



Marie Curtis Park

Terrestrial Biological Inventory and Assessment

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TORONTO AND REGION Conservation for The Living City

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Table of Contents

page

List of Tables

List of Maps

List of Appendices

1.0 Introduction

In 2011 the Toronto and Region Conservation Authority (TRCA) conducted a repeat fauna inventory of Marie Curtis Park in preparation for an upcoming management plan. Marie Curtis Park was initially inventoried for fauna and flora in 2003 and this most recent inventory maintained the same study area boundary. Marie Curtis Park, a waterfront park, is located in the south-west corner of the TRCA jurisdiction, at the mouth of the Etobicoke Creek.

The purpose of the work conducted by the TRCA during the 2003 and 2011 field seasons was to *provide site-specific advice on management decisions* in the upcoming plan. In order to provide this advice, detailed field work was undertaken to *characterize the terrestrial natural heritage features* of Marie Curtis Park. Once characterized, the site features can then be understood within the larger regional context of the Terrestrial Natural Heritage Program of the TRCA. The question that the inventory addresses is "*How does the area surveyed at the Marie Curtis Park fit within the regional and watershed natural system, and how should its contribution to this system be protected and maximized?"* The important underlying message offered 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.

In addition, a general comparison is made in this report of flora and fauna species richness from 1995 to 2011. The earlier flora data, collected in 1995, was obtained from The Arsenal Lands Park and Site Remediation Master Plan prepared for TRCA in 1998. Fauna data used is from TRCA's work in 2003 and 2001.

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. 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 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.

The lack of natural cover that occurs throughout the Etobicoke Creek watershed has resulted from a massive amount of cumulative loss. The Marie Curtis Park study area has been directly affected by the overall trend of continuous and incremental losses of natural cover and species in the watershed and to changes in the surrounding matrix as can be seen by species losses and quality deterioration within the park itself.

2.0 Study Area Description

The Marie Curtis Park study area is located at the mouth of the Etobicoke Creek, lying partly in both the City of Mississauga and the City of Toronto. The study area is bordered to the south by the continuation of Fergus Avenue (to the lake shore), to the west by Lakeshore Road, the north by 42nd Street, and the east by Lake Ontario itself. Based on GIS analysis of 2003 inventory data, the Marie Curtis Park study area covers 55 ha including mowed areas. Central to the study area is the old Arsenal Lands, a 15.7 ha former industrial site.

The Park lies entirely within the Carolinian floristic region that is composed primarily of deciduous forest. At the coarse physiographic level, Marie Curtis Park is situated on a southern extension of the South Slope physiographic zone that is characterized by an extensive, gently undulating, till plain with overall low recharge per unit area and localized groundwater discharge in deeply incised river valleys. The communities closest to the lake are on pure sand soils and the majority of the remaining soils are clay loam. Marie Curtis Park is a coastal park and the waterfront is influenced by the coastal dynamics of Lake Ontario. There are two creeks running through the park: Applewood Creek borders the west side and Etobicoke Creek is on the east side.

Marie Curtis Park was created in the 1950s in the wake of Hurricane Hazel. Incorporated into the present Marie Curtis Park is an area previously known as the Arsenal Lands; this block of approximately 16 ha is situated in the southwest quarter of the park and is a recently remediated former industrial site.

Recreational activity currently occurs throughout much of the study area although the partial fencing around the Arsenal Lands is intended to diminish activity within that parcel. A network of formal and informal trails used by cyclists, hikers, and dog-walkers occurs throughout Marie Curtis Park.

3.0 Inventory Methodology

A biological inventory of Marie Curtis Park 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 (TRCA 2007c) and field data collection (TRCA 2007d). Habitat patch mapping was excerpted from the regional 2007/08 mapping of broadly-defined patch categories (forest, wetland, meadow and coastal) and digitized using ArcView GIS software.

A key component of the field data collection is the scoring and ranking of vegetation communities and flora and fauna species to generate local "L" ranks (L1 to L5); this process was undertaken in 1996-2000 and ranks are reviewed regularly (TRCA 2010). 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.

3.1 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 3.2).

Quality Distribution of Natural Cover

The quality of each habitat patch is evaluated according to three criteria: *size* (the number of ha 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 3 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 m from the edge of the forest patch, using 100 m increments. A recognized distance for deep interior conditions occurs at 400 m 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 Vegetation Community and Flora and Fauna Species

Vegetation community and flora and fauna species data were collected through field surveys. These surveys were done during the appropriate times of year to capture breeding status in the case of amphibians and birds, and during the optimal growing period of the various plant species and communities (Table 2). Vegetation communities and flora species were surveyed concurrently.

Vegetation community designations were based on the Ecological Land Classification (ELC) and determined to the level of vegetation type (Lee *et al*. 1998). In 2003 community boundaries were outlined onto printouts of 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. A list of all other species observed was documented for the site. In addition, a limited vegetation community survey was conducted on one day in 1999 along the shoreline and species of conservation concern were mapped.

The most complete fauna surveys of the site were conducted by the TRCA in April to July of 2003, and in April to June of 2011. Additional observations are included from the TRCA's long-term monitoring station, situated in the south-eastern woodland block and initiated in 2010. The spring surveys searched primarily for frog species of regional concern but recorded incidentally the presence of any early-spring nocturnal bird species (owls and American woodcocks). Surveys in late May, June and July were concerned primarily with the mapping of breeding bird species of regional concern. As per the TRCA data collection protocol breeding bird surveys were carried out by visiting all parts of the site at least twice during the breeding season (last week of May to mid-July) to determine the breeding status of each mapped point. The methodology for identifying confirmed and possible breeding birds follows Cadman *et al*. (2007). All initial visits were completed by the end of the third week of June. The field-season is to be organized so that by late June only repeat visits are being conducted. It is imperative that any visit made in the first half of June is subsequently validated by a second visit later in the season. Fauna species of both regional and urban concern (species ranked L1 to L4) were mapped as point data with each point

representing a possible breeding pair.

Table 2. Schedule of TRCA biological surveys at Marie Curtis Park

Survey Item	Survey Dates	Survey Effort (hours)
Patch / Landscape	2007/2008 ortho-photos	21 hours
Vegetation Communities and Flora Species	September 9th, 1999 May 7th; June 16th, 17th; August 6th, 2003	28 hours
Frogs and Nocturnal Spring Birds	April 25th and May 1st, 2003 April 11th, 2011	3 hours
Breeding Songbirds	June 18th and July 9th, 2003 May 31st and June 22nd, 2011	15 hours

4.0 Results and Discussion

Information pertaining to the Marie Curtis Park 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 2007/08 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, currently (i.e. 2007/08) 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.

At the regional level, analysis of habitat patches shows that the present average patch quality for the entire TRCA jurisdiction is “fair” (L3). Thus the existing natural system stands below the quality target for the region (L2, “good”) which requires 30% forest and wetland cover. Furthermore the existing natural cover has a very unbalanced distribution, with large patches of forest and wetland cover restricted largely to the northern half of the TRCA jurisdiction, especially on the Oak Ridges Moraine (ORM) (Map 3). The distribution of fauna species of concern is similarly distributed with a bias 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 Quantity of Natural Cover in the Etobicoke Creek Watershed

The area of the Etobicoke Creek watershed is approximately 21,165 ha with 14% natural cover including 992 ha as forest (5%), 1,639 ha as meadow (8%), 105 ha as successional (<1%), 0.8 ha

as beach bluff (<1%), and 201 ha as wetland (<1%). The Marie Curtis Park study area is about 55 ha in total, with 39 ha of natural cover including 11.5 ha of forest and plantation, 5.8 ha of successional, 0.7 ha of wetland, 1.8 ha of aquatic, 1.7 of dynamic, and 17.2 ha of meadow. The study area contains 0.1% of the total natural cover in the Etobicoke Creek watershed.

4.3 Habitat Patch Findings for Marie Curtis Park

The following details the study area according to the natural system indicator *quality distribution* used in designing the Terrestrial Natural Heritage System Strategy. The results for quality distribution are reported below under the headings of habitat patch size and shape, matrix influence and total score. Analysis was based on 2007-2008 ortho-photos.

Habitat Patch Size and Shape

The one forest patch at Marie Curtis Park was mapped at the landscape level as 13.5 ha and scores “fair” for patch size. The most extensive open habitat patch (including meadow and successional) is about 15 ha and also scores as “fair” for size (Map 5). There is no forest interior within Marie Curtis Park. Forest interior provides shaded, moist, cool conditions, and some refuge from external effects; all of which are necessary for numerous native plants and animals. Larger forests are more resilient to negative matrix influences accompanying urbanization or trail systems. There are a range of shape scores but the majority of habitat scores “poor” for shape.

Habitat Patch Matrix Influence

Marie Curtis Park is situated in the Lower Etobicoke Creek subwatershed where an urban matrix influence is the overwhelming majority land-use type resulting in a “very poor” score for the subwatershed. The study area is slightly better than the rest of the subwatershed, divided between “fair” and “poor” scores for matrix influence (i.e. scores four out of a possible five points, see Maps 6 and 7). The slightly higher scoring waterfront area is affected by the positive matrix influence of Lake Ontario and the other half of the park is more affected by the urban matrix. However, because there is no immediately adjacent residential community, the matrix influence might be somewhat better than if there were. For example, roaming cats, dumping (vegetation etc), and other backyard influences may be less. The current fences have not helped to limit public use enough as seen through the decrease in biodiversity.

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 2 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 low matrix influence scores and habitat patch size and shape scores results in an overall "poor" or L4 habitat patch quality (Map 8). Note that the highly degraded small patch in the middle of Map 8 scores an L3 for total score primarily because this patch is one of very few habitat patches on the site that exhibits an L2 ("good") shape.

4.4 Vegetation Community Findings for Marie Curtis Park

4.4.1 Vegetation Community Representation

Marie Curtis Park is in the southernmost part of the TRCA jurisdiction; an area that once supported Carolinian vegetation communities. However, the vegetation currently at Marie Curtis Park is not representative of typical Carolinian communities. There are a few Carolinian species found in the park but they are not dominant in the community compositions. A total of 25 different ELC vegetation community types were described for the site (listed in Appendix 1 and summarized in Table 3). There are 10 forest communities (6 natural forest and 4 plantation), 6 successional communities, 3 wetlands, 2 non-vegetated aquatic, 3 dynamic communities, and 1 meadow type. Of the 25 communities, 4 were recorded solely as complexes or inclusions within other communities. The study area is composed of disturbed cultural and natural vegetation communities with heavy trampling, invasive non-native species, and littering being the primary disturbances. Map 9 illustrates the vegetation communities and their ranks.

Table 3. Summary of Vegetation Communities, Marie Curtis Park

Class	Number of Types	Area (hectares)
Forest	10	11.5
Successional	6	5.8
Wetland	3	0.7
Aquatic	2	1.8
Dynamic (beach, bluff, barren)	3	1.7
Meadow	1	17.2
Total	25	39

The site has 10.2 ha of natural forest, about 26% of the whole natural cover at Marie Curtis Park. The main forest is a mature fresh-moist red oak (*Quercus rubra*) and beech (*Fagus grandifolia*) forest (FOD9-A) with vernal pooling. White pine (*Pinus strobus*) occurs on the slight elevations in complexes with red oak (FOM2-1) and some paper birch (*Betula papyrifera*) also occurs (FOD8-1). This deciduous forest is where the Carolinian species are currently found on site as well as most of the flora species of conservation concern that were identified. Unfortunately trampling and

littering is severe, and ground and shrub layer flora have been dramatically reduced. The other natural forests are: dry-fresh red oak, white ash (*Fraxinus americana*), and basswood (*Tilia americana*) forest (FOD2-4); crack willow low-land forest (FOD7-3); and fresh-moist cottonwood (*Populus deltoides*) coastal forest (FOD8-1).

