.5	0.0	1.5	L5
CUS1-b	Exotic Successional Savannah	0.8	1.5	0.0	1.5	L+

Appendix 1: List of Vegetation Communities - Maple Nature Reserve (former MNR lands) and Adjacent Area

ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	area # ha	Local Occur.	Geophy. Requir.	Total Score	Local Rank (2009-03)
*CUW1-A3	Native Deciduous Successional Woodland		1.5	0.0	1.5	L5
CUW1-D	Hawthorn Successional Woodland	0.8	2.5	0.0	2.5	L5
Wetland						
SWM1-1	White Cedar - Hardwood Mineral Mixed Swamp	1.8	2.0	2.0	4.0	L4
SWM4-1	White Cedar - Hardwood Organic Mixed Swamp	1.0	2.0	3.0	5.0	L3
SWD2-2	Red (Green) Ash Mineral Deciduous Swamp	0.04	2.5	2.0	4.5	L4
MAM2-a	Common Reed Mineral Meadow Marsh	0.1	3.0	0.0	3.0	L+
MAS2-1A	Broad-leaved Cattail Mineral Shallow Marsh	0.1	2.0	1.0	3.0	L4
MAS2-9	Forb Mineral Shallow Marsh	0.04	3.0	1.0	4.0	L4
Aquatic						
OAO1-T	Turbid Open Aquatic (disturbed unvegetated)	0.1	2.0	0.0	2.0	L+
Meadow						
CUM1-A	Native Forb Meadow	3.3	1.5	0.0	1.5	L5
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	0.1	1.0	0.0	1.0	L+
CUM1-c	Exotic Forb Meadow	1.8	1.5	0.0	1.5	L+

Appendix 2: Maple Nature Reserve and Adjacent Lands Flora Species (2009)		Local	Popn.	Hab.	Sens.	Total	Rank	L1-L3 in
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Reserve
		1-5	1-5	0-5	0-5	2-20	(03/2009)	Proper
<i>Carex garberi</i>	Garber's sedge	5	4	5	4	18	L2	
<i>Moehringia lateriflora</i>	grove stitchwort	5	3	5	4	17	L2?	
<i>Picea mariana</i>	black spruce	4	4	5	5	18	L2	
<i>Abies balsamea</i>	balsam fir	2	3	4	5	14	L3	
<i>Alnus incana</i> ssp. <i>rugosa</i>	speckled alder	2	4	4	5	15	L3	
<i>Anemone acutiloba</i>	sharp-lobed hepatica	2	4	4	5	15	L3	
<i>Aquilegia canadensis</i>	wild columbine	2	4	3	5	14	L3	
<i>Aralia racemosa</i> ssp. <i>racemosa</i>	spikenard	2	4	4	4	14	L3	
<i>Aster laevis</i> var. <i>laevis</i>	smooth aster	5	4	4	2	15	L3	
<i>Cardamine concatenata</i>	cut-leaved toothwort	2	3	5	4	14	L3	
<i>Carex albursina</i>	white bear sedge	2	3	5	4	14	L3	
<i>Carex alopecoidea</i>	foxtail wood sedge	2	3	5	4	14	L3	
<i>Carex backii</i>	Back's sedge	4	3	4	4	15	L3	
<i>Carex cephalophora</i>	oval-headed sedge	3	3	4	4	14	L3	
<i>Carex disperma</i>	two-seeded sedge	2	3	5	4	14	L3	
<i>Carex hitchcockiana</i>	Hitchcock's sedge	3	3	5	3	14	L3	
<i>Carex interior</i>	fen star sedge	2	4	4	4	14	L3	
<i>Carex laevivaginata</i>	smooth-sheathed sedge	2	4	4	4	14	L3	
<i>Carex leptonevia</i>	few-nerved wood sedge	2	4	4	4	14	L3	
<i>Carex platyphylla</i>	broad-leaved sedge	3	4	4	3	14	L3	
<i>Claytonia caroliniana</i>	broad-leaved spring beauty	2	4	5	5	16	L3	
<i>Cystopteris tenuis</i>	Mackay's fragile fern	2	4	5	5	16	L3	
<i>Desmodium glutinosum</i>	pointed-leaved tick-trefoil	3	4	4	5	16	L3	
<i>Dicentra canadensis</i>	squirrel-corn	2	4	5	4	15	L3	
<i>Dirca palustris</i>	leatherwood	3	4	5	4	16	L3	
<i>Dryopteris clintoniana</i>	Clinton's wood fern	2	4	5	4	15	L3	
<i>Equisetum scirpoides</i>	dwarf scouring-rush	2	4	5	5	16	L3	
<i>Equisetum sylvaticum</i>	woodland horsetail	2	3	5	4	14	L3	
<i>Galium boreale</i>	northern bedstraw	4	4	4	3	15	L3	
<i>Gymnocarpium dryopteris</i>	oak fern	2	3	5	5	15	L3	
<i>Hamamelis virginiana</i>	witch-hazel	2	4	4	4	14	L3	
<i>Juglans cinerea</i>	butternut	1	5	4	4	14	L3	
<i>Lemna trisulca</i>	star duckweed	2	4	5	3	14	L3	
<i>Lobelia inflata</i>	Indian tobacco	3	4	4	4	15	L3	
<i>Lonicera canadensis</i>	fly honeysuckle	2	4	4	4	14	L3	
<i>Lonicera dioica</i>	wild honeysuckle	3	4	4	4	15	L3	
<i>Medeola virginiana</i>	Indian cucumber-root	2	5	4	5	16	L3	
<i>Mitella diphylla</i>	mitrewort	2	3	4	5	14	L3	
<i>Mitella nuda</i>	naked mitrewort	2	4	5	5	16	L3	
<i>Monotropa hypopithys</i>	pinemap	2	4	5	5	16	L3	
<i>Monotropa uniflora</i>	Indian-pipe	2	4	5	5	16	L3	
<i>Oryzopsis asperifolia</i>	white-fruited mountain-rice	2	4	4	5	15	L3	
<i>Phegopteris connectilis</i>	northern beech fern	3	3	5	5	16	L3	
<i>Picea glauca</i>	white spruce	1	5	4	4	14	L3	
<i>Polystichum acrostichoides</i>	Christmas fern	1	3	5	5	14	L3	
<i>Prenanthes alba</i>	white wood lettuce	3	4	4	3	14	L3	
<i>Pyrola elliptica</i>	shinleaf	2	4	4	4	14	L3	
<i>Ranunculus hispidus</i> var. <i>caricetorum</i>	swamp buttercup	3	4	4	3	14	L3	
<i>Ribes triste</i>	swamp red currant	2	4	4	5	15	L3	
<i>Stellaria longifolia</i>	long-leaved chickweed	3	3	4	4	14	L3	
<i>Streptopus roseus</i>	rose twisted-stalk	2	4	4	5	15	L3	
<i>Symphoricarpos albus</i> var. <i>albus</i>	eastern snowberry	3	4	4	5	16	L3	
<i>Taxus canadensis</i>	Canada yew	2	4	4	5	15	L3	
<i>Uvularia grandiflora</i>	large-flowered bellwort	1	4	5	5	15	L3	
<i>Viburnum acerifolium</i>	maple-leaved viburnum	2	3	4	5	14	L3	
<i>Viola blanda</i>	sweet white violet	3	4	4	3	14	L3	
<i>Viola cucullata</i>	marsh blue violet	3	3	4	4	14	L3	
<i>Acer rubrum</i>	red maple	2	4	1	5	12	L4	
<i>Acer spicatum</i>	mountain maple	2	3	4	4	13	L4	
<i>Actaea pachypoda</i>	white baneberry	2	3	4	3	12	L4	
<i>Allium tricoccum</i>	wild leek	1	3	4	4	12	L4	
<i>Amelanchier arborea</i>	downy serviceberry	3	2	4	3	12	L4	
<i>Antennaria howellii</i> ssp. <i>howellii</i>	Howell's pussytoes	4	2	3	3	12	L4	
<i>Apocynum androsaemifolium</i>	spreading dogbane	2	3	2	4	11	L4	
<i>Asarum canadense</i>	wild ginger	2	3	4	3	12	L4	
<i>Aster macrophyllus</i>	big-leaved aster	2	3	2	4	11	L4	
<i>Betula alleghaniensis</i>	yellow birch	1	4	3	5	13	L4	
<i>Betula papyrifera</i>	paper birch	1	4	2	4	11	L4	

