



Lake St. George Field Centre

Terrestrial Biological Inventory and Assessment

February, 2017



Report prepared by: Gavin Miller, Flora Biologist
Dell Tune, Monitoring Technician
Patricia Moleirinho, GIS Technologist

Reviewed by: Sue Hayes, Project Manager, Terrestrial Monitoring and Inventories
Scott Jarvie, Associate Director, Environmental Monitoring and Data Management Section

This report may be referenced as:

Toronto and Region Conservation Authority (TRCA). 2017. Lake St. George Field Centre Biological Inventory and Assessment.

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1.0 Introduction

In 2014 and 2016 the Toronto Region Conservation Authority (TRCA) conducted fauna and flora inventories of the Lake St. George Field Centre property. This inventory was undertaken primarily to update existing information for the property, information which had been collected in a previous inventory conducted in 2001; but also in order to fulfill the TRCA's commitment to maintaining up-to-date data on vegetation communities, flora and fauna species across its jurisdiction. Hence, the information can be used for both local and regional natural heritage assessment and planning.

At the larger scale, the purpose of the work conducted by the TRCA during the 2014 and 2016 field seasons was to *characterize the terrestrial natural heritage features* of the Lake St. George property. Once characterized, the site features can then be understood within the larger watershed and the regional context of the Terrestrial Natural Heritage Program, enabling a better understanding of biodiversity across the jurisdiction. Results can be used to improve the Terrestrial Natural Heritage System Strategy (TNHSS) targets. The question that the inventory addresses is "*How does the area surveyed at the Lake St. George Field Centre 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.

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, achieved 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 natural habitat associated with Lake St. George Field Centre acts as an important link along the Oak Ridges Moraine (ORM), helping to create a continuous corridor of natural cover across the north end of the TRCA jurisdiction. In particular, Lake St. George connects with natural areas around Swan Lake, West Gormley, and Jefferson Forest to the south; and Haynes Lake and Bloomington Wetland to the north and east. The persistence of natural cover at sites such as this is extremely important in maintaining effective migration and dispersal routes across the rapidly expanding urban landscape.

2.0 Study Area Description

The Lake St. George Field Centre is a TRCA owned property located on the ORM in the northern part of the Town of Richmond Hill bound to the south by Bethesda Sideroad, to the west by Bayview Avenue, to the east by Diamondback Golf Club, and to the north by Bloomington Downs Golf Course (Maps 1 and 2). There are ponds and wetlands in the immediate vicinity, including a kettle depression with peatland elements barely 100 m east of the property on the north side of Bethesda Road.

The 121.9-ha site includes the 11 ha kettle lake: Lake St. George. Aside from the small areas in the immediate vicinity of the field centre, outbuildings, and driveways, it is entirely natural cover. The lake is noteworthy in that its entire catchment area is undeveloped and largely natural. Most of the catchment area lies within the Field Centre; a small amount is within the Bloomington Downs Golf Course to the north. Lake St. George is one of the most intact kettle lakes on the Oak Ridges Moraine. It has been designated as a provincial Area of Natural and Scientific Interest (ANSI), a

Provincially-Significant Wetland (PSW), and an Environmentally-Significant Area (ESA). Lake St. George is one of five ANSIs in the vicinity (OMNR 2001).

The lake is shaped like a pair of glasses, with two basins 15-16 m deep at the centre joined by a narrows on the north side (OMNR 2001). It is one of only 11 kettle lakes that are over 10 ha in size on the Oak Ridges Moraine. The surrounding terrain is relatively flat, with the lake being in a broad trough along the East Humber River valley between morainal ridges to the north and south (OMNR 2001). The southeast corner of the property is hillier. Soils are mostly very fine sands, with finer loams in lower areas, and often poorly drained. There are marl deposits around the shoreline.

The lake is the source of the East Humber River, which flows out of the southwest corner and across Bayview Avenue to Lake Wilcox (Map 2). A couple of poorly-defined ephemeral watercourses enter the lake from swamps to the north. The outflow channel looks as though it has been straightened and dug out during the agricultural period of the 19th or very early 20th centuries, and the outlet from the lake is periodically obstructed by beaver dams (OMNR 2001). The interplay of human and beaver activity has probably contributed to mid-to-long-term fluctuations in lake levels. In drought years such as 2016, the East Humber headwater channel becomes completely dry (Figure 1).