Plantation is concentrated along the west side of Marie Curtis Park and totals 1.3 ha. Most of this is silver maple (*Acer saccharinum*) (CUP1-5) and mixed plantation of Scots pine (*Pinus sylvestris*), Norway spruce (*Picea abies*), and white ash (CUP2-G). There are smaller polygons each of white cedar (*Thuja occidentalis*) (CUP3-G) and Scots pine (CUP3-3) in the same area.

Six types of successional semi-woody habitat cover 5.8 ha. There are two savannahs, one treed hedgerow, one thicket, and two woodlands. Dominant woody species include staghorn sumac (*Rhus typhina*), crack willow (*Salix x fragilis*), silver maple, and Manitoba maple (*Acer negundo*).

There are 0.7 ha of wetland made up of two community types: narrow-leaved cattail mineral marsh (MAS2-1b) and broad-leaved cattail mineral marsh (MAS2-1A). About three-quarters of the wetland area is the non-native MAS2-1b. A common reed (*Phragmites australis*) mineral meadow marsh (MAM2-a) occurs as an inclusion only.

The Etobicoke Creek is classified as an open aquatic type (OAO1) and there is one aquatic inclusion (SAF1-3) in the native cattail marsh dominated by duckweed (*Lemna minor*) and water-meal (*Wolffia* cf. *columbiana*).

Dynamic communities are particularly interesting as they require ongoing natural disturbance such as the wind and wave action of the lakeshore. The beach, although fairly heavily used, remains a natural sand beach (BBO1). There are two other small coastal communities occurring near the lakeshore: a balsam poplar (*Populus balsamifera ssp. balsamifera*) treed dune (SDT1-2) and a willow shrub beach (BBS1-2A).

The meadows are 44% of the natural cover, totalling 17.2 ha. Non-native cool-season grass meadows (CUM1-b) are now where the former arsenal lands were and also in five other polygons. Native goldenrod species (*Solidago* spp.) are also abundant in the meadows.

4.4.2 Vegetation Communities of Conservation 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 3.0. Vegetation communities with a rank of L1 to L3 are considered of conservation concern in the TRCA jurisdiction while L4 communities are considered of concern in the urban portion of the jurisdiction. Marie Curtis Park lies within the urban landscape and so L1 to L4 communities are of conservation concern.

Nine communities at Marie Curtis Park are ranked L1 to L4, two of which only occur as a complex or inclusion within another larger community. There are four forest types ranging from L2 to L4, one wetland type (L4), one aquatic type (L4), and all three dynamic types ranging from L2 to L4

(communities are listed with ranks in Appendix 1; location and boundaries shown on Map 9). These communities occupy 9.6 ha, or 25% of the total natural cover.

The forest communities are of conservation concern at Marie Curtis Park because either they have an oak component or a coastal influence (in the case of FOD8-A). The native wetlands and aquatic communities are ranked L4 simply because they are very uncommon in urban landscapes. Dynamic communities are also uncommon in urban landscapes even when some of the necessary disturbances exist as these areas are mostly built upon or severely disturbed (e.g. excavation/filling). The coastal/beach at Marie Curtis Park is one of the only opportunities for such an ecosystem on the western part of the Lake Ontario shoreline within the TRCA jurisdiction.

4.5 Flora Findings for Marie Curtis Park

4.5.1 Flora Species Representation

Floristic surveys conducted in Marie Curtis Park in 1999 and 2003 identified a total of 151 species of vascular plants (listed in Appendix 2 and summarized in Table 4). These included 136 naturally-occurring species and 15 planted species. Of the non-planted species, 85 are native (62%). There were an additional 20 native species recorded in a 1995 survey within the study area (Hough Woodland Naylor Dance Leinster *et al*. 1998) that were not recorded again by TRCA in 2003 (Appendix 2) which suggests a loss in flora biodiversity at Marie Curtis Park.

Table 4. Summary of Flora Species, Marie Curtis Park

Total # of species	151
Naturally-occurring species	136
Planted species	15
Native (naturally-occurring) species	85
Non-native (naturally-occurring) species	51
Number of L1 – L4 species	25

4.5.2 Flora Species of Conservation Concern

There are 25 vascular plant species of conservation concern (rank L1 to L4) at Marie Curtis Park occurring in very low abundance. For example, there was a single L3 shagbark hickory (*Carya ovata*). Appendix 2 lists plant species by ranks and locations are shown on Map 10. 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.

None of the species are regionally rare (found in six or fewer of the forty-four 10x10 km UTM grid squares that cover the TRCA jurisdiction). However, butternut (*Juglans cinerea*) is currently

endangered both provincially and federally. Butternut is being severely attacked across the host range by the pathogen, butternut canker (*Sirococcus clavigignenti-juglandacearum*). The canker is an invasive alien species threatening the long-term viability of butternut. Butternut is still abundant in the TRCA jurisdiction but almost all surveyed trees are showing signs of the canker.

All of the flora species of concern except the water-meal (L4) are sensitive to development, being vulnerable to at least one kind of disturbance that is associated with land use changes (see Map 6 for sensitivity to development scores). They score three or more out of a possible five points. 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. Species of concern associated with mature deciduous forests are vulnerable to trampling and invasive non-native species such as dog-strangling vine (*Cynanchum rossicum*) and garlic mustard (*Alliaria petiolata*). A few examples include wood-anemone (*Anemone quinquefolia var. quinquefolia*) and wild honeysuckle (*Lonicera dioica*). The forest ground layer, despite being a mature forest, is desolate of spring ephemerals, except for trout lily (*Erythronium americanum ssp. americanum*), which could also be a result of trampling and non-natives. Other species such as eastern hemlock (*Tsuga canadensis*) have an added sensitivity to hydrological changes and often disappear or are in significant decline in urban parks. Nutrient inputs from roads or fill dumping also can affect the marshes; invasive species such as common reed and narrow-leaved cattail (*Typha angustifolia*) are taking hold in some of the wetlands; they are displacing some of the smaller and more sensitive wetland species. There were seven flora species of conservation concern reported in 1995 (Hough Woodland Naylor Dance Leinster *et al*. 1998) during a survey within the same area that were not recorded during the 2003 inventory. They can be found in Appendix 2.

Some species may be deliberately removed if they are seen: white trillium (*Trillium grandiflora*), some trees such as white cedar, and several of the fern species are prized for gardens. White trillium, an L4, was reported during a survey in 1995 (Hough Woodland Naylor Dance Leinster *et al*. 1998) but not during the 2003 survey.

Habitat fragmentation can lead to increased populations of herbivores such as white-tailed deer (*Odocoileus virginianus*); deer have had significant impacts in some parts of the jurisdiction.

In addition to being sensitive to land use impacts, 20 of the species of conservation concern can be considered habitat specialists, scoring 3 or more out of a possible 5 points for *habitat dependence*. Habitat dependence scores are shown on Map 11. Roughly, they are found in seven or fewer vegetation cohorts (groupings of vegetation types with similar floristic characteristics) (TRCA 2010). They will not readily recover when their habitats are lost or altered. Marie Curtis Park has habitat specialists corresponding forest, wetland and aquatic types. Some examples of species of mature deciduous forest include wild honeysuckle, beaked hazel (*Corylus cornuta*), Pennsylvania sedge (*Carex pensylvanica*), and wood-anemone. Those species with southern affinities found in deciduous forests include shagbark hickory, witch-hazel (*Hamamelis virginiana*), and wild geranium (*Geranium maculatum*). Silver maple, false nettle (*Boehmeria cylindrica*), and yellow birch (*Betula alleghaniensis*) are found in more moist forests as is hemlock although it also grows on more upland slopes with northern aspects.

Marshes and aquatic habitats include broad-leaved cattail (*Typha latifolia*), water-meal, soft-stemmed bulrush (*Schoenoplectus tabernaemontani*), and river bulrush (*Bolboschoenus fluviatilis*).

Invasive Species

Invasive non-native species, particularily garlic mustard in the forest, are a serious problem at Marie Curtis Park. Garlic mustard occurs in those communities that are disturbed in nature and it easily spreads along trail systems. Scots pine can be a vigorous regenerator in meadows and successional habitats. There are some areas now dominated by monotypic stands of common reed or narrow-leaved cattail, both of which tend to colonize disturbed wetlands where broad-leaved cattail and a variety of other native species cannot compete. The main threat of all of these species is that they out-compete native species, negatively altering the community structure and reducing biodiversity unless aggressive management action is taken.

4.6 Fauna Species Findings for Marie Curtis Park

4.6.1 Fauna Species Representation

The TRCA fauna surveys at the Marie Curtis Park in 2003 and 2011 documented a total of 45 bird species, six mammals, and three herpetofauna species. One additional bird species – eastern screech-owl (*Megascops asio),* was documented as an incidental observation during the long-term monitoring program in 2010 bringing the total number of possible breeding vertebrate fauna species identified by the TRCA to 55. This total is similar to that found at many other urban sites within the TRCA jurisdiction, for example, the 2006 survey of the similarly urban but considerably larger (164 ha) Rowntree Mills Park documented a total of 66 breeding fauna species. Refer to Appendix 3 for a list of the fauna species and their corresponding L-ranks.

4.6.2 Fauna Species of Conservation Concern

Fauna species, like vegetation communities and flora species, are considered of regional conservation concern if they rank L1 to L3 based on their scores for the seven criteria mentioned in Section 3.2. Since the subject site is situated within the urban zone this report also considers in detail those species ranked as L4, i.e. those species that are of concern in urban landscapes. 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 Marie Curtis Park study area over the past decade reported 21 bird species of either regional or urban concern (L1 to L4), including three L3 bird species: American woodcock (*Scolopax minor*), bobolink (*Dolichonyx oryzivora*) and brown thrasher (*Toxostoma rufum*). In addition, there were three mammal species of urban concern (i.e. ranked L4), and three herpetofauna of either regional or urban concern including the L3 ranked northern leopard frog

(*Lithobates pipiens*), bringing the total to 27 L1 to L4 ranked fauna species (Table 5). Locations of these breeding fauna are depicted on Map 12. It should be noted that the American woodcock reports in 2011 were made in early April and as such fall within the migration timing threshold and therefore these reports likely refer to migrating individuals, despite the fact that these birds were calling and displaying in suitable habitat.

Table 5: Summary of Fauna Species, Marie Curtis Park

Fauna	# species	# L1–L3: Species of Regional Concern	# L4: Species of Urban Concern	Total # L1-L4: Species of Regional or Urban Concern
birds	46	3	18	21
herps	3	1	2	3
mammals	6	0	3	3
Totals	55	4	23	27

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 Ontario Ministry of Natural Resources (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 forty-four 10x10 km UTM grid squares in the TRCA jurisdiction is considered regionally rare (i.e. scores three to five points for this criterion) (TRCA, 2010).