Appendix 2: Maple Nature Reserve and Adjacent Lands Flora Species (2009)		Local	Popn.	Hab.	Sens.	Total	Rank	L1-L3 in
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Reserve
		1-5	1-5	0-5	0-5	2-20	(03/2009)	Proper
<i>Caltha palustris</i>	marsh marigold	2	4	3	4	13	L4	
<i>Cardamine diphylla</i>	broad-leaved toothwort	2	3	4	4	13	L4	
<i>Cardamine pensylvanica</i>	bitter cress	3	2	4	4	13	L4	
<i>Carex arctata</i>	nodding wood sedge	2	4	2	3	11	L4	
<i>Carex aurea</i>	golden-fruited sedge	2	2	4	4	12	L4	
<i>Carex communis</i>	fibrous-rooted sedge	2	4	3	3	12	L4	
<i>Carex deweyana</i>	Dewey's sedge	2	4	3	3	12	L4	
<i>Carex hystericina</i>	porcupine sedge	2	3	2	5	12	L4	
<i>Carex laxiflora</i>	loose-flowered sedge	3	3	4	3	13	L4	
<i>Carex peckii</i>	Peck's sedge	3	3	4	3	13	L4	
<i>Carex pedunculata</i>	early-flowering sedge	2	3	3	3	11	L4	
<i>Carex pensylvanica</i>	Pennsylvania sedge	2	4	3	4	13	L4	
<i>Carex projecta</i>	necklace sedge	3	2	4	3	12	L4	
<i>Carex pseudo-cyperus</i>	pseudocyperus sedge	2	3	3	4	12	L4	
<i>Carex scabrata</i>	rough sedge	2	3	4	3	12	L4	
<i>Carex sparganioides</i>	bur-reed sedge	2	2	5	2	11	L4	
<i>Carex tenera</i>	straw sedge	2	3	3	3	11	L4	
<i>Carya cordiformis</i>	bitternut hickory	2	4	4	2	12	L4	
<i>Caulophyllum giganteum</i>	long-styled blue cohosh	2	3	4	4	13	L4	
<i>Cornus rugosa</i>	round-leaved dogwood	2	4	4	3	13	L4	
<i>Corylus cornuta</i>	beaked hazel	2	4	3	4	13	L4	
<i>Crataegus macracantha</i>	long-spined hawthorn	2	2	4	3	11	L4	
<i>Cystopteris bulbifera</i>	bulblet fern	2	3	4	4	13	L4	
<i>Diervilla lonicera</i>	bush honeysuckle	2	3	2	4	11	L4	
<i>Dryopteris intermedia</i>	evergreen wood fern	2	4	4	3	13	L4	
<i>Dryopteris marginalis</i>	marginal wood fern	2	3	3	4	12	L4	
<i>Epifagus virginiana</i>	beechnut	2	3	5	2	12	L4	
<i>Eupatorium perfoliatum</i>	boneset	1	3	4	3	11	L4	
<i>Fagus grandifolia</i>	American beech	1	4	3	4	12	L4	
<i>Fraxinus nigra</i>	black ash	2	4	4	3	13	L4	
<i>Galium aparine</i>	cleavers	3	3	4	2	12	L4	
<i>Glyceria grandis</i>	tall manna grass	2	3	4	2	11	L4	
<i>Juncus effusus</i> ssp. <i>solutus</i>	soft rush	2	4	4	3	13	L4	
<i>Lycopus americanus</i>	cut-leaved water-horehound	2	4	3	3	12	L4	
<i>Lycopus uniflorus</i>	northern water-horehound	2	3	3	3	11	L4	
<i>Maianthemum canadense</i>	Canada mayflower	1	4	1	5	11	L4	
<i>Monarda fistulosa</i>	wild bergamot	3	3	2	3	11	L4	
<i>Myosotis laxa</i>	smaller forget-me-not	2	4	3	4	13	L4	
<i>Pinus strobus</i>	white pine	1	4	3	4	12	L4	
<i>Polygonatum pubescens</i>	downy Solomon's seal	2	4	2	5	13	L4	
<i>Populus grandidentata</i>	large-toothed aspen	2	3	4	3	12	L4	
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	heal-all (native)	4	2	3	2	11	L4	
<i>Pteridium aquilinum</i> var. <i>latiusculum</i>	eastern bracken	2	4	2	4	12	L4	
<i>Quercus rubra</i>	red oak	1	4	2	4	11	L4	
<i>Rorippa palustris</i> cf. ssp. <i>fernaldiana</i>	Fernald's marsh cress	3	2	4	2	11	L4	
<i>Rosa blanda</i>	smooth wild rose	2	3	3	4	12	L4	
<i>Rubus pubescens</i>	dwarf raspberry	2	3	3	5	13	L4	
<i>Rudbeckia hirta</i>	black-eyed Susan	1	4	4	3	12	L4	
<i>Salix amygdaloides</i>	peach-leaved willow	2	2	5	3	12	L4	
<i>Salix bebbiana</i>	Bebb's willow	2	3	3	4	12	L4	
<i>Salix discolor</i>	pussy willow	2	3	4	3	12	L4	
<i>Scirpus microcarpus</i>	barber-pole bulrush	2	2	4	3	11	L4	
<i>Scirpus validus</i>	soft-stemmed bulrush	2	2	5	3	12	L4	
<i>Solidago rugosa</i> ssp. <i>rugosa</i>	rough-stemmed goldenrod	3	3	2	3	11	L4	
<i>Thuja occidentalis</i>	white cedar	1	4	1	5	11	L4	
<i>Tiarella cordifolia</i>	foam-flower	1	3	3	4	11	L4	
<i>Trillium erectum</i>	red trillium	1	4	3	5	13	L4	
<i>Trillium grandiflorum</i>	white trillium	1	3	4	5	13	L4	
<i>Tsuga canadensis</i>	eastern hemlock	1	4	3	5	13	L4	
<i>Typha latifolia</i>	broad-leaved cattail	1	4	4	4	13	L4	
<i>Veronica americana</i>	American speedwell	2	3	4	4	13	L4	
<i>Acer saccharum</i> ssp. <i>saccharum</i>	sugar maple	1	3	0	2	6	L5	
<i>Achillea millefolium</i> ssp. <i>lanulosum</i>	woolly yarrow	2	2	0	1	5	L5	
<i>Actaea rubra</i>	red baneberry	2	3	1	3	9	L5	
<i>Agrimonia gryposepala</i>	agrimony	2	2	0	2	6	L5	
<i>Alisma plantago-aquatica</i>	water-plantain	2	2	4	2	10	L5	
<i>Ambrosia artemisiifolia</i>	common ragweed	2	1	3	0	6	L5	
<i>Amphicarpaea bracteata</i>	hog-peanut	2	2	2	2	8	L5	