Figure 1. East Humber River headwater channel downstream of Lake St. George – note the straight ditch-like appearance (photo: TRCA 2016)

The site has had a history of European settlement dating back at least to 1847, when the French royalist immigrant Henri St. George (from whom the lake took its name) set up his estate called Glen Lonely (Stamp 1991). The property subsequently was purchased in 1906 by Robert Davies who built the main house (Davies Hall). After World War I, the land became a large and prosperous dairy farm under the Snively family. It was during this period that land use at the site was most intense, with numerous cattle. TRCA purchased the property in 1965 and the field centre opened in 1979 with two additional dormitories constructed.

The transition of land use away from agriculture to regenerated natural cover was gradual. Cows were grazing on the gentle kame slopes until 1983 (OMNR 2001). Some fields in the south and east remained in row crops, with the last ones being planted with trees in 2002.

At the same time as the Lake St. George property was becoming more naturalized, urban pressures nearby began to increase. Nearby Lake Wilcox has had housing around its shoreline for many decades, but real urban expansion in the area began in the late 1980s/early 1990s. In 2002, Bayview Avenue was extended as a major arterial road, and this shaved off the western edge of the Field Centre. In compensation, three wetland basins were excavated in the northwest part of the property around this time or just prior to it. These obviously-constructed but functioning wetlands are obvious on the air photo (Map 2). Lands to the west of Lake St. George Field Centre are now urbanized (1990s-mid 2000s). The area to the south is largely protected land with several small but dense subdivisions fronting on Bethesda Road across from the Field Centre. These were very recently constructed (2012 to present).

3.0 Inventory Methodology

A biological inventory of the Lake St. George Field Centre 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 taken from the regional 2013 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 2016). 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 as 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, 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

Quantity

The amount of natural cover needed in the landscape is based on the quantity needed to accommodate and achieve the quality distribution targets described above. The two targets are hence linked to each other: it is 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 was identified as 30%.

3.2 Vegetation Communities, 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. Vegetation communities and flora species were surveyed concurrently.

Botanical field-work was conducted in 2016 between the months of May through October (Table 2). Botanical data also includes additional records obtained from earlier surveys: one performed by Ministry of Natural Resources and Forestry (MNR) mostly in 1996 (OMNR 2001) and a schematic survey by TRCA in 2001. A few incidental observations along the east side of the property were obtained in 2014 as part of TRCA's Richmond Hill study (TRCA 2015).

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 2013 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) along with flora species of urban concern (ranked L4) were mapped as point data with approximate number of individuals seen. A list of all other species observed was documented for the site.

Prior to 2014, the most complete fauna survey of the study area had been conducted by the TRCA in 2001. In 2014, fauna surveys were conducted on dates in April, early June, and early July. The April visit 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 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 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 regional and urban concern (species ranked L1 to L4) were mapped as point data with each point representing a possible breeding territory.

In addition to the 2014 data, this inventory considers all incidental fauna observations mapped over the previous 10 years. Additional records from an MNRF survey conducted primarily in 1996 (OMNR 2001) and a 2000-2001 TRCA inventory survey are referred to in the text as historical data. The fauna data management protocol imposes a 10 year threshold on use of historical data, and therefore observations made prior to 2007 are not included in the current fauna inventory.

Table 2. Schedule of TRCA biological surveys at Lake St. George Field Centre

Survey Item	Survey Dates	Survey Effort (hours)
Patch / Landscape	2013: ortho-photos	21 hours
Vegetation Communities and Flora Species	2016: May 16 th ; June 3 rd , 13 th , 14 th ; July 21 st ; August 4 th , 8 th , 9 th , 10 th , 11 th , 12 th , 19 th , 22 nd ; October 3 rd , 4 th , 6 th , 7 th .	119 hours
Frogs and Nocturnal Spring Birds	2014: April 14 th , April 22 nd	1 hour
Breeding Songbirds	2014: June 9 th ; July 8 th	12 hours

4.0 Results and Discussion

Information pertaining to the Lake St. George Field Centre 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 2013 ortho-photography, 26% of the land area in the TRCA jurisdiction consists of natural cover but this figure includes meadow. Although historically, the region would have consisted of up to 95% forest cover, currently (i.e. 2013) only about 17% is covered by forest

(includes successional) and wetland. Of the non-natural cover (i.e. the remaining 74%), 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)(Map 3); 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 17% of the surface area of the jurisdiction. In addition, meadow cover stands at 8% of the region. 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 (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. The natural cover at the Lake St. George Field Centre is a major part of the regional natural heritage system. Its natural cover fills an important function in helping to maintain a viable east-west connection across the Oak Ridges Moraine, and to the rivers flowing south into Toronto and north into Lake Simcoe.