None of the species recorded at the Marie Curtis Park study area in the past decade are considered regionally rare, but one of the study area's species of concern, bobolink, is listed on the provincial Species at Risk list as threatened and is therefore afforded protection under Ontario's Endangered Species Act (2007). Unfortunately, although two pairs of this meadow-dependent species were reported from the Arsenal Lands portion of the study area in 2003, the full survey conducted in 2011 failed to relocate this species on the site.

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 understory). 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, *Sciuridae*; raccoons, *Procyon lotor*; and house cats, *Felis catus*); 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 Marie Curtis Park study area 16 of the 26 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 (Map 7). This number includes all four of the L3 species, and several of the more sensitive L4 species including red-eyed vireo (*Vireo olivaceus*), common yellowthroat (*Geothlypis trichas*) and blue-grey gnatcatcher (*Polioptila caerulea*).

Several of the species reported from the study area are ground-nesting and as such are highly susceptible to ground-borne disturbance, e.g. off-leash dog-walking. Unfortunately, it appears that almost all of the individuals representing these sensitive species have disappeared from the site sometime over the period from 2003 to 2011. In 2003 there were eight pairs of savannah sparrow (*Passerculus sandwichensis*), two pairs of bobolinks, and one pair of common yellowthroat. In 2011, only the common yellowthroat remained. All of these individuals had been previously documented within the open-habitat on the Arsenal Lands portion of the site which is fenced-off to restrict public access to what is a former industrial site. By 2011, this fence had been thoroughly breached at several points and hikers and dog-walkers (with animals both on and off-leash) had free access to the meadow-type habitat. There can be very little doubt that the loss of this entire ground-nesting meadow community at Marie Curtis Park – including a species now listed as threatened under the Species at Risk Act - can be attributed to disturbance by dog-walkers.

Ground-nesting birds 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. These same disturbances also have considerable impact on northern leopard frogs in their meadow summer-foraging habitat. Again, the disturbance within the Arsenal Land section of the site appears to have resulted in the decline and disappearance of this L3 ranked amphibian. Three small choruses of this species were documented from wetlands at the edge of the meadow habitat in 2003, and at least one small chorus still persisted in 2007. Unfortunately, no specific search was conducted for these late season frogs in 2011 and therefore the presence or absence of the species cannot be confirmed in this report.

The tendency for local urbanization to be accompanied by the clearing and maintenance of woodlands and thickets in the vicinity dramatically disrupts any species that is dependent on such shrub cover for nesting or foraging, and certainly at least two of the sensitive bird species at the Marie Curtis Park study area have such specific requirements: brown thrasher and grey catbird (*Dumetella carolinensis*). Similarly, clearing of forest understory to accommodate trails will displace such sensitive species together with understory and forest edge associates such as American redstart (*Setophaga ruticilla*).

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).

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 ha in total) score the maximum five points, while species that either show no minimum habitat requirement, or require <1 ha in total, score one point. Species scoring three points or more (require ≥5 ha 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).

Eight of the fauna species of regional or urban concern that were identified at the study area are considered area sensitive. Several of these species are forest species and as such are well-accommodated by the largest patch of forest on the site which covers 13.5 ha. The main patch of open meadow-type habitat covers approximately 10 ha, more than enough to accommodate the one area sensitive meadow-species – bobolink – reported in 2003.

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. Currently, the relatively extensive forest cover provides enough of this buffering benefit to allow several pairs of American redstart, blue-grey gnatcatcher and great-crested flycatcher (*Myiarchus crinitus*) to nest, together with one pair of Cooper's hawks (*Accipiter cooperii*) and a pair of eastern screech-owl. This latter species is not considered area sensitive but larger habitat patches will certainly also benefit even less area-sensitive species, particularly predators requiring adequate prey availability.

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 road-kill). 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.

Five of the species of regional or urban concern that occur at the study area score high for patch isolation sensitivity: three herpetofauna and two mammal species. All of these species are susceptible to some extent to road-kill on the various paved surfaces throughout the site but this is of particular significance for the three herpetofauna species. American toads (*Anaxyrus americana*) habitually disperse across the landscape as they move from upland over-wintering and foraging habitat to wetland breeding locations; northern leopard frogs forage extensively across terrestrial habitats (particularly open meadow) adjacent to their wetland breeding and wintering sites; and green frogs (*Lithobates clamitans*) disperse from wetland to wetland in search of breeding, foraging and over-wintering opportunities. If traffic volume – both car and bicycle - on the paved surfaces in the study area increases there may be an increase in the number of road-kill incidents for all three of these frog and toad species.

One important consideration regarding habitat connectivity concerns migrant fauna, primarily birds but also migrant bats and the Monarch butterfly (*Danaus plexippus*). Connectivity of natural habitat is extremely important for fauna species that migrate over relatively long distances when those species are passing through an otherwise hostile landscape. Long-distance migrants such as song-birds are quite capable of over-flying obstructions in the landscape, but to have to do so puts considerable extra stress on any individuals that have already been forced to make unscheduled migration stops due to poor weather. In such situations the migrating songbirds will require access to adequate foraging opportunities in order to replenish body fat for the next leg of their journeys and access to shelter from local predators. Furthermore, an important component of the fall migration strategy for many bird and bat species is the concept of “coasting”, i.e. following a continuous line of habitat along a shoreline. Presumably this method provides an easy route for first time migrants in the fall and the provision of well-connected natural habitat along the Toronto waterfront would benefit such migrants tremendously.

Fauna species that score greater than three points under the ***habitat dependence*** criterion are considered habitat specialists (Map 13). These species exhibit a combination of very specific habitat requirements that range from the 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. Only three fauna species that occur in the study area are considered habitat specialists: the two raptor species (Cooper’s hawk and eastern screech-owl) are both dependent on forest habitat; and northern rough-winged swallow (*Stelgidopteryx serripennis*) requires cavities or the opportunities for excavating cavities in banks and bluffs).

Richness is essentially the presence or absence of species at a site. Beyond mere presence 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. The presence of a very low number of habitat dependent species, in particular, species that are dependent on forest, suggests that the forest habitat in the study area is not functioning at a particularly high level, i.e. the forest is not of

a particularly high quality. It should however, be noted, that several L4 ranked species that are generally associated with any forested or treed habitat are present (e.g. great-crested flycatcher, hairy woodpecker, *Picoides villosus*; blue-grey gnatcatcher) and although these species do not require forest of an especially high quality, their presence in relatively good numbers indicates that the forest has potential for functioning at a higher level.

One habitat type that is often overlooked in appraisals of the natural cover on a site is successional habitat. Characterized by sparse to dense shrubby vegetation cover, this habitat presents nesting and foraging opportunities for a large number of fauna species, several of which have recently been identified as undergoing long-term provincial and continental declines. As should be expected given the human history of the Marie Curtis Park site, the mosaic of habitats includes such transitional habitat. Consequently, the site holds several species such as brown thrasher (*Toxostoma rufum*), American redstart and grey catbird – each represented by multiple territories.

All natural cover on the site has considerable significance for migrant songbird species. Although in migrant situations a different level of habitat quality is required by most bird species, there is a definite requirement for habitat that can provide adequate foraging and shelter opportunities. Within the urban landscape this could be considered an even more important function of natural cover than the provision of nesting opportunities for local and migrant birds.

5.0 Recommendations

The recommendations for the Marie Curtis Park study area 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 will require its own individualized plan of action. Following is a short summary of Marie Curtis Park within the regional context, followed by specific recommendations.

5.1 Study Area Summary

1. Part of the study area (the Arsenal Lands) was used as a manufacturing site for small arms during the Second World War. Site remediation has since been completed that included improving the natural integrity of the land (TRCA 2007e).

2. Marie Curtis Park is at the southernmost corner of TRCA jurisdiction. It is likely one of the only opportunities for a natural coastal ecosystem on the western part of the Lake Ontario shoreline within the TRCA jurisdiction.

3. Trampling, littering and unrestricted off-leash dog access are severely impacting habitat quality and biodiversity.

4. Twenty-five vegetation types observed, ranging from mature forest to treed sand dunes and sand beaches.

5. Nine vegetation communities of conservation concern including 4 coastal communities: a treed sand dune (L2), a willow shrub beach, an open beach, and a coastal deciduous forest (L3).

6. One hundred and fifty-one flora species were observed of which 20 are species of conservation concern (L1 to L4); flora species of concern were associated especially with forest habitats. None of the flora are regionally-rare.

7. A total of 55 vertebrate fauna species were observed including 26 species of either regional or urban conservation concern.

8. Two species at risk were last documented in 2003: Bobolink was a breeding species in the former Arsenal Lands and butternut was found throughout the larger forest. It is believed bobolink no longer breeds there.

9. An entire meadow-bird community – eight pairs of savannah sparrows and two pairs of bobolinks - has been lost at some point within the past seven years, probably as a result of excessive disturbance by dog-walkers in the ostensibly restricted access portion of the site (the Arsenal Lands).

10. The existing natural cover at Marie Curtis Park is one of very few patches along this west-end lakeshore and doubtless is extremely important in providing foraging opportunities and shelter for migrant songbirds and Monarch butterflies. This natural cover also serves as a starting point for spring migrant dispersal north along the Etobicoke Creek corridor.

5.2 Site Recommendations

In order to reverse the trend of biodiversity loss at Marie Curtis Park, the overall integrity of the natural heritage system that includes the site must be protected. The factors that are most limiting to biodiversity in the park are: small forest size, trampling and public access in general, and invasive non-native species. Any further habitat losses will contribute to the current trend of species losses in the park and the overall trend of cumulative habitat loss both locally and in the region. Therefore, habitat patch size needs to be increased. Furthermore, habitat quality and integrity must be protected from the negative matrix influences such as trampling and disturbance. This includes managing public use, allowing healthy dynamic natural processes to proceed, and controlling invasive species. In addition, connectivity between natural habitats within and beyond Marie Curtis Park must be improved.

The following recommendations address the above natural heritage concerns, with an emphasis upon matrix issues given that opportunities for increasing patch size are limited at Marie Curtis Park.

It is recommended overall that **1) existing habitats and features be protected and enhanced; 2) that public use be managed; 3) that invasive species be controlled; and 4) that some further assessment and monitoring should be done**.