Appendix 2: Maple Nature Reserve and Adjacent Lands Flora Species (2009)		Local	Popn.	Hab.	Sens.	Total	Rank	L1-L3 in
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Reserve
		1-5	1-5	0-5	0-5	2-20	(03/2009)	Proper
<i>Anemone virginiana</i>	common thimbleweed	2	3	0	3	8	L5	
<i>Aralia nudicaulis</i>	wild sarsaparilla	2	3	1	4	10	L5	
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	1	3	2	3	9	L5	
<i>Asclepias syriaca</i>	common milkweed	2	2	0	2	6	L5	
<i>Aster cordifolius</i>	heart-leaved aster	2	1	0	2	5	L5	
<i>Aster ericoides</i> ssp. <i>ericoides</i>	heath aster	2	1	2	1	6	L5	
<i>Aster lanceolatus</i> ssp. <i>lanceolatus</i>	panicled aster	1	2	3	1	7	L5	
<i>Aster lateriflorus</i> var. <i>lateriflorus</i>	calico aster	2	2	3	2	9	L5	
<i>Aster novae-angliae</i>	New England aster	1	2	2	1	6	L5	
<i>Aster puniceus</i> var. <i>puniceus</i>	swamp aster	2	2	2	2	8	L5	
<i>Athyrium filix-femina</i> var. <i>angustum</i>	northeastern lady fern	2	3	1	3	9	L5	
<i>Bidens cernuus</i>	nodding bur-marigold	2	2	3	3	10	L5	
<i>Bidens frondosus</i>	common beggar's-ticks	2	1	4	0	7	L5	
<i>Carex blanda</i>	common wood sedge	2	2	1	2	7	L5	
<i>Carex cristatella</i>	crested sedge	2	2	4	1	9	L5	
<i>Carex granularis</i>	meadow sedge	2	2	1	3	8	L5	
<i>Carex radiata</i>	straight-styled sedge	2	2	2	2	8	L5	
<i>Carex rosea</i>	curly-styled sedge	2	2	3	2	9	L5	
<i>Carex stipata</i>	awl-fruited sedge	2	3	2	3	10	L5	
<i>Carex vulpinoidea</i>	fox sedge	2	2	4	1	9	L5	
<i>Circaea lutetiana</i> ssp. <i>canadensis</i>	enchanter's nightshade	2	1	1	1	5	L5	
<i>Cornus alternifolia</i>	alternate-leaved dogwood	2	2	1	2	7	L5	
<i>Cornus foemina</i> ssp. <i>racemosa</i>	grey dogwood	2	2	4	2	10	L5	
<i>Cornus stolonifera</i>	red osier dogwood	1	2	0	3	6	L5	
<i>Crataegus punctata</i>	dotted hawthorn	2	2	3	3	10	L5	
<i>Dryopteris carthusiana</i>	spinulose wood fern	2	3	2	2	9	L5	
<i>Echinocystis lobata</i>	wild cucumber	2	2	3	1	8	L5	
<i>Eleocharis erythropoda</i>	creeping spike-rush	2	2	4	1	9	L5	
<i>Epilobium ciliatum</i> ssp. <i>ciliatum</i>	sticky willow-herb	2	2	2	2	8	L5	
<i>Equisetum arvense</i>	field horsetail	1	2	1	1	5	L5	
<i>Equisetum hyemale</i> ssp. <i>affine</i>	scouring-rush	2	2	2	2	8	L5	
<i>Erigeron annuus</i>	daisy fleabane	2	2	0	1	5	L5	
<i>Erigeron philadelphicus</i> ssp. <i>philadelphicus</i>	Philadelphia fleabane	2	2	0	1	5	L5	
<i>Erythronium americanum</i> ssp. <i>americanum</i>	yellow trout-lily	2	3	3	2	10	L5	
<i>Eupatorium maculatum</i> ssp. <i>maculatum</i>	spotted Joe-Pye weed	2	2	3	3	10	L5	
<i>Eupatorium rugosum</i>	white snakeroot	2	2	2	1	7	L5	
<i>Euthamia graminifolia</i>	grass-leaved goldenrod	2	1	4	1	8	L5	
<i>Fragaria vesca</i> ssp. <i>americana</i>	woodland strawberry	3	2	2	2	9	L5	
<i>Fragaria virginiana</i>	wild strawberry	2	2	0	2	6	L5	
<i>Fraxinus americana</i>	white ash	1	2	0	3	6	L5	
<i>Fraxinus pennsylvanica</i> var. <i>pennsylvanica</i>	red ash	2	2	2	3	9	L5	
<i>Galium palustre</i>	marsh bedstraw	2	2	3	3	10	L5	
<i>Galium triflorum</i>	sweet-scented bedstraw	2	2	2	2	8	L5	
<i>Geum canadense</i>	white avens	2	2	1	2	7	L5	
<i>Glyceria striata</i>	fowl manna grass	2	2	1	2	7	L5	
<i>Hackelia virginiana</i>	Virginia stickseed	2	2	0	2	6	L5	
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	2	2	1	2	7	L5	
<i>Impatiens capensis</i>	orange touch-me-not	1	2	0	2	5	L5	
<i>Juglans nigra</i>	black walnut	2	1	2	1	6	L5	
<i>Juncus tenuis</i>	path rush	2	2	1	1	6	L5	
<i>Laportea canadensis</i>	wood nettle	2	3	2	2	9	L5	
<i>Leersia oryzoides</i>	rice cut grass	2	2	3	2	9	L5	
<i>Lemna minor</i>	common duckweed	2	2	4	2	10	L5	
<i>Maianthemum racemosum</i> ssp. <i>racemosum</i>	false Solomon's seal	2	3	2	3	10	L5	
<i>Maianthemum stellatum</i>	starry false Solomon's seal	2	2	1	3	8	L5	
<i>Matteuccia struthiopteris</i> var. <i>pensylvanica</i>	ostrich fern	1	2	2	2	7	L5	
<i>Mentha arvensis</i> ssp. <i>borealis</i>	wild mint	2	2	3	2	9	L5	
<i>Muhlenbergia mexicana</i> var. <i>mexicana</i>	common muhly grass	3	2	0	1	6	L5	
<i>Oenothera biennis</i>	common evening-primrose	2	1	1	1	5	L5	
<i>Onoclea sensibilis</i>	sensitive fern	2	3	1	3	9	L5	
<i>Ostrya virginiana</i>	ironwood	2	3	2	2	9	L5	
<i>Oxalis stricta</i>	common yellow wood-sorrel	3	1	1	1	6	L5	
<i>Parthenocissus inserta</i>	thicket creeper	1	2	0	1	4	L5	
<i>Phryma leptostachya</i>	lopseed	2	2	3	2	9	L5	
<i>Pilea pumila</i>	dwarf clearweed	2	2	1	1	6	L5	
<i>Plantago rugelii</i>	red-stemmed plantain	2	2	0	1	5	L5	
<i>Poa palustris</i>	fowl meadow-grass	2	2	3	2	9	L5	
<i>Podophyllum peltatum</i>	May-apple	1	3	3	3	10	L5	