4.2 Habitat Patch Findings for Lake St. George Field Centre

The following details the site 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 2013 ortho-photos.

4.2.1 Quantity of Natural Cover

The Humber watershed covers a total of 91,078 ha. Natural cover in the watershed covers 30,270 ha (33%), including 20,100 ha as forest/successional, 8,334 ha as meadow and 1,836 ha as wetland. The Lake St. George Field Centre is 121.9 ha in size and contains 118.8 ha of natural habitat (Table 3; Appendix 1), which amounts to 0.39% of the total natural cover in the Humber watershed. Although this is not a large total area of natural cover, the location, lying on the ORM, confers a high degree of importance to the area from a connectivity perspective. The natural cover includes 29.4 ha of forest, 51.9 ha of planted and successional, 6.0 ha of meadow and 20.83 of wetland. Natural cover types are based on ground-truthed ELC vegetation communities.

4.2.2. 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

The study area consists of the natural cover that surrounds the kettle lake, Lake St. George. The large majority of the natural cover, including all forest and successional habitats, scored high for habitat patch size (L2 or “good”) (Map 5) but scored low for habitat patch shape (L5 or “very

poor”). This low score for shape is a result of a combination of irregular edges imposed by the shore of the lake and the manicured areas surrounding the Field Centre buildings.

Related to an optimal configuration of patch size and patch shape is the concept of forest interior, a reflection of the distance of any point in the forest to the closest edge. Forest interior is measured at 100 m increments from the forest edge. Within the study area there are two areas of interior forest present, both north of the lake. The most extensive interior forest, and therefore the most equipped to support interior-forest dependent species, is located in the forest patch in the north-east corner of the study area (Map 6).

Habitat Patch Matrix Influence

Analysis based on the 2013 ortho-photos shows that the matrix influence score for habitat in the Field Centre is “fair” (Maps 7 and 8). This score is as expected given that the Field Centre lies on the ORM yet is bordered by residential housing to the west and golf courses to the north and east. 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. This mixture of urban and rural landscape exerts a low negative matrix influence on the site.

Habitat Patch Total Score

The combination of “fair” matrix influence on the site, and the majority of “good” mixed with “fair” to “very poor” habitat patch size with predominantly “very poor” patch shape, results in an overall “poor” to “fair” habitat patch quality (Map 9). Landscape scores are intended to be applied at the broader landscape level and therefore caution needs to be exercised when referring to such measures at the more refined site level. However, in this particular case, it appears that the landscape scores are in keeping with the ground-truthed fauna representation, with the majority of L3 fauna species reported from the higher quality interior forest patches to the north and north-east of Lake St. George. Flora follows a somewhat different pattern, with higher-ranked plants concentrated in wetlands and in relict areas of older upland vegetation (see sections 4.3 and 4.4.2). Plant populations are less mobile and respond slower to environmental changes; the interior forest includes a lot of younger growth that has grown up after agriculture over the past several decades and has not been colonized by sensitive species. For the same reason, less mobile fauna taxa such as herpetofauna lag behind highly mobile birds in the exodus of sensitive fauna that occurs as urbanization encroaches.

4.3 Vegetation Community Findings for Lake St. George Field Centre

4.3.1 Vegetation Community Representation

Lake St. George Field Centre has a total of 75 different vegetation communities, 5 are found solely as an inclusion or complex within a larger community. Wetlands are particularly diverse. Dynamic communities are conspicuously absent, and meadow is scarce, having largely been replaced by plantation (Table 3).

Table 3. Summary of Vegetation Communities, Lake St. George Field Centre

Class	Number of Types	Area (hectares)*
Forest	13	29.4
Plantation	19	43.2
Successional	11	8.6
Meadow	1	6.0
Wetland	26	20.8
Aquatic	5	10.7
Dynamic (beach, bluff, barren)	0	0.0
<i>Total</i>	<i>75</i>	<i>118.8</i>

*Please note: due to rounding of decimals, totals may differ by 0.1 ha from the sum of north and south, complexes and inclusions not included in total