1) Protect and Enhance Existing Features

The first priority should be to focus on ***maintaining conditions that allow existing communities or species of conservation concern to thrive***. Since the loss of the meadow bird community in the last decade most of the existing breeding bird community makes use of sheltered forest habitat rather than open or coastal vegetation. Therefore, the integrity of the forest is important. The more that natural cover is retained at the study area and vicinity, the better it can support a healthy level of biodiversity. Marie Curtis Park is endowed with a mature forest habitat, and recreation or other activities should be directed away from the main forest (FOD9-A) as much as possible. Increasing natural cover through strategic plantings and restoration will improve the patch size and shape, and facilitate in reducing negative matrix influences. 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.

a) Plant and regenerate areas in and around the current forest to improve size and shape attributes, increasing the extent of interior forest habitat, and creating and enhancing opportunities for sensitive forest species. Use local seed in plantings. Focus on improving conditions to allow current communities or species of conservation concern to continue and perhaps expand.

b) Unless management intends to prohibit public access (and especially dog access) to the meadow habitat, any plans to re-establish the functioning meadow fauna community should be abandoned, leaving an opportunity for extending forest and shrub cover. Alternatively, if effective mitigation of ground-borne disturbance (e.g. off-leash dogs) is envisaged then efforts should be directed to improving and maintaining the quality of the meadow habitat on the old Arsenal Lands by controlling the encroachment of shrub and tree species (both native and non-native), and perhaps by the use of controlled burns.

c) Improve the quality of forest habitat where taller vegetation structure allows for greater nesting opportunities and success for several otherwise sensitive bird species. The majority of fauna species thriving at the site are species that nest at levels considerably higher than ground-level. It is unlikely, given the urban matrix, that significant populations of lower-nesting species can be encouraged to nest at the site.

d) Pursue opportunities for improving habitat connectivity by re-establishing a corridor of natural habitat along the entire shoreline, including but not limited to ecological restoration.

2) Manage Public Use

Although landscape metrics indicate that the matrix influence at the site is "fair" to "poor", the "fair" score is largely attributable to the positive influence score given to Lake Ontario. Human traffic (hikers, bikers, dog-walkers) increases considerably throughout the summer and early fall and certainly there is more disturbance on the site than the matrix influence scores suggest. This is especially true for the old Arsenal Lands where a very extensive network of informal trails runs throughout the meadow habitat. Public use is the main reason why this habitat accommodates such a depauperate meadow fauna community. ***Controlling disturbance associated with urbanization and public land use is a high priority***.

a) Consider the locations of flora and fauna species of concern in any future trail planning and direct visitor pressure away from these areas. Likewise, restoration activities should target non-sensitive areas.

b) Install board-walks to replace some of the typical ground-borne trails to protect sensitive flora and fauna species.

c) Exclude dogs from the more sensitive areas of the study area and enforce the leash-by-law.

d) Formalize the nest-box installation provided for tree swallows, and equip them with effective predator guards and properly monitor/maintain on an annual basis.

e) Initiate a formal program for the installation of bat-roost boxes.

f) Build an artificial nesting facility ("hotel") for purple martins (*Progne subis*). The proximity of Lake Ontario also provides an opportunity for these birds.

g) Post signs to warn of reptile/amphibian basking/crossing on trails and roads.

3) Control Invasive Species

Marie Curtis Park is subject to threats from multiple invasive non-native species including insects such as the emerald ash borer, tree pathogens such as butternut canker, and several plants such as garlic mustard. ***It is essential that well-planned and realistic measures be undertaken to control invasive non-native species.***

a) Control the more abundant invasive non-native species such as garlic mustard, dog-strangling vine, and common reed using the most recently accepted methods (TRCA 2008). Common sources of disturbance such as erosion (in forest environments), nutrient

input, and trampling allow these invaders to thrive. Competitive plantings may play a role in containing invasions, and biological control may act in the longer term (Yates and Murphy 2008).

b) Any mowed or manicured areas will attract heavy grazing by Canada geese, and such areas also provide ideal loafing areas for this species. An effective way to deal with so-called "nuisance" Canada goose populations is to reduce the area allotted for such intensive mowing. Allowing such areas to grow-in with a healthy native meadow flora (e.g. goldenrods and asters) will considerably reduce any goose problem at the site.

4) Further Assessment and Monitoring

In order to address some remaining questions as well as to assess the efficacy of habitat protection and restoration work, certain aspects of ***Marie Curtis Park should be subject to further assessment and monitoring***.

a) Continue the TRCA's long-term monitoring plot at Marie Curtis Park as part of the Regional Watershed Monitoring Program. In addition, establish a monitoring protocol to evaluate management activities and biodiversity in the entire park (recommendations b) and c) could be part of this protocol).

b) Assess the status of northern leopard frog in and around the Arsenal Lands section since this could have implications for management and use at this site.

c) Monitor amphibian and reptile road-kill on any of the paved surfaces along the waterfront so as to enable planning for mitigation. Basking snakes on the waterfront are especially at risk from both car and bicycle traffic, as are foraging northern leopard frogs.

6.0 References

Banks P.B. and Bryant J.V. 2007. ***Four-legged friend or foe? Dog walking displaces native birds from natural areas***. Biology Letters (2007) 3. 611-613. Available on-line at: http://rsbl.royalsocietypublishing.org/content/3/6/611.full.pdf [Accessed 8 January 2010].

Cadman M.D., Sutherland D.A., Beck G.G., Lepage D., and Couturier A.R. (eds). 2007. ***Atlas of the Breeding Birds of Ontario, 2001 – 2005***. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706pp.

Gutzwiller K.J. and Anderson S.H. 1999. ***Spatial extent of human-intrusion effects on subalpine bird distributions***. Condor 101:378-389.

Kilgour B. 2003. ***Landscape and patch character as a determinant of occurrence of eighty selected bird species in the Toronto area.*** A report prepared for the TRCA. Jacques-Whitford Ltd.,2003

Lee H., Bakowsky W.D., Riley J., Bowles J., Puddister M., Uhlig P. and McMurray S. 1998. ***Ecological land classification for southern Ontario: first approximation and its application.*** Peterborough, Ontario: Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch.

Hough Woodland Naylor Dance Leinster, Duke Engineering Services (Canada) Inc., Angus Environmental Ltd., Michael Michalski Associates, DS - Lea Associates.1998. ***The Arsenal Lands Park and Site Remediation Master Plan***. Prepared for the Toronto and Region Conservation Authority.

NHIC [Ontario Natural Heritage Information Centre] 2008. Natural Heritage Information website. Available on-line at: http://nhic.mnr.gov.on.ca/nhic_.cfm [Accessed 14 February 2011].

Rosenburg K.V., Rohrbaugh R.W. Jr., Barker S.E., Hames R.S. and Dhondt A.A. 1999. ***A land manager's guide to improving habitat for scarlet tanagers and other forest-interior birds***. Ithaca, NY: The Cornell Lab of Ornithology.

TRCA 2007a. ***The Terrestrial Natural Heritage System Strategy***. Toronto Region Conservation Authority.

TRCA 2007b. ***Setting Terrestrial Natural Heritage System Targets.*** Toronto Region Conservation Authority.

TRCA 2007c. ***Evaluating and Designing Terrestrial Natural Heritage Systems***. Toronto Region Conservation Authority.

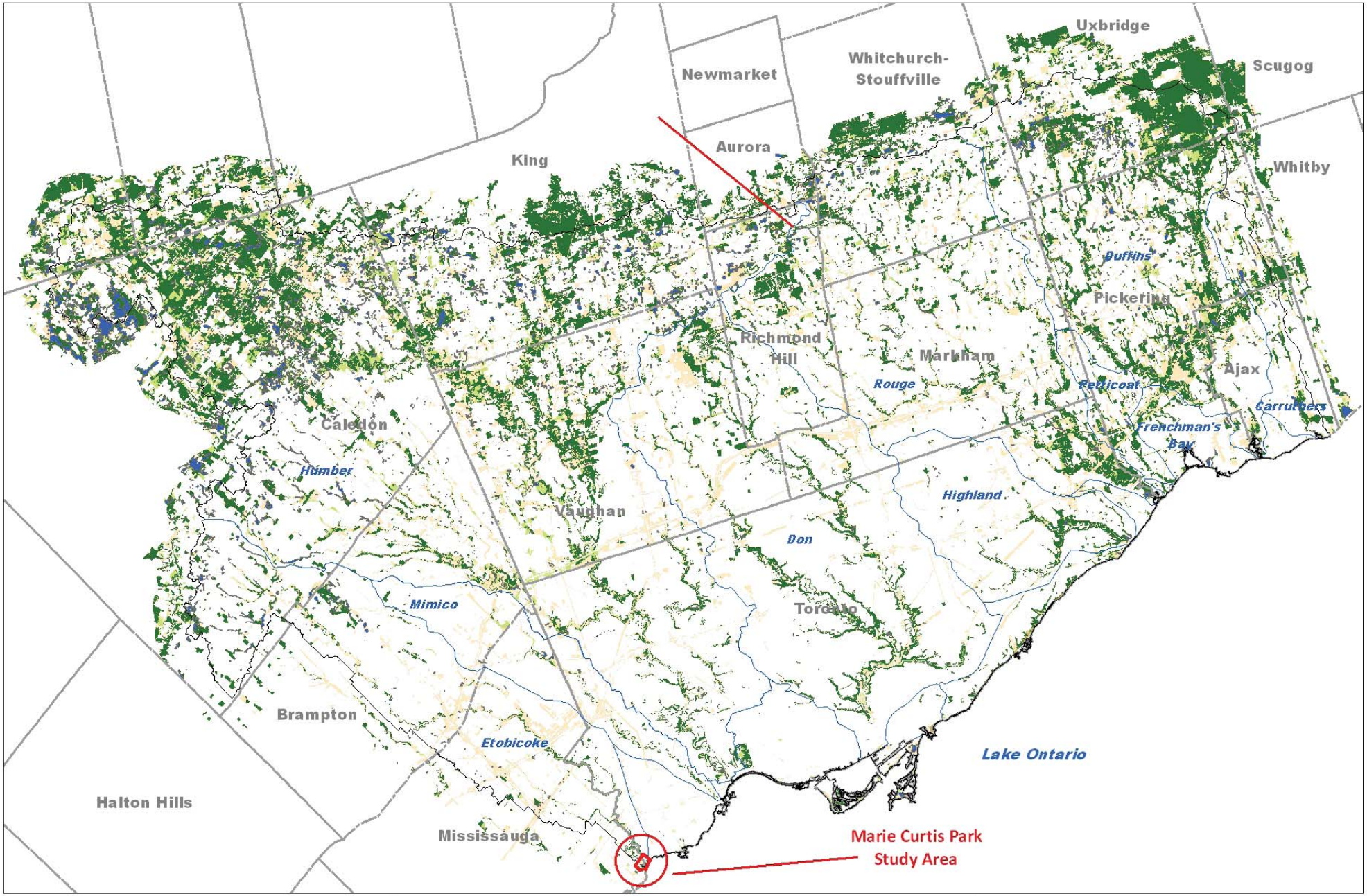
TRCA 2007d. ***Terrestrial Natural Heritage Program Data Collection Methodology***. Toronto Region Conservation Authority.

TRCA 2007e. ***Arsenal Lands Master Plan Addendum Including Marie Curtis Park West***. Toronto and Region Conservation Authority.

TRCA 2008. ***Dog-strangling vine* – Cynanchum rossicum *(Kleopow) Borhidi: a review of distribution, ecology and control of this invasive plant***. Toronto and Region Conservation Authority.

TRCA 2010. ***Vegetation Community and Species Ranking and Scoring method***. Toronto Region Conservation Authority.

Yates C.N. and Murphy S.D. 2008. ***Observations of herbivore attack on garlic mustard* (Alliaria petiolata) *in southwestern Ontario, Canada***. Biol Invasions 10:757-760.