Appendix 2: Maple Nature Reserve and Adjacent Lands Flora Species (2009)		Local	Popn.	Hab.	Sens.	Total	Rank	L1-L3 in
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Reserve
		1-5	1-5	0-5	0-5	2-20	(03/2009)	Proper
<i>Populus balsamifera</i> ssp. <i>balsamifera</i>	balsam poplar	1	2	3	2	8	L5	
<i>Populus deltoides</i>	cottonwood	2	1	4	1	8	L5	
<i>Populus tremuloides</i>	trembling aspen	1	3	1	3	8	L5	
<i>Prenanthes altissima</i>	tall wood lettuce	2	3	2	2	9	L5	
<i>Prunus serotina</i>	black cherry	2	2	0	2	6	L5	
<i>Prunus virginiana</i> ssp. <i>virginiana</i>	choke cherry	1	2	0	1	4	L5	
<i>Ranunculus abortivus</i>	kidney-leaved buttercup	2	3	1	2	8	L5	
<i>Ranunculus recurvatus</i> var. <i>recurvatus</i>	hooked buttercup	2	3	2	3	10	L5	
<i>Ranunculus sceleratus</i>	cursed crowfoot	2	2	3	2	9	L5	
<i>Rhus radicans</i> ssp. <i>rydbergii</i>	poison ivy (shrub form)	2	2	0	2	6	L5	
<i>Rhus typhina</i>	staghorn sumach	2	1	2	2	7	L5	
<i>Ribes americanum</i>	wild black currant	2	3	2	2	9	L5	
<i>Ribes cynosbati</i>	prickly gooseberry	2	3	2	2	9	L5	
<i>Rubus allegheniensis</i>	common blackberry	2	3	0	1	6	L5	
<i>Rubus idaeus</i> ssp. <i>melanolasius</i>	wild red raspberry	1	1	0	1	3	L5	
<i>Rubus occidentalis</i>	wild black raspberry	2	1	0	1	4	L5	
<i>Rubus odoratus</i>	purple-flowering raspberry	2	2	2	2	8	L5	
<i>Salix eriocephala</i>	narrow heart-leaved willow	2	1	3	1	7	L5	
<i>Sambucus canadensis</i>	common elderberry	2	3	2	2	9	L5	
<i>Sambucus racemosa</i> ssp. <i>pubens</i>	red-berried elder	2	3	2	2	9	L5	
<i>Sanguinaria canadensis</i>	bloodroot	2	3	0	3	8	L5	
<i>Scirpus atrovirens</i>	black-fruited bulrush	2	2	4	2	10	L5	
<i>Smilax herbacea</i>	carrion-flower	3	3	2	2	10	L5	
<i>Solanum ptychanthum</i>	American black nightshade	4	1	4	0	9	L5	
<i>Solidago altissima</i>	tall goldenrod	1	2	0	0	3	L5	
<i>Solidago caesia</i>	blue-stemmed goldenrod	2	2	4	2	10	L5	
<i>Solidago canadensis</i> var. <i>canadensis</i>	Canada goldenrod	2	2	0	1	5	L5	
<i>Solidago flexicaulis</i>	zig-zag goldenrod	2	1	3	2	8	L5	
<i>Solidago gigantea</i>	late goldenrod	2	1	1	1	5	L5	
<i>Thalictrum dioicum</i>	early meadow rue	2	3	3	2	10	L5	
<i>Tilia americana</i>	basswood	1	4	2	3	10	L5	
<i>Ulmus americana</i>	white elm	1	4	0	2	7	L5	
<i>Urtica dioica</i> ssp. <i>gracilis</i>	American stinging nettle	2	3	2	2	9	L5	
<i>Verbena urticifolia</i>	white vervain	2	2	2	2	8	L5	
<i>Viola conspersa</i>	dog violet	2	2	0	2	6	L5	
<i>Viola pubescens</i>	stemmed yellow violet	2	3	1	2	8	L5	
<i>Viola sororia</i>	common blue violet	2	2	0	2	6	L5	
<i>Vitis riparia</i>	riverbank grape	1	1	0	0	2	L5	
<i>Acer platanoides</i>	Norway maple	3				3	L+	
<i>Aegopodium podagraria</i>	goutweed	4				4	L+	
<i>Agrostis gigantea</i>	redtop	3				3	L+	
<i>Alliaria petiolata</i>	garlic mustard	2				2	L+	
<i>Alnus incana</i> ssp. <i>incana</i>	grey alder	4				4	L+	
<i>Amorpha fruticosa</i>	shrubby false indigo	5				5	L+	
<i>Arctium minus</i> ssp. <i>minus</i>	common burdock	3				3	L+	
<i>Arenaria serpyllifolia</i>	thyme-leaved sandwort	5				5	L+	
<i>Berberis thunbergii</i>	Japanese barberry	4				4	L+	
<i>Betula pendula</i>	European white birch	4				4	L+	
<i>Bromus inermis</i> ssp. <i>inermis</i>	smooth brome grass	3				3	L+	
<i>Bromus tectorum</i>	downy chess	4				4	L+	
<i>Buxus sempervirens</i>	boxwood						L+	
<i>Campanula rapunculoides</i>	creeping bellflower	3				3	L+	
<i>Carduus nutans</i> ssp. <i>nutans</i>	nodding thistle	5				5	L+	
<i>Carex spicata</i>	spiked sedge	3				3	L+	
<i>Catalpa speciosa</i>	northern catalpa	5				5	L+	
<i>Celastrus orbiculatus</i>	oriental bittersweet	4				4	L+	
<i>Cerastium fontanum</i>	mouse-ear chickweed	3				3	L+	
<i>Chelidonium majus</i>	celandine	3				3	L+	
<i>Chenopodium album</i> var. <i>album</i>	lamb's quarters	3				3	L+	
<i>Chrysanthemum leucanthemum</i>	ox-eye daisy	3				3	L+	
<i>Cichorium intybus</i>	chicory	3				3	L+	
<i>Cirsium arvense</i>	creeping thistle	2				2	L+	
<i>Cirsium vulgare</i>	bull thistle	3				3	L+	
<i>Convallaria majalis</i>	lily-of-the-valley	3				3	L+	
<i>Coronilla varia</i>	crown vetch	4				4	L+	
<i>Crataegus monogyna</i>	English hawthorn	3	1	4	0	8	L+	
<i>Cynanchum rossicum</i>	dog-strangling vine	3				3	L+	
<i>Dactylis glomerata</i>	orchard grass	3				3	L+	