There are 29.4 ha of forest, approximately 25% of the Lake St. George Field Centre. A total of 13 forest type vegetation communities were documented (Appendix 1). Most of the forest is young to mid-aged, having regenerated on agricultural land (largely cow pasture) since the mid-late 20th century. Patches of mid-aged Fresh-Moist White Cedar Coniferous Forest (FOC4-1) and Fresh-Moist White Cedar – White Pine Coniferous Forest (FOC4-A) occur northeast and southwest of the lake. Fresh-Moist Poplar Deciduous Forest (FOD8-1) occurs north and west of the lake, with areas of Fresh-Moist Exotic Deciduous Forest (FOD7-c) interspersed. The exotic forest is dominated by large European buckthorn (*Rhamnus cathartica*) which is more tree-sized (i.e. 10 m tall) than shrub sized in these places. It is interspersed with scattered native trees and shrubs and tends to have a weedy but native ground layer. Where there is enough basswood (*Tilia americana*) in the overstorey, the community subtly changes to Fresh-Moist Basswood Deciduous Forest (FOD7-F). A small area of Fresh-Moist Willow Deciduous Forest (FOD7-3) follows the East Humber River headwater channel out of Lake St. George toward Bayview Avenue. Fresh-Moist Norway Maple Deciduous Forest (FOD7-b) has developed from horticultural plantings in the vicinity of the old estate house which is now the field centre headquarters, Davies Hall. Fresh-Moist Manitoba Maple Deciduous Forest (FOD7-a), another exotic type, has appeared in a couple of gaps in recent plantations where planted trees failed.

Mature forest is largely restricted to old hedgerows as well as a strip of slope along the southeast shore of the lake. These older patches of original vegetation can still be seen as more-or-less linear polygons following the entrance laneway from Bethesda Road to the field centre and the edges of former agricultural fields and property lines (Map 10). The slope near the lake is Fresh-Moist White Cedar – Sugar Maple Mixed Forest (FOM7-1), while the former hedgerows include Dry-Fresh Sugar Maple Deciduous Forest (FOD5-1), Dry-Fresh Sugar Maple – Red Oak Deciduous Forest (FOD5-3), and Dry-Fresh Sugar Maple – Basswood Deciduous Forest (FOD5-6). These features also include a less-densely treed but still mature White Pine Woodland (CUW1-A2) which, strictly speaking, would be classified as a successional type. It is noteworthy that these linear relict ecosystems contain the most upland flora biodiversity; but also that there has been little colonization of native species from them into the surrounding successional and planted areas

over the past 15-30 years. They have remained islands of original vegetation even while naturalization has occurred around them.

Plantations are prominent at Lake St. George Field Centre, and in fact take up 43 ha, about half the total upland habitat at the site. Somewhat older plantations from the mid-to-late 20th century occur across the western and northern edges of the Lake St. George Field Centre, while a couple of large blocks of younger plantation (planted in 2002) occupy about 19 ha of the eastern and southern parts on areas that were agricultural fields as recently as the 2001 TRCA survey. The older plantations include many different types, but various conifer plantations are most prominent. The two large blocks of younger plantation in the south and east were more carefully designed to include a range of native species; they are Restoration Mixed Plantation (CUP2-A). They include trees such as white pine (*Pinus strobus*), white spruce (*Picea glauca*), tamarack (*Larix laricina*), red ash (*Fraxinus pennsylvanica*), and black walnut (*Juglans nigra*).

Successional communities are represented by 11 different vegetation types and cover 8.6 ha. At Lake St. George, they are poorly-differentiated from the younger forests, being distinguished mainly by having somewhat less and/or shorter woody cover, though often the same or similar species. For example, Buckthorn Successional Thicket (CUT1-b) is very similar to Fresh-Moist Exotic Deciduous Forest (FOD7-c). Other prominent types include Native Deciduous Successional Woodland (CUW1-A3), Native Deciduous Successional Savannah (CUS1-A1), and Exotic Successional Woodland (CUW1-b). While most of the old cow pasture has grown in with buckthorn, there is a small area (0.7 ha) where hawthorns (*Crataegus* spp) are prominent and the community is Hawthorn Successional Woodland (CUW1-D). In addition to the actual successional communities, the majority of the plantations at Lake St. George are young enough to function more as successional habitat than as forest.

Open meadow covers just 6.0 ha with patches being found south of the lake and in the southeastern corner of the Lake St. George Field Centre. Because of plantings and succession, there has been a drastic decline in meadow and open habitats generally. In 2001, there were approximately 17 ha of meadow in addition to 19 ha of agricultural field. In 2016, the agricultural field was all gone, and meadow reduced to 6 ha. The meadows at Lake St. George are Native Forb Meadow (CUM1-A), with an abundance of aster (*Symphotrichum* spp), tall goldenrod (*Solidago altissima*) and common milkweed (*Asclepias syriaca*). These host an array of native invertebrates including monarch butterflies (*Danaus plexippus*) which were observed in 2016.