TORONTO AND REGION Conservation for The Living City

N

0 2.5 5 10 15 20 Kilometers

Date: March 2012

* Landscape analysis based on 2007/2008 Orthophotography

Map 1:
Marie Curtis Park Study Area
in the Context of Regional Natural Cover

Natural Cover *
- Forest
- Successional
- Meadow
- Wetland
- Beach/Bluff

Legend
- Marie Curtis Park Study Area
- TRCA Jurisdiction
- Watershed
- Municipal Boundary

TORONTO AND REGION Conservation for The Living City

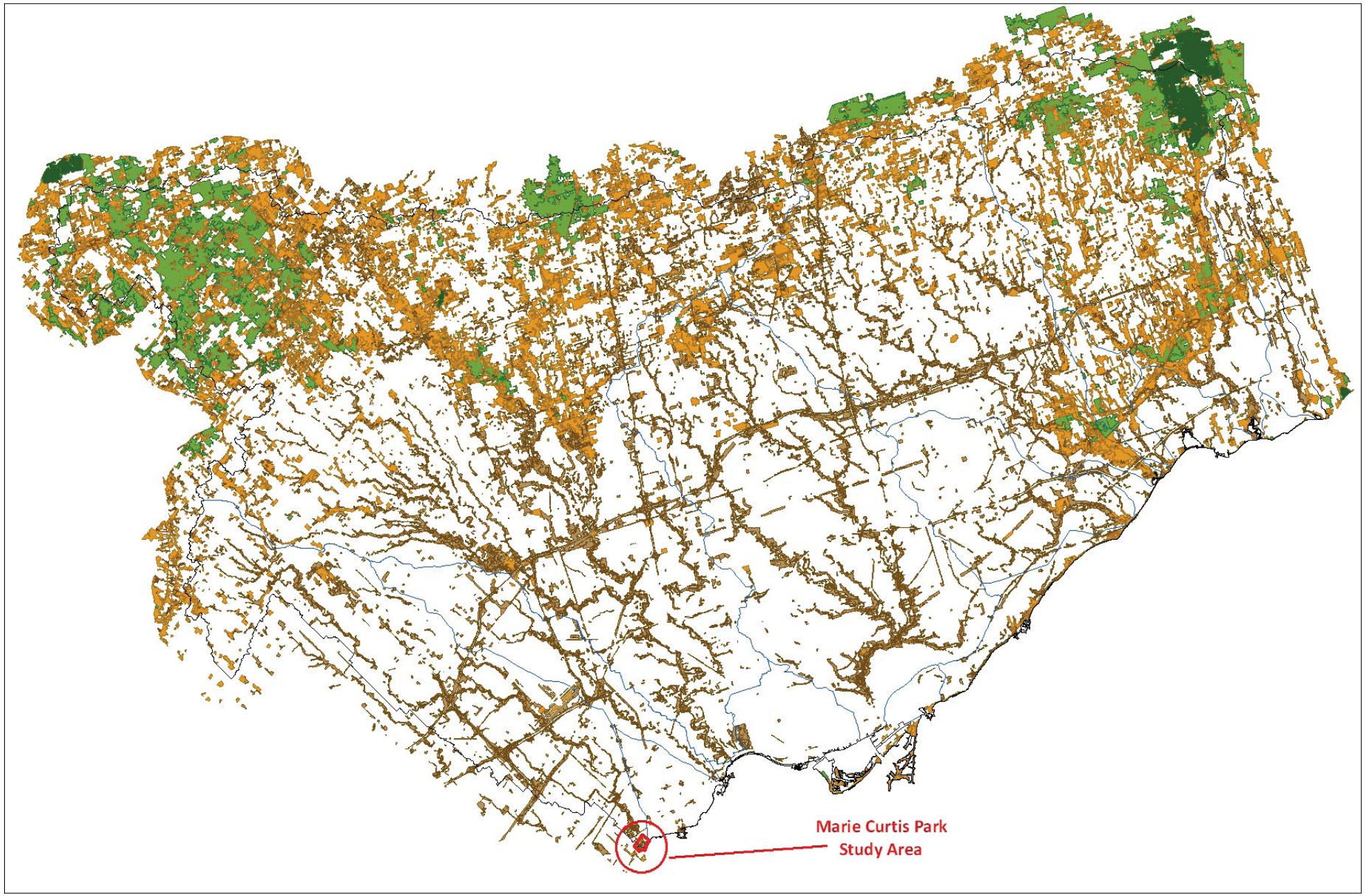
0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 2:
Marie Curtis Park
Study Area

Legend

Marie Curtis Park Boundary



TORONTO AND REGION Conservation for The Living City

N

0 2.5 5 10 15 20 Kilometers

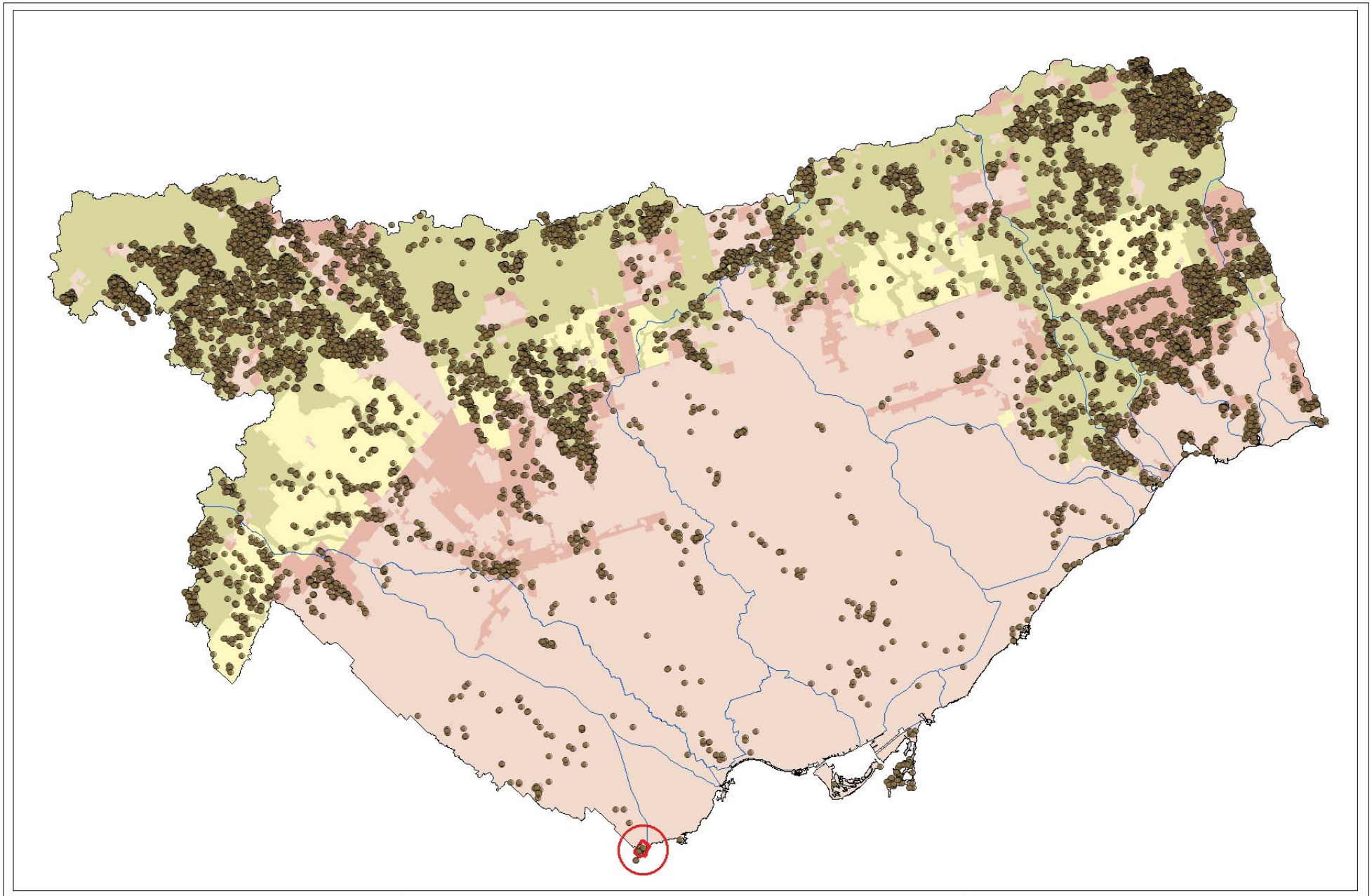
Date: March 2012
* Landscape analysis based on 20072008 Orthophotography

Map 3:
Regional Natural System
Habitat Patch Quality

Legend

Habitat Patch Quality *
- L1 - Excellent
- L2 - Good
- L3 - Fair
- L4 - Poor
- L5 - Very Poor

- Marie Curtis Park Study Area
- TRCA Jurisdiction
- Watershed



TORONTO AND REGION Conservation for The Living City

0 2.5 5 10 15 20 Kilometers

Date: March 2012

Map 4:
Distribution of Fauna
Regional Species of Concern

Legend

- Fauna Species of Concern (L1 - L3)
- Marie Curtis Park Study Area
- TRCA Jurisdiction
- Watershed
- Agricultural & Rural Area
- Built-up Area
- Designated Greenfield Area
- Greenbelt Area

Fauna Area Sensitivity Scores

- 5 - >100ha
- 4 - >20ha
- 3 - > 5ha
- 2 - > 1ha
- 1 - < 1ha

- Fauna Species
- Frog Species

Habitat Patch Size Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor

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N

0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.
* Landscape analysis based on 20072008 Orthophotography

Map 5: Habitat Patch Size Scores with Fauna Area Sensitivity Scores

Legend

Marie Curtis Park Study Area

NOTE: All fauna species with their associated scores for area sensitivity can be found in Appendix #3.

Flora Sensitivity to Development Scores

- 5 - Species receives severe negative impact from development-related disturbances
- 4 - Species receives moderately severe negative impact from development-related disturbances
- 3 - Species receives significant negative impact from development-related disturbances
- 2 - Species receives slight negative impact from development-related disturbances
- 1 - Species experiences no overall benefit or detriment from development-related disturbances (neutral)
- 0 - Species benefits significantly from development-related disturbances

NOTE: All flora species with their associated scores for sensitivity to development can be found in Appendix #2.