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Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Reserve
		1-5	1-5	0-5	0-5	2-20	(03/2009)	Proper
<i>Daucus carota</i>	Queen Anne's lace	3				3	L+	
<i>Elaeagnus umbellata</i>	autumn olive	4				4	L+	
<i>Elymus repens</i>	quack grass	3				3	L+	
<i>Epilobium hirsutum</i>	European willow-herb	4				4	L+	
<i>Epilobium parviflorum</i>	small-flowered willow-herb	4				4	L+	
<i>Epipactis helleborine</i>	helleborine	3				3	L+	
<i>Euonymus europaea</i>	European spindle-tree	4				4	L+	
<i>Festuca pratensis</i>	meadow fescue	3				3	L+	
<i>Festuca rubra ssp. rubra</i>	red fescue	3				3	L+	
<i>Forsythia viridissima</i>	forsythia	5				5	L+	
<i>Galium verum</i>	yellow bedstraw	4				4	L+	
<i>Geum urbanum</i>	urban avens	3				3	L+	
<i>Glechoma hederacea</i>	creeping Charlie	3				3	L+	
<i>Hemerocallis fulva</i>	orange day-lily	4				4	L+	
<i>Hesperis matronalis</i>	dame's rocket	2				2	L+	
<i>Hieracium aurantiacum</i>	orange hawkweed	4				4	L+	
<i>Hieracium caespitosum ssp. caespitosum</i>	yellow hawkweed	3				3	L+	
<i>Hieracium pilosella</i>	mouse-ear hawkweed	5				5	L+	
<i>Hypericum perforatum</i>	common St. Johnswort	3				3	L+	
<i>Inula helenium</i>	elecampane	3				3	L+	
<i>Iris germanica</i>	garden iris	5				5	L+	
<i>Lactuca serriola</i>	prickly lettuce	3				3	L+	
<i>Larix decidua</i>	European larch	4				4	L+	
<i>Lathyrus latifolius</i>	everlasting pea	4				4	L+	
<i>Leonurus cardiaca ssp. cardiaca</i>	motherwort	3				3	L+	
<i>Lepidium campestre</i>	field pepper-grass	4				4	L+	
<i>Linaria vulgaris</i>	butter-and-eggs	3				3	L+	
<i>Lonicera morrowii</i>	Morrow's honeysuckle	3				3	L+	
<i>Lonicera tatarica</i>	Tartarian honeysuckle	4				4	L+	
<i>Lonicera x bella</i>	shrub honeysuckle	3				3	L+	
<i>Lotus corniculatus</i>	bird's foot trefoil	3				3	L+	
<i>Lysimachia nummularia</i>	moneywort	4				4	L+	
<i>Lythrum salicaria</i>	purple loosestrife	3				3	L+	
<i>Malus pumila</i>	apple	2				2	L+	
<i>Matricaria perforata</i>	scentless chamomile	4				4	L+	
<i>Medicago lupulina</i>	black medick	3				3	L+	
<i>Melilotus alba</i>	white sweet clover	3				3	L+	
<i>Melilotus officinalis</i>	yellow sweet clover	3				3	L+	
<i>Mentha spicata</i>	spear mint	4				4	L+	
<i>Mentha x piperita</i>	peppermint	5				5	L+	
<i>Myosotis scorpioides</i>	true forget-me-not	3				3	L+	
<i>Myosotis sylvatica</i>	woodland forget-me-not	5				5	L+	
<i>Myosoton aquaticum</i>	giant chickweed	5				5	L+	
<i>Narcissus poeticus</i>	narcissus	5				5	L+	
<i>Narcissus pseudonarcissus</i>	daffodil	5				5	L+	
<i>Nasturtium microphyllum</i>	small-leaved watercress	4				4	L+	
<i>Nepeta cataria</i>	catnip	3				3	L+	
<i>Petunia sp.</i>	petunia						L+	
<i>Phleum pratense</i>	timothy grass	3				3	L+	
<i>Picris hieracioides ssp. hieracioides</i>	hawkweed oxtongue	5				5	L+	
<i>Plantago lanceolata</i>	English plantain	4				4	L+	
<i>Poa compressa</i>	Canada blue grass	3				3	L+	
<i>Poa nemoralis</i>	woodland spear grass	4				4	L+	
<i>Poa pratensis ssp. pratensis</i>	Kentucky blue grass	3				3	L+	
<i>Polygonum convolvulus</i>	black bindweed	4				4	L+	
<i>Polygonum cuspidatum</i>	Japanese knotweed	4				4	L+	
<i>Populus alba</i>	white poplar	4				4	L+	
<i>Potentilla recta</i>	sulphur cinquefoil	3				3	L+	
<i>Ranunculus acris</i>	tall buttercup	3				3	L+	
<i>Rhamnus cathartica</i>	common buckthorn	2				2	L+	
<i>Ribes nigrum</i>	black currant	5				5	L+	
<i>Ribes rubrum</i>	garden red currant	3				3	L+	
<i>Robinia pseudoacacia</i>	black locust	3				3	L+	
<i>Rosa multiflora</i>	multiflora rose	3				3	L+	
<i>Rumex crispus</i>	curly dock	3				3	L+	
<i>Salix alba</i>	white willow	5				5	L+	
<i>Silene pratensis</i>	evening lychnis	4				4	L+	
<i>Silene vulgaris</i>	bladder campion	4				4	L+	