Wetland and aquatic communities represent the most prominent and diverse vegetation at Lake St. George. There were 26 wetland vegetation types recorded in 2016, covering a total of 20.8 ha. The largest share of this land was deciduous swamp (9.9 ha). Areas of deciduous swamp are found throughout the Lake St. George Field Centre in shallow kettle depressions and swales, often interspersed with forest north of the lake. The most prevalent deciduous swamps are Red Ash Mineral Deciduous Swamp (SWD2-2) and Willow Mineral Deciduous Swamp (SWD4-1). Small patches of Silver Maple Mineral Deciduous Swamp (SWD3-2) and Silver Maple Organic Deciduous Swamp (SWD6-2) can be found in the southern part of the Field Centre. A couple of areas of White Cedar Mineral Coniferous Swamp (SWC1-1) and White Cedar – Hardwood Mineral

Mixed Swamp (SWM1-1) can be found south and east of the lake where there is some ground water seepage.

Thicket swamps cover 4.3 ha. The largest patch is a wide fringe on the north side of the lake, a Willow Mineral Thicket Swamp (SWT2-2). This is a very structurally-diverse habitat with many dead cedars and small flooded channels. The cedars died from increased lake levels which occurred probably before the 1980s. It also has some fen-like characteristics, with marl in the soil and a few historic and current fen plant species (section 4.4.2). In fact, this patch's counterpart on the south side of the lake on the peninsula between the two basins is slightly more open and was classified as a Willow Shrub Mineral Fen (FES2-A).

Marshes form a ring around Lake St. George and also can be found in a few separate kettle wetlands and dug-out habitat wetlands. There are 2.8 ha of shallow marsh and 0.9 ha of meadow-marsh at the Lake St. George Field Centre. Hybrid Cattail Marshes (MAS2-1b and MAS3-1b) occupy 1.6 ha and Reed Canary Grass Mineral Meadow Marsh (MAM2-2) occupies 0.6 ha. The remainder are higher-quality native marshes such as Swamp Loosestrife Organic Shallow Marsh (MAS3-12) and Bulrush Organic Shallow Marsh (MAS3-2).

Organic soils cover just 2.2 ha. Most of the wetlands at Lake St. George are mineral, due to the deep open character of the lake. A large organic wetland sits at the extreme northwest of the Field Centre adjacent to Bayview Avenue and is mostly on the Bloomington Downs Golf Course property.

The first 20 m or so of Lake St. George is occupied by an inner ring of Water Lily – Bullhead Lily Mixed Shallow Aquatic Community (SAM1-A). Along with fragrant water-lily (*Nymphaea odorata* ssp. *odorata*) and yellow pond-lily (*Nuphar variegata*), this community has pondweeds (*Potamogeton* spp) and stonewort (*Chara* spp.) The dug-out ponds in the northwest part of the Lake St. George Field Centre have two additional aquatic communities: Pondweed Mixed Shallow Aquatic (SAM1-4) and Bur-reed Mixed Shallow Aquatic (SAM1-5).

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 3.0. Vegetation communities with a rank of L1 to L3 are considered of concern across the entire jurisdiction while L4 communities are considered of concern in the urban portion of the jurisdiction. In addition, 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. For example, an old-growth sugar maple forest may belong to a relatively common and adaptable vegetation type but should still be considered of high conservation concern.

There are 15 communities of regional conservation concern (ranked L2 and L3) at Lake St. George. These are all wetland and aquatic communities and mostly occur in a ring around the

lake (Figure 2) (see also Map 10). A couple of aquatic communities also occur in the dug-out habitat wetlands. The various L2 and L3 wetland and aquatic communities occupy 3% of the total natural cover. There are also twenty L4 communities that occupy 29% of the total natural cover and include some forest and successional types.



Figure 2. Shoreline of Lake St. George showing four communities of regional conservation concern (rear to front): Willow Shrub Mineral Fen (with dead cedars), Bulrush Organic Shallow Marsh, Swamp Loosestrife Organic Shallow Marsh, and Water-lily Mixed Shallow Aquatic (photo: TRCA, 2016).