○ Flora Species

Toronto and Region Conservation for The Living City

N

0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.
* Landscape analysis based on 2007/2008 Orthophotography

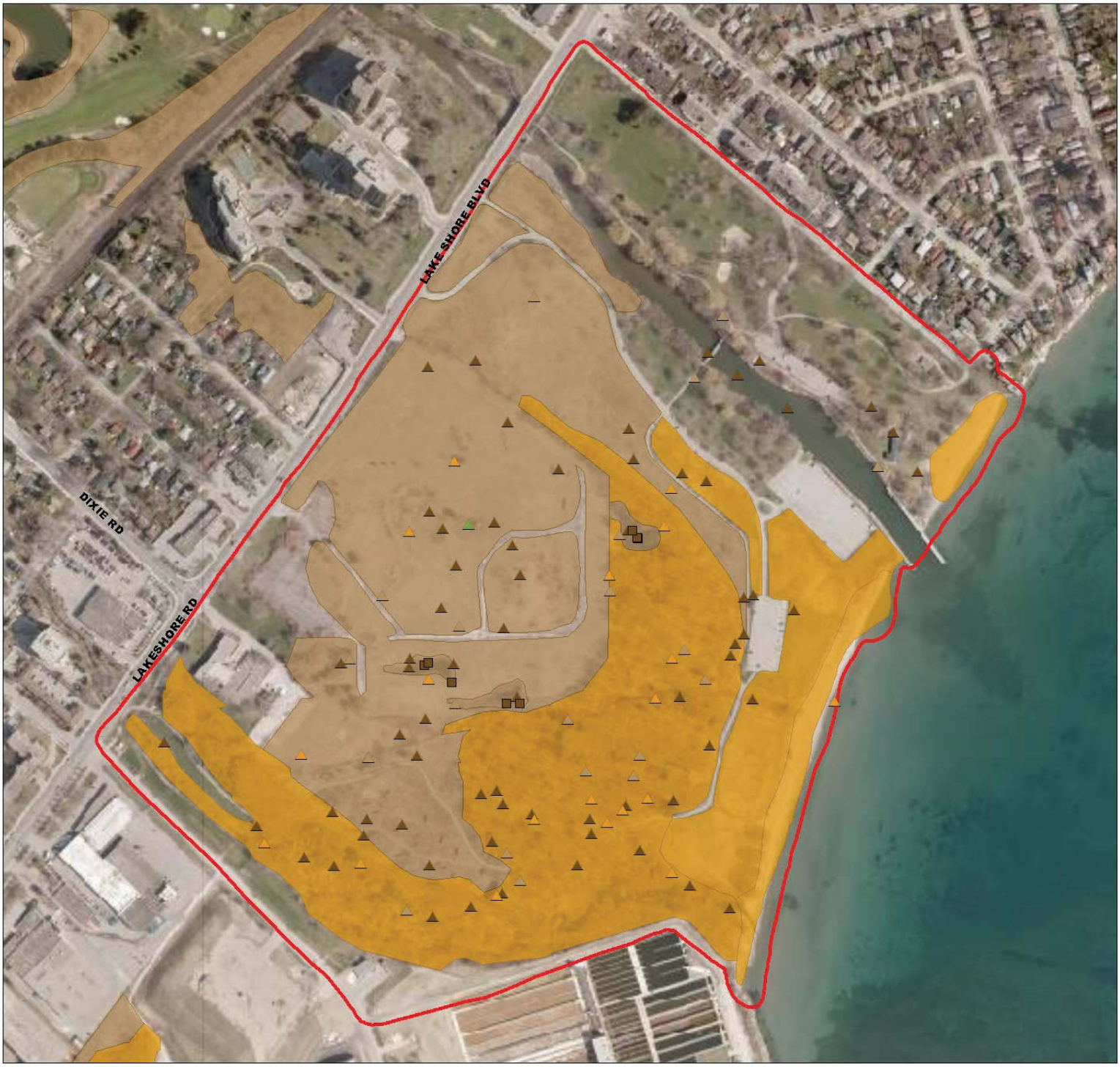
Map 6: Scores for Matrix Influence and Flora Sensitivity to Development

Legend

Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor

Marie Curtis Park Study Area



Fauna Sensitivity to Development Scores

- 5 - Species receives severe negative impact from development-related disturbances
- 4 - Species receives moderately severe negative impact from development-related disturbances
- 3 - Species receives significant negative impact from development-related disturbances
- 2 - Species receives slight negative impact from development-related disturbances
- 1 - Species experiences no overall benefit or detriment from development-related disturbances (neutral)
- 0 - Species benefits significantly from development-related disturbances

NOTE: All fauna species with their associated scores for sensitivity to development can be found in Appendix #3.

- Fauna Species
- Frog Species

TORONTO AND REGION Conservation for The Living City

N

0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.
* Landscape analysis based on 2007-2008 Orthophotography

Map 7: Scores for Matrix Influence and Fauna Sensitivity to Development

Legend

Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor

Marie Curtis Park Study Area

TORONTO AND REGION Conservation for The Living City

N

0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.
* Landscape analysis based on 2007/2008 Orthophotography

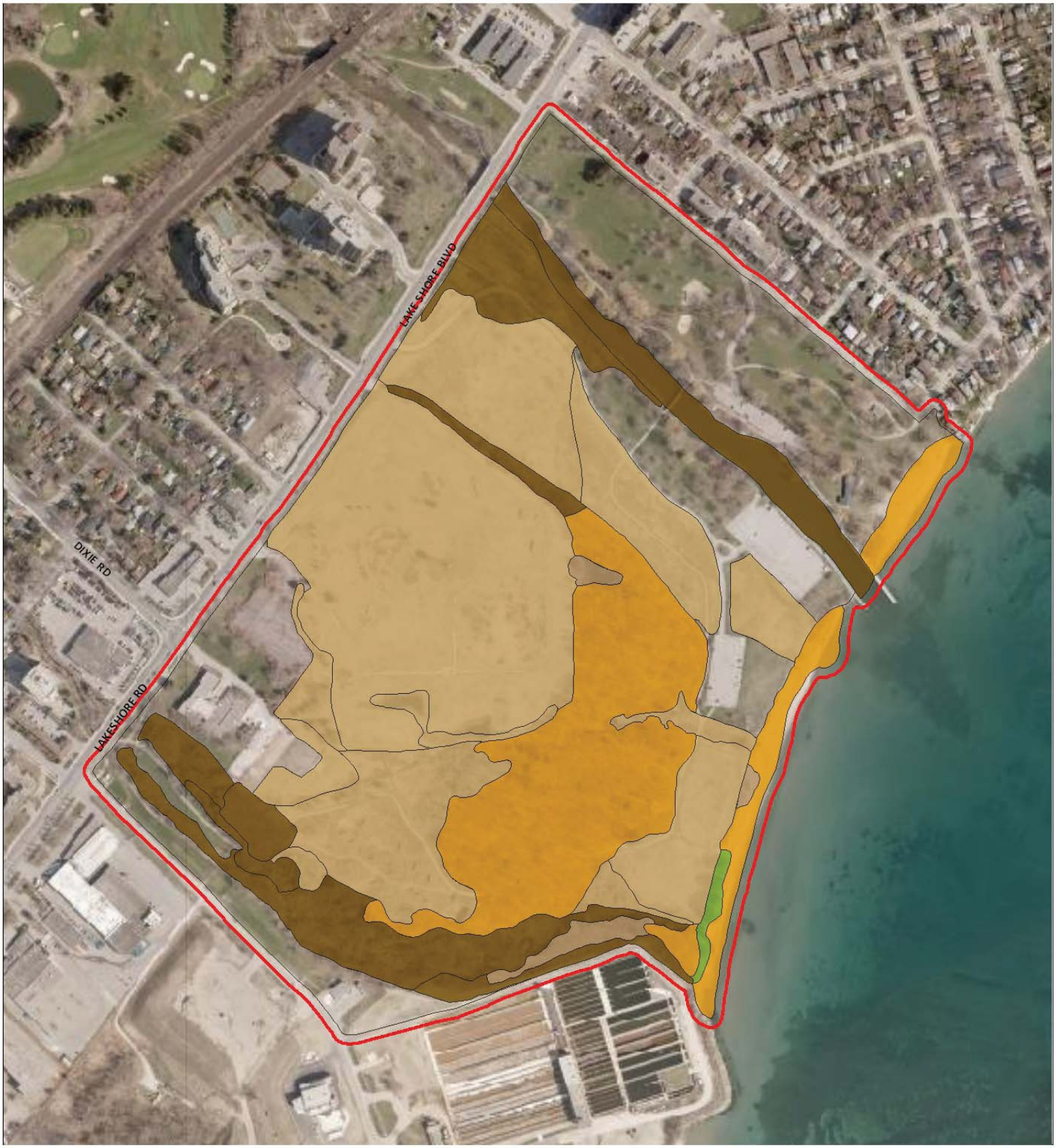
Map 8: Habitat Patch Quality

Legend

Habitat Patch Quality *

- L1 - Excellent
- L2 - Good
- L3 - Fair
- L4 - Poor
- L5 - Very Poor

Marie Curtis Park Study Area



TORONTO AND REGION Conservation for The Living City

N

0 50 100 200 300 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 9:
Vegetation Communities with their Associated Local Ranks

Legend

Vegetation Community Ranks

L1
L2
L3
L4
L5
L+

Marie Curtis Park Study Area

NOTE: All vegetation communities with their associated scores and ranks can be found in Appendix #1.

TORONTO AND REGION Conservation for The Living City

N

0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 10: Locations of Flora Species of Concern

Legend

Flora Species of Concern

L1 L3
L2 L4

Marie Curtis Park Study Area

Flora Habitat Dependence Scores

- 5 - Extreme habitat specialist
- 4 - Strong habitat specialist
- 3 - Moderate habitat specialist
- 2 - Moderate habitat generalist
- 1 - Strong habitat generalist
- 0 - Extreme habitat generalist

○ Flora Species

NOTE: All flora species with their associated scores for habitat dependence can be found in Appendix #2.

Toronto and Region Conservation for The Living City

N

0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 11: Flora Species Habitat Dependence Scores

Legend

Marie Curtis Park Study Area

TORONTO AND REGION Conservation for The Living City

N

0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 12: Locations of Fauna Species of Concern

Legend

Fauna Species of Concern		Frog Species of Concern	
L1	L3	L1	L3
L2	L4	L2	L4

Marie Curtis Park Study Area

Fauna Habitat Dependence Scores

- 5 - Extreme habitat specialist
- 4 - Strong habitat specialist
- 3 - Moderate habitat specialist
- 2 - Moderate habitat generalist
- 1 - Strong habitat generalist
- 0 - Extreme habitat generalist

Fauna Species

Frog Species

NOTE: All fauna species with their associated scores for habitat dependence can be found in Appendix #3.

TORONTO AND REGION Conservation for The Living City

N

0 25 50 100 150 200 250 Meters

Date: March 2012
Orthophoto: Spring 2007, First Base Solutions Inc.