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Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Reserve
		1-5	1-5	0-5	0-5	2-20	(03/2009)	Proper
<i>Solanum dulcamara</i>	bittersweet nightshade	3				3	L+	
<i>Sonchus arvensis</i> ssp. <i>arvensis</i>	glandular perennial sow-thistle	5				5	L+	
<i>Sonchus oleraceus</i>	annual sow-thistle	5				5	L+	
<i>Sorbaria sorbifolia</i>	false spiraea	4				4	L+	
<i>Sorbus aucuparia</i>	European mountain-ash	3				3	L+	
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	western snowberry	5				5	L+	
<i>Syringa vulgaris</i>	common lilac	3				3	L+	
<i>Taraxacum officinale</i>	dandelion	3				3	L+	
<i>Taxus cuspidata</i>	Japanese yew	5				5	L+	
<i>Thlaspi arvense</i>	penny-cress	3				3	L+	
<i>Tragopogon dubius</i>	lemon-yellow goat's beard	3				3	L+	
<i>Tragopogon pratensis</i> ssp. <i>pratensis</i>	meadow goat's beard	3				3	L+	
<i>Trifolium hybridum</i>	alsike clover	5				5	L+	
<i>Trifolium pratense</i>	red clover	3				3	L+	
<i>Trifolium repens</i>	white clover	3				3	L+	
<i>Tussilago farfara</i>	coltsfoot	2				2	L+	
<i>Typha angustifolia</i>	narrow-leaved cattail	3				3	L+	
<i>Ulmus glabra</i>	Scotch elm	5				5	L+	
<i>Valeriana officinalis</i>	common valerian	4				4	L+	
<i>Verbascum thapsus</i>	common mullein	3				3	L+	
<i>Veronica officinalis</i>	common speedwell	3				3	L+	
<i>Veronica serpyllifolia</i> ssp. <i>serpyllifolia</i>	thyme-leaved speedwell	5				5	L+	
<i>Veronica verna</i>	spring speedwell	5				5	L+	
<i>Viburnum lantana</i>	wayfaring tree	4				4	L+	
<i>Viburnum opulus</i>	European highbush cranberry	3				3	L+	
<i>Viburnum recognitum</i>	southern arrow-wood	5				5	L+	
<i>Vicia cracca</i>	cow vetch	3				3	L+	
<i>Vinca minor</i>	periwinkle	4				4	L+	
<i>Viola arvensis</i>	field pansy	5				5	L+	
<i>Acer negundo</i>	Manitoba maple	2	0	0	2	4	L+?	
<i>Agrostis stolonifera</i>	creeping bent grass	3				3	L+?	
<i>Geranium robertianum</i>	herb Robert	3				3	L+?	
<i>Phalaris arundinacea</i>	reed canary grass	3				3	L+?	
<i>Phragmites australis</i>	common reed	3				3	L+?	
<i>Potentilla norvegica</i>	rough cinquefoil	4				4	L+?	
<i>Pinus resinosa</i>	red pine	2	5	5	5	17	pL2	
<i>Penstemon digitalis</i>	foxglove beard-tongue	3	3	4	4	14	pL3	
<i>Juniperus virginiana</i>	red cedar	2	1	4	1	8	pL5	
<i>Abies</i> sp.	fir						pL+	
<i>Picea abies</i>	Norway spruce	5				5	pL+	
<i>Pinus albicaulis</i>	white-bark pine						pL+	
<i>Pinus densiflora</i>	Japanese red pine						pL+	
<i>Pinus koraiensis</i>	Korean pine						pL+	
<i>Pinus nigra</i>	Austrian pine	5				5	pL+	
<i>Pinus pentaphyla</i>	Japanese white pine						pL+	
<i>Pinus peuce</i>	European white pine						pL+	
<i>Pinus peuce x strobis</i>	hybrid white pine						pL+	
<i>Pinus rigida</i>	pitch pine						pL+	
<i>Pinus sylvestris</i>	Scots pine	3				3	pL+	
<i>Pinus x griffithii</i>	Himalayan hybrid white pine						pL+	
<i>Populus tremula</i>	European aspen						pL+	
<i>Populus x canescens</i>	grey poplar hybrid	5				5	pL+	
<i>Prunus avium</i>	mazzard cherry	5				5	pL+	
<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	Rocky Mountain Douglas-fir	5				5	pL+	
<i>Salix matsudana</i>	corkscrew willow	5				5	pL+	
<i>Taxodium distichum</i>	bald-cypress						pL+	
	Counts of:		%					
	total species	399	100.0%					
	total natural (not planted)	378	94.7%					
	total planted	21	5.3%					
	total native species (not planted)	245	64.8%					
	total exotic species (not planted)	133	35.2%					
	L1-L3 species (not planted)	60	15.9%					
	L1-L3 with L.D. ≥ 4	6						
	L1-L3 with SD ≥ 3	59						
	L1-L3 with HD ≥ 3	60						
	planted L1-L3	2						

Appendix 3: Maple Nature Reserve and Adjacent Lands Fauna Species.

Common Name	Code	Scientific Name	number of territories	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank	
			Maple Nature Reserve											
			adjacent land											
Survey Species: species for which the TRCA protocol effectively surveys.														
Birds														
brown creeper	BRCR	<i>Certhia americana</i>	1	1	2	2	3	2	2	4	0	16	L3	
pileated woodpecker	PIWO	<i>Dryocopus pileatus</i>	1	0	2	2	4	1	3	3	0	15	L3	
pine warbler	PIWA	<i>Dendroica pinus</i>	5	1	2	2	4	1	3	3	0	16	L3	
wild turkey	WITU	<i>Meleagris gallopavo</i>	2	2	1	0	4	3	4	3	0	17	L3	
wood thrush	WOTH	<i>Hylocichla mustelina</i>	2	0	3	2	3	2	2	4	0	16	L3	
belted kingfisher	BEKI	<i>Ceryle alcyon</i>	1	0	3	2	2	1	2	2	0	12	L4	
eastern wood-pewee	EAWP	<i>Contopus virens</i>	1	0	4	2	2	1	1	3	0	13	L4	
great-crested flycatcher	GCFL	<i>Myiarchus crinitus</i>	1	1	0	2	2	3	1	2	2	0	12	L4
hairy woodpecker	HAWO	<i>Picoides villosus</i>	1	0	2	2	3	1	2	2	0	12	L4	
indigo bunting	INBU	<i>Passerina cyanea</i>	2	5	0	2	2	1	1	2	4	0	12	L4
northern flicker	NOFL	<i>Colaptes auratus</i>	1	0	3	2	1	1	2	3	0	12	L4	
red-breasted nuthatch	RBNU	<i>Sitta canadensis</i>	1	0	1	2	3	1	1	2	0	10	L4	
red-eyed vireo	REVI	<i>Vireo olivaceus</i>	7	0	2	2	2	1	1	3	0	11	L4	
white-breasted nuthatch	WBNU	<i>Sitta carolinensis</i>	1	0	2	2	3	1	2	2	0	12	L4	
American Crow	AMCR	<i>Corvus brachyrhynchos</i>	x	x	0	1	2	1	1	0	0	5	L5	
American goldfinch	AMGO	<i>Carduelis tristis</i>	x	x	0	2	2	1	1	0	1	7	L5	
American robin	AMRO	<i>Turdus migratorius</i>	x	x	0	1	2	1	1	0	1	6	L5	
Baltimore oriole	BAOR	<i>Icterus galbula</i>	x	x	0	2	2	1	1	0	1	7	L5	
black-capped chickadee	BCCH	<i>Parus atricapillus</i>	x	x	0	1	2	1	1	0	1	6	L5	
blue jay	BLJA	<i>Cyanocitta cristata</i>	x	x	0	4	2	1	1	0	1	9	L5	
brown-headed cowbird	BHCO	<i>Molothrus ater</i>	x	x	0	2	2	1	1	0	1	7	L5	
Canada goose	CANG	<i>Branta canadensis</i>	x	x	0	1	1	1	2	1	0	6	L5	
cedar waxwing	CEDW	<i>Bombycilla cedrorum</i>	x	x	0	1	2	1	1	0	1	6	L5	
chipping sparrow	CHSP	<i>Spizella passerina</i>	x	x	0	2	2	1	1	0	2	8	L5	
common grackle	COGR	<i>Quiscalus quiscula</i>	x	x	0	3	2	1	1	0	1	8	L5	
downy woodpecker	DOWO	<i>Picoides pubescens</i>	x	x	0	3	2	1	1	1	1	9	L5	
eastern phoebe	EAPH	<i>Sayornis phoebe</i>	x	x	0	2	2	1	1	2	1	9	L5	
mallard	MALL	<i>Anas platyrhynchos</i>	x	x	0	2	2	1	2	0	1	8	L5	
mourning dove	MODO	<i>Zenaida macroura</i>	x	x	0	2	2	1	1	0	0	6	L5	
northern cardinal	NOCA	<i>Cardinalis cardinalis</i>	x	x	0	2	2	1	1	1	2	9	L5	

Appendix 3: Maple Nature Reserve and Adjacent Lands Fauna Species.