Map 13: Fauna Species Habitat Dependence Scores

Legend

Marie Curtis Park Study Area

Appendix 1: List of TRCA Vegetation Communities at Marie Curtis Park

ELC Code	Vegetation Type (** indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2010-04)
			Local Occur.	Geophy. Requir.	Total Score	
	Forest					
FOM2-1	Dry-Fresh White Pine - Oak Mixed Forest**		3.0	4.0	7.0	L2
FOD2-4	Dry-Fresh Oak - Hardwood Deciduous Forest	0.4	2.5	2.0	4.5	L4
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest	2.4	2.0	0.0	2.0	L5
FOD8-1	Fresh-Moist Poplar Deciduous Forest**		1.0	0.0	1.0	L5
FOD8-A	Fresh-Moist Cottonwood Coastal Deciduous Forest	0.2	3.0	2.0	5.0	L3
FOD9-A	Fresh-Moist Oak - Beech Deciduous Forest	7.2	3.5	2.0	5.5	L3
CUP1-5	Silver Maple Deciduous Plantation	0.4	3.0	0.0	3.0	L5
CUP2-G	Ash - Conifer Mixed Plantation	0.5	3.5	0.0	3.5	L5
CUP3-3	Scotch Pine Coniferous Plantation	0.1	2.0	0.0	2.0	L+
CUP3-G	White Cedar Coniferous Plantation	0.3	2.5	0.0	2.5	L5
	Successional					
CUT1-1	Sumac Deciduous Thicket	0.5	2.0	0.0	2.0	L5
CUT1-c	Exotic Deciduous Thicket	0.3	2.0	0.0	2.0	L+
CUH1-A	Treed Hedgerow	0.4	1.5	0.0	1.5	L5
CUS1-b	Exotic Successional Savannah	2.9	1.5	0.0	1.5	L+
CUW1-A3	Native Deciduous Successional Woodland	1.4	1.5	0.0	1.5	L5
CUW1-b	Exotic Successional Woodland	0.5	1.5	0.0	1.5	L+
	Wetland					
MAM2-a	Common Reed Mineral Meadow Marsh**		3.0	0.0	3.0	L+
MAS2-1A	Broad-leaved Cattail Mineral Shallow Marsh	0.1	2.0	1.0	3.0	L4
MAS2-1b	Narrow-Leaved Cattail Mineral Shallow Marsh	0.6	2.0	0.0	2.0	L+
	Aquatic					
SAF1-3	Duckweed Floating-leaved Shallow Aquatic**		2.5	1.0	3.5	L4
OAO1	Open Aquatic (deep or riverine unvegetated)	1.8	1.5	0.0	1.5	L5
	Dynamic (Beach, Bluff, Barren, Prairie, Savannah)					
BBO1	Mineral Open Beach	1.7	3.0	2.0	5.0	L3
BBS1-2A	Willow Shrub Beach	0.1	5.0	3.0	8.0	L4
SDT1-2	Balsam Poplar Treed Sand Dune		4.5	3.0	7.5	L2

Appendix 1: List of TRCA Vegetation Communities at Marie Curtis Park

ELC Code	Vegetation Type (** indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2010-04)
			Local Occur.	Geophy. Requir.	Total Score	
	Meadow					
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	17.2	1.0	0.0	1.0	L+

Appendix 2: List of Flora Species at Marie Curtis Park 1999 and 2003

Scientific Name	Common Name	Local Occur. 1-5	Popn. Trend 1-5	Hab. Dep. 0-5	Sens. Dev. 0-5	Total Score 2-20	Rank TRCA (03/2009)
Anemone quinquefolia var. *quinquefolia*	wood-anemone	2	4	3	5	14	L3
Bolboschoenus fluviatilis	river bulrush	3	2	5	4	14	L3
Carya ovata	shagbark hickory	2	4	4	4	14	L3
Hamamelis virginiana	witch-hazel	2	4	4	4	14	L3
Juglans cinerea	butternut	1	5	4	4	14	L3
Lonicera dioica	wild honeysuckle	3	4	4	4	15	L3
*Viburnum acerifolium***	maple-leaved viburnum	2	3	4	5	14	L3
Acer rubrum	red maple	2	4	1	5	12	L4
Acer saccharinum	silver maple	1	2	5	3	11	L4
*Actaea pachypoda***	white baneberry	2	3	4	3	12	L4
*Apocynum androsaemifolium***	spreading dogbane	2	3	2	4	11	L4
Betula alleghaniensis	yellow birch	1	4	3	5	13	L4
Betula papyrifera	paper birch	1	4	2	4	11	L4
Boehmeria cylindrica	false nettle	2	4	4	3	13	L4
*Carex lacustris***	lake-bank sedge	2	3	3	4	12	L4
Carex pensylvanica	Pennsylvania sedge	2	4	3	4	13	L4
Carpinus caroliniana ssp. *virginiana*	blue beech	1	3	4	3	11	L4
Cornus rugosa	round-leaved dogwood	2	4	4	3	13	L4
Corylus cornuta	beaked hazel	2	4	3	4	13	L4
*Epifagus virginiana***	beech-drops	2	3	5	2	12	L4
Eurybia macrophylla	big-leaved aster	2	3	2	4	11	L4
Fagus grandifolia	American beech	1	4	3	4	12	L4
Geranium maculatum	wild geranium	3	3	4	3	13	L4
Maianthemum canadense	Canada May-flower	1	4	1	5	11	L4
Pinus strobus	white pine	1	4	3	4	12	L4
Quercus rubra	red oak	1	4	2	4	11	L4
Schoenoplectus tabernaemontani	soft-stemmed bulrush	2	2	5	3	12	L4
*Solidago juncea***	early goldenrod	3	3	4	2	12	L4
*Trillium grandiflorum***	white trillium	1	3	4	5	13	L4
Tsuga canadensis	eastern hemlock	1	4	3	5	13	L4
Typha latifolia	broad-leaved cattail	1	4	4	4	13	L4
Wolffia columbiana	Columbia water-meal	2	4	5	2	13	L4
Acer saccharum	sugar maple	1	3	0	2	6	L5
Anemone canadensis	Canada anemone	2	2	2	2	8	L5
*Anemone virginiana***	common thimbleweed	2	3	0	3	8	L5
Aralia nudicaulis	wild sarsaparilla	2	3	1	4	10	L5
*Arisaema triphyllum***	Jack-in-the-pulpit	1	3	2	3	9	L5
Asclepias syriaca	common milkweed	2	2	0	2	6	L5
Bidens frondosa	common beggar's-ticks	2	1	4	0	7	L5
Carex blanda	common wood sedge	2	2	1	2	7	L5
Carex cristatella	crested sedge	2	2	4	1	9	L5
Carex radiata	straight-styled sedge	2	2	2	2	8	L5
Carex vulpinoidea	fox sedge	2	2	4	1	9	L5
Circaea canadensis ssp. *canadensis*	enchanter's nightshade	2	1	1	1	5	L5
*Cornus alternifolia***	alternate-leaved dogwood	2	2	1	2	7	L5
Cornus stolonifera	red osier dogwood	1	2	0	3	6	L5
Crataegus punctata	dotted hawthorn	2	2	3	3	10	L5
*Echinocystis lobata***	wild cucumber	2	2	3	1	8	L5
Epilobium ciliatum ssp. *ciliatum***	sticky willow-herb	2	2	2	2	8	L5
Equisetum arvense	field horsetail	1	2	1	1	5	L5
Erigeron philadelphicus var. *philadelphicus***	Philadelphia fleabane	2	2	0	1	5	L5
Erythronium americanum ssp. *americanum*	yellow trout-lily	2	3	3	2	10	L5
Eutrochium maculatum var. *maculatum*	spotted Joe-Pye weed	2	2	3	3	10	L5
Fragaria vesca ssp. *americana***	woodland strawberry	3	2	2	2	9	L5
Fragaria virginiana	wild strawberry	2	2	0	2	6	L5
Fraxinus americana	white ash	1	2	0	3	6	L5
*Fraxinus pennsylvanica***	red ash	5	2	0	3	10	L5
Galium palustre	marsh bedstraw	2	2	3	3	10	L5
*Geum canadense***	white avens	2	2	1	2	7	L5
*Glyceria striata***	fowl manna grass	2	2	1	2	7	L5
Hydrophyllum virginianum	Virginia waterleaf	2	2	1	2	7	L5
Impatiens capensis	orange touch-me-not	1	2	0	2	5	L5
Juglans nigra	black walnut	2	1	2	1	6	L5
Juncus dudleyi	Dudley's rush	2	2	3	1	8	L5

**only recorded during a 1995 survey by Michael Michalski and Associates.

Appendix 2: List of Flora Species at Marie Curtis Park 1999 and 2003

Scientific Name	Common Name	Local Occur. 1-5	Popn. Trend 1-5	Hab. Dep. 0-5	Sens. Dev. 0-5	Total Score 2-20	Rank TRCA (03/2009)
Laportea canadensis	wood nettle	2	3	2	2	9	L5
Lemna minor	common duckweed	2	2	4	2	10	L5
Lysimachia ciliata	fringed loosestrife	2	2	2	2	8	L5
Maianthemum racemosum ssp. *racemosum*	false Solomon's seal	2	3	2	3	10	L5
Matteuccia struthiopteris var. *pensylvanica*	ostrich fern	1	2	2	2	7	L5
Oenothera biennis	common evening-primrose	2	1	1	1	5	L5
Onoclea sensibilis	sensitive fern	2	3	1	3	9	L5
Ostrya virginiana	ironwood	2	3	2	2	9	L5
Parthenocissus inserta	thicket creeper	1	2	0	1	4	L5
Podophyllum peltatum	May-apple	1	3	3	3	10	L5
Populus balsamifera	balsam poplar	1	2	3	2	8	L5
Populus deltoides	cottonwood	2	1	4	1	8	L5
Populus tremuloides	trembling aspen	1	3	1	3	8	L5
Prunus serotina	black cherry	2	2	0	2	6	L5
Prunus virginiana var. *virginiana*	choke cherry	1	2	0	1	4	L5
Rhus typhina	staghorn sumach	2	1	2	2	7	L5
*Ribes americanum***	wild black currant	2	3	2	2	9	L5
Rubus allegheniensis	common blackberry	2	3	0	1	6	L5
Rubus idaeus ssp. *strigosus*	wild red raspberry	1	1	0	1	3	L5
Rubus occidentalis	wild black raspberry	2	1	0	1	4	L5
Salix interior	sandbar willow	2	1	5	2	10	L5
Sambucus racemosa ssp. *pubens*	red-berried elder	2	3	2	2	9	L5
Solidago altissima	tall goldenrod	1	2	0	0	3	L5
Solidago caesia	blue-stemmed goldenrod	2	2	4	2	10	L5
Solidago canadensis var. *canadensis***	Canada goldenrod	2	2	0	1	5	L5
Solidago flexicaulis	zig-zag goldenrod	2	1	3	2	8	L5
Solidago gigantea	late goldenrod	2	1	1	1	5	L5
Symphyotrichum cordifolium	heart-leaved aster	2	1	0	2	5	L5
Symphyotrichum ericoides var. *ericoides*	heath aster	2	1	2	1	6	L5
Symphyotrichum lanceolatum var. *lanceolatum*	panicled aster	1	2	3	1	7	L5
Thalictrum dioicum	early meadow rue	2	3	3	2	10	L5
Thalictrum pubescens	tall meadow rue	2	3	2	2	9	L5
Tilia americana	basswood	1	4	2	3	10	L5
Toxicodendron radicans var. *rydbergii*	poison ivy (shrub form)	2	2	0	2	6	L5
Ulmus americana	white elm	1	4	0	2	7	L5
Viburnum lentago	nannyberry	2	3	1	2	8	L5
Viola pubescens	stemmed yellow violet (sensu lato)	2	3	1	2	8	L5
Viola sororia	common blue violet	2	2	0	2	6	L5
Vitis riparia	riverbank grape	1	1	0	0	2	L5
Xanthium strumarium	clotbur	3	1	4	0	8	L5
Acer platanoides	Norway maple	3				3	L+
Alliaria petiolata	garlic mustard	2				2	L+
Arctium lappa	great burdock	3				3	L+
Bromus inermis	smooth brome grass	3				3	L+
Bromus tectorum	downy chess	4				4	L+
Campanula rapunculoides	creeping bellflower	3				3	L+
Cirsium arvense	creeping thistle	2				2	L+
Cirsium vulgare	bull thistle	3				3	L+
Crataegus monogyna	English hawthorn	3	1	4	0	8	L+
Cynanchum rossicum	dog-strangling vine	3				3	L+
Dactylis glomerata	orchard grass	3				3	L+
Daucus carota	Queen Anne's lace	3				3	L+
Fallopia japonica var. *japonica*	Japanese knotweed	4				4	L+
Geum urbanum	urban avens	3				3	L+
Hemerocallis fulva	orange day-lily	4				4	L+
Hesperis matronalis	dame's rocket	2				2	L+
Hypericum perforatum	common St. John's-wort	3				3	L+
Iris pseudacorus	yellow flag	4				4	L+
Lonicera morrowii	Morrow's honeysuckle	3				3	L+
Lonicera tatarica	Tartarian honeysuckle	4				4	L+
Lonicera x *bella*	shrub honeysuckle	3				3	L+
Lotus corniculatus	bird's foot trefoil	3				3	L+
Lysimachia nummularia	moneywort	4				4	L+
Lythrum salicaria	purple loosestrife	3				3	L+

**only recorded during a 1995 survey by Michael Michalski and Associates.

Appendix 2: List of Flora Species at Marie Curtis Park 1999 and 2003

Scientific Name	Common Name	Local Occur. 1-5	Popn. Trend 1-5	Hab. Dep. 0-5	Sens. Dev. 0-5	Total Score 2-20	Rank TRCA (03/2009)
Malus pumila	apple	2				2	L+
Papaver orientale	oriental poppy	5				5	L+
Phleum pratense	Timothy grass	3				3	L+
Poa pratensis ssp. *pratensis*	Kentucky blue grass	3				3	L+
Ranunculus acris	tall buttercup	3				3	L+
Rhamnus cathartica	common buckthorn	2				2	L+
Ribes rubrum	garden red currant	3				3	L+
Robinia pseudoacacia	black locust	3				3	L+
Rosa multiflora	multiflora rose	3				3	L+
Salix x *fragilis*	crack willow	3				3	L+
Schedonorus pratensis	meadow fescue	3				3	L+
Solanum dulcamara	bittersweet nightshade	3				3	L+
Solanum rostratum	buffalo-bur	5				5	L+
Taraxacum officinale	dandelion	3				3	L+
Torilis japonica	hedge-parsley	4				4	L+
Tussilago farfara	coltsfoot	2				2	L+
Typha angustifolia	narrow-leaved cattail	3				3	L+
Typha x *glauca*	hybrid cattail	3				3	L+
Ulmus pumila	Siberian elm	4				4	L+
Urtica dioica ssp. *dioica*	European stinging nettle	4				4	L+
Viburnum opulus	European highbush cranberry	3				3	L+
Vicia cracca	cow vetch	3				3	L+
Acer negundo	Manitoba maple	2	0	0	2	4	L+?
Geranium robertianum	herb Robert	3				3	L+?
Phalaris arundinacea	reed canary grass	3				3	L+?
Phragmites australis ssp. *australis*	common reed	3				3	L+?
*Prunella vulgaris***	heal-all	4				4	L+?
Anaphalis margaritacea	pearly everlasting	3	4	4	3	14	pL3
Penstemon hirsutus	hairy beard-tongue	5	4	4	3	16	pL3
Picea glauca	white spruce	1	5	4	4	14	pL3
Diervilla lonicera	bush honeysuckle	2	3	2	4	11	pL4
Rosa blanda	smooth wild rose	2	3	3	4	12	pL4
Thuja occidentalis	white cedar	1	4	1	5	11	pL4
Fraxinus pennsylvanica	red ash	2	2	2	3	9	pL5
Fraxinus pennsylvanica	red ash	2	2	2	3	9	pL5
Acer tataricum ssp. *ginnala*	Amur maple	4	0	0	2	6	pL+
Agastache scrophulariifolia							pL+
Larix decidua	European larch	4				4	pL+
Picea abies	Norway spruce	5				5	pL+
Pinus sylvestris	Scots pine	3				3	pL+
Populus x *canadensis*	Carolina poplar	5				5	pL+
Populus nigra	black poplar	5				5	prL+
Chamaesyce sp.	spurge						

**only recorded during a 1995 survey by Michael Michalski and Associates.

Appendix 3: List of Fauna Species for Marie Curtis Park from 2002 - 2011

Common Name	Code	Scientific Name	2003	2011	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
Survey Species: species for which the TRCA protocol effectively surveys.														
Birds														
American woodcock	AMWO	*Scolopax minor*		(2)	0	2	3	3	2	2	4	0	16	**L3**
bobolink	BOBO	*Dolichonyx oryzivorus*	2		0	3	3	3	1	1	5	1	17	**L3**
brown thrasher	BRTH	*Toxostoma rufum*	2	1	0	3	3	2	2	1	4	0	15	**L3**
American redstart	AMRE	*Setophaga ruticilla*		2	0	2	2	3	1	2	4	0	14	**L4**
barn swallow	BARS	*Hirundo rustica*		3	0	2	3	1	1	2	1	0	10	**L4**
belted kingfisher	BEKI	*Ceryle alcyon*		1	0	3	2	2	1	2	2	0	12	**L4**
blue-grey gnatcatcher	BGGN	*Polioptila caerulea*		5	1	1	1	3	1	1	3	0	11	**L4**
common yellowthroat	COYE	*Geothlypis trichas*	1	1	0	2	2	1	2	1	4	0	12	**L4**
Cooper's hawk	COHA	*Accipiter cooperii*		1	0	2	1	4	1	3	2	0	13	**L4**
eastern kingbird	EAKI	*Tyrannus tyrannus*	1	3	0	4	2	2	1	1	3	0	13	**L4**
eastern screech-owl	EASO	*Megascops asio*		(2010)	0	2	2	1	2	3	3	0	13	**L4**
great-crested flycatcher	GCFL	*Myiarchus crinitus*		2	0	2	2	3	1	2	2	0	12	**L4**
grey catbird	GRCA	*Dumetella carolinensis*	10	12	0	2	2	1	1	1	3	0	10	**L4**
hairy woodpecker	HAWO	*Picoides villosus*		1	0	2	2	3	1	2	2	0	12	**L4**
northern flicker	NOFL	*Colaptes auratus*	2	2	0	3	2	1	1	2	3	0	12	**L4**
northern rough-winged swallow	NRWS	*Stelgidoptery x serripennis*	3	2	0	1	2	1	1	3	2	0	10	**L4**
red-eyed vireo	REVI	*Vireo olivaceus*	3	2	0	2	2	2	1	1	3	0	11	**L4**
ruby-throated hummingbird	RTHU	*Archilochus colubris*		1	0	2	2	1	1	2	2	0	10	**L4**
savannah sparrow	SAVS	*Passerculus sandwichensis*	8		0	3	2	1	1	1	4	0	12	**L4**
tree swallow	TRES	*Tachycineta bicolor*	1	2	0	2	2	1	1	2	2	0	10	**L4**
willow flycatcher	WIFL	*Empidonax traillii*	1	2	0	4	2	1	1	1	3	0	12	**L4**
American goldfinch	AMGO	*Carduelis tristis*		x	0	2	2	1	1	0	1	0	7	**L5**
American robin	AMRO	*Turdus migratorius*		x	0	1	2	1	1	0	1	0	6	**L5**
Baltimore oriole	BAOR	*Icterus galbula*		x	0	2	2	1	1	0	1	0	7	**L5**
black-capped chickadee	BCCH	*Parus atricapillus*		x	0	1	2	1	1	0	1	0	6	**L5**
blue jay	BLJA	*Cyanocitta cristata*		x	0	4	2	1	1	0	1	0	9	**L5**
brown-headed cowbird	BHCO	*Molothrus ater*		x	0	2	2	1	1	0	1	0	7	**L5**
Canada goose	CANG	*Branta canadensis*		x	0	1	1	1	2	1	0	0	6	**L5**
cedar waxwing	CEDW	*Bombycilla cedrorum*		x	0	1	2	1	1	0	1	0	6	**L5**
common grackle	COGR	*Quiscalus quiscula*		x	0	3	2	1	1	0	1	0	8	**L5**
house wren	HOWR	*Troglodytes aedon*		x	0	2	2	1	2	1	1	0	9	**L5**
mallard	MALL	*Anas platyrhynchos*		x	0	2	2	1	2	0	1	0	8	**L5**
mourning dove	MODO	*Zenaida macroura*		x	0	2	2	1	1	0	0	0	6	**L5**

Appendix 3: List of Fauna Species for Marie Curtis Park from 2002 - 2011

Common Name	Code	Scientific Name	2003	2011	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
northern cardinal	NOCA	*Cardinalis cardinalis*		x	0	2	2	1	1	1	2	0	9	**L5**
northern mockingbird	NOMO	*Mimus polyglottos*	1		0	2	0	1	1	1	1	0	6	**L5**
orchard oriole	OROR	*Icterus spurius*		1	1	2	1	1	1	0	1	0	7	**L5**
red-tailed hawk	RTHA	*Buteo jamaicensis*		x	0	2	2	2	1	1	1	0	9	**L5**
red-winged blackbird	RWBL	*Agelaius phoeniceus*		x	0	2	2	1	1	0	2	0	8	**L5**
song sparrow	SOSP	*Melospiza melodia*		x	0	2	2	1	2	0	2	0	9	**L5**
warbling vireo	WAVI	*Vireo gilvus*		x	0	1	2	1	1	1	2	0	8	**L5**
yellow warbler	YWAR	*Setophaga petechia*		x	0	1	2	1	1	1	3	0	9	**L5**
European starling	EUST	*Sturnus vulgaris*		x										**L+**
house finch	HOFI	*Carpodacus mexicanus*		x										**L+**
house sparrow	HOSP	*Passer domesticus*		x										**L+**
mute swan	MUSW	*Cygnus olor*		x										**L+**
rock dove	ROPI	*Columba livia*		x										**L+**
Herpetofauna														
northern leopard frog	LEFR	*Lithobates pipiens*	3		0	3	2	1	4	2	5	1	18	**L3**
American toad	AMTO	*Anaxyrus americana*	2		0	3	2	1	4	0	4	0	14	**L4**
green frog	GRFR	*Rana clamitans*		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 cottontail	EACO	*Sylvilagus floridanus*		1	0	2	2	1	3	1	2	0	11	**L4**
muskrat	MUSK	*Ondatra zibethicus*	1	1	0	2	2	1	3	1	3	0	12	**L4**
white-tailed deer	WTDE	*Odocoileus virginianus*		1	0	2	1	3	2	2	1	0	11	**L4**
grey squirrel	GRSQ	*Sciurus carolinensis*		x	0	2	2	1	3	0	0	0	8	**L5**
raccoon	RACC	*Procyon lotor*		x	0	2	2	1	3	1	0	0	9	**L5**
striped skunk	STSK	*Mephitis mephitis*		x	1	2	2	1	3	0	0	0	9	**L5**
LEGEND														
LO = local occurrence		AS = area sensitivity				TS = total score								
PTn = population trend, continent-wide		PIS = Patch Isolation Sensitivity				L-rank = TRCA Rank, December, 2010								
PTt = population trend, TRCA		STD = sensitivity to development												
HD = habitat dependence		+ = additional points												