Common Name	Code	Scientific Name	number of territories		LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
red-winged blackbird	RWBL	<i>Agelaius phoeniceus</i>	x	x	0	2	2	1	1	0	2	0	8	L5
song sparrow	SOSP	<i>Melospiza melodia</i>	x	x	0	2	2	1	2	0	2	0	9	L5
Herpetofauna														
wood frog	WOFR	<i>Rana sylvatica</i>	2	1	0	2	3	3	4	3	5	1	21	L2
northern leopard frog	LEFR	<i>Rana pipiens</i>	1		0	3	2	1	4	2	5	1	18	L3
American toad	AMTO	<i>Bufo americanus</i>		1	0	3	2	1	4	0	4	0	14	L4
green frog	GRFR	<i>Rana clamitans</i>	cc=1		0	2	2	1	3	1	4	0	13	L4
Incidental Species: species that are reported on as incidental to the TRCA protocol.														
Mammals														
eastern chipmunk	EACH	<i>Tamias striatus</i>	1		0	2	2	2	3	1	3	0	13	L4
white-tailed deer	WTDE	<i>Odocoileus virginianus</i>		1	0	2	1	3	2	2	1	0	11	L4
grey squirrel	GRSQ	<i>Sciurus carolinensis</i>	x		0	2	2	1	3	0	0	0	8	L5
Herpetofauna														
northern red-bellied snake	RBSN	<i>Storeria occipitomaculata occipitomaculata</i>		1	3	2	2	2	3	1	5	1	19	L3
LEGEND														
LO = local occurrence			PIS = Patch Isolation Sensitivity											
PTn = population trend, continent-wide			STD = sensitivity to development											
PTt = population trend, TRCA			+ = additional points											
HD = habitat dependence			TS = total score											
AS = area sensitivity			cc = call code (chorus intensity)			L-rank = TRCA Rank, October, 2008								

Appendix 4: Maple Nature Reserve Recommended Planting List for Quonset Hut Site

1. Annual or Short-Lived Nurse / Cover Crop

<i>Fagopyrum esculentum</i>	buckwheat
<i>Impatiens capensis</i>	jewelweed (collect locally and scatter in September – will persist permanently)

<i>Calamagrostis canadensis</i>	Canada bluejoint grass
<i>Carex crinita</i>	fringed sedge
<i>Carex lacustris</i>	lake-bank sedge
<i>Carex lupulina</i>	hop sedge
<i>Carex projecta</i>	necklace sedge
<i>Carex pseudocyperus</i>	pseudocyperus sedge
<i>Carex retrorsa</i>	retorse sedge
<i>Carex vulpinoidea</i>	fox sedge
<i>Eleocharis smallii</i>	Small's spike-rush
<i>Glyceria borealis</i>	northern manna grass
<i>Glyceria striata</i>	fowl manna grass
<i>Leersia oryzoides</i>	rice cut-grass
<i>Scirpus cyperinus</i>	woolgrass bulrush
<i>Scirpus validus</i>	soft-stemmed bulrush
<i>Sparganium emersum</i>	green bur-reed
<i>Asclepias incarnata</i>	swamp milkweed
<i>Aster puniceus</i>	swamp aster
<i>Chelone glabra</i>	turtlehead
<i>Eupatorium maculatum</i>	spotted Joe Pye weed
<i>Eupatorium perfoliatum</i>	boneset
<i>Iris versicolor</i>	northern blue flag
<i>Lobelia siphilitica</i>	great blue lobelia
<i>Lysimachia terrestris</i>	swamp candles
<i>Potamogeton natans</i>	floating pondweed
<i>Sagittaria latifolia</i>	common arrow-head
<i>Verbena hastata</i>	blue vervain

Appendix 4: Maple Nature Reserve Recommended Planting List for Quonset Hut Site

3. Wetland Margins and Elevated Areas between Pools

<i>Acer spicatum</i>	mountain maple
<i>Acer x freemanii</i>	swamp maple
<i>Betula alleghaniensis</i>	yellow birch
<i>Betula papyrifera</i>	paper birch
<i>Ilex verticillata</i>	winterberry
<i>Populus balsamifera</i>	balsam poplar
<i>Salix bebbiana</i>	Bebb's willow
<i>Sambucus canadensis</i>	common elderberry
<i>Thuja occidentalis</i>	eastern white cedar
<i>Tsuga canadensis</i>	eastern hemlock
<i>Viburnum lentago</i>	nannyberry
<i>Carex gracillima</i>	graceful sedge
<i>Carex intumescens</i>	bladder sedge
<i>Carex radiata</i>	straight-styled sedge
<i>Elymus virginicus</i>	virginia wild rye
<i>Aster cordifolius</i>	heart-leaved aster
<i>Aster lanceolatus</i>	panicled aster
<i>Aster macrophyllus</i>	big-leaved aster
<i>Aster novae-angliae</i>	New England aster
<i>Hydrophyllum virginianum</i>	Virginia waterleaf
<i>Hypericum ascyron</i>	great St. John's wort
<i>Lilium michiganense</i>	Michigan lily
<i>Maianthemum stellatum</i>	starry false Solomon's seal
<i>Matteucia struthiopteris</i>	ostrich fern
<i>Onoclea sensibilis</i>	sensitive fern
<i>Podophyllum peltatum</i>	May-apple
<i>Sanguinaria canadensis</i>	bloodroot
<i>Thalictrum pubescens</i>	tall meadow-rue
<i>Viola pubescens</i>	yellow violet
<i>Viola sororia</i>	common blue violet