The highest-ranked communities (L2) include Silver Maple Organic Deciduous Swamp (SWD6-2), Willow Shrub Mineral Fen (FES2-A), Narrow-leaved Sedge Organic Meadow Marsh (MAM3-5), Bulrush Organic Shallow Marsh (MAS3-2), Forb Organic Shallow Marsh (MAS3-10), Swamp Loosestrife Organic Shallow Marsh (MAS3-12) and Bur-reed Mixed Shallow Aquatic (SAM1-5). All of the L2 and L3 wetland communities are sensitive to hydrological alterations (drainage, flooding or interruption of natural fluctuations), nutrient inputs from agriculture or storm water runoff, and invasion by exotic species such as common reed (*Phragmites australis*). They are also characteristic of undisturbed kettle topographic features. They exist at Lake St. George because it is an intact kettle lake with relatively little disturbance in its catchment area (aside from a period of agriculture).

Along with several additional wetland communities, the L4 communities include six forest and four successional vegetation types. These are mostly communities with a natural coniferous

component, but also include an old hedgerow of Dry-Fresh Sugar Maple – Oak Deciduous Forest on the eastern boundary of the Field Centre.

4.4 Flora Findings for Lake St. George Field Centre

4.4.1 Flora Species Representation

Floristic surveys conducted by TRCA in 2016 identified a total of 432 species of vascular plants (Table 4; Appendix 2). Of these, 401 species were naturally occurring; the remaining 31 were associated with plantings. Of the non-planted species recorded, 262 are native (65%). The site is currently not very disturbed, but has a history of intensive agriculture on much of the land. The species richness and proportion of exotic species (35%) is intermediate between TRCA's highest-quality and more disturbed sites. This reflects the mixed land use history.

Table 4. Summary of Flora Species, Lake St. George Field Centre

Total # of species found in 2016	432
Naturally-occurring species	401
Planted species	31
Native (naturally-occurring) species	263
Number of L1 to L3 species (excludes planted)	60
Number of L4 species (excludes planted)	77
Exotic species (established)	139

4.4.2 Flora Species of Concern

There are 60 vascular plant species of regional conservation concern (rank L1 to L3) at Lake St. George; an additional 77 are ranked L4 and would be considered of concern in an urban environment. A few unusual asters (*Symphyotrichum* spp.) were also observed in 2016 that didn't match most descriptions of regular species. Two specimens were sent to John Semple at University of Waterloo and the sample from within the Lake St. George property was identified as an atypical calico aster (*Symphyotrichum lateriflorum*), a common L5 species. However, the sample from the Bloomington Downs Golf Course property (just off-site) turned out to be a hybrid (*S. cordifolium* x *lateriflorum*) (Semple 2017).

Ten of these L1 to L3 plants are regionally rare (found in six or fewer of the forty-four 10x10 km UTM grid squares that cover the TRCA jurisdiction. Cuckoo-flower (*Cardamine nymanii*) appears to be restricted within the TRCA jurisdiction to Lake St. George and a few localities along Duffins Creek near and upstream of Greenwood Conservation Area. The population at this site is healthy and extensive, occurring in damp wooded areas all around the lake (Figure 3). Running serviceberry and variable hawthorn have a rare but widely-scattered distribution across the TRCA jurisdiction, while the other seven regionally-rare plants such as knotted pondweed (*Potamogeton nodosus*) are restricted to several kettle lakes and wetlands on the Oak Ridges Moraine.



Figure 3. Cuckoo-flower, a rare plant with an extensive population at Lake St. George (photo TRCA 2016).

All of the 60 flora species of concern at Lake St. George are sensitive to development, being vulnerable to at least one kind of disturbance that is associated with land use changes (see Map 7 for sensitivity to development scores). A large proportion of the species of concern (notably the wetland species) are vulnerable to hydrological changes. The presence of dead trees and shrubs along the edge of Lake St. George suggests that water levels have increased in recent decades. This may have resulted in declines (or losses) of wetland species such as stiff marsh bedstraw (*Galium tinctorium*) and yellow sedge (*Carex flava*). Conversely, the summer of 2016 was very dry. Many wetlands that normally have standing water all year became dry by August. The presence of variable water levels is a healthy, renewing factor for many wetland plants that require dry-down periods to renew their populations. The hydrological pattern at Lake St. George allows for this natural variability. For example, water star-grass (*Heteranthera dubia*) flowers when water levels drop, exposing the submerged plants (Figure 4). Nutrient inputs from agriculture, roads, construction or fill dumping also can affect the wetland and aquatic communities; such changes have been observed in kettle lakes near Toronto (Watchorn *et al.* 2008). Lake St. George would have been affected by the presence of large numbers of dairy cattle when it was a farm; however, since then the water quality has been relatively good based on regular testing by visiting students.



Figure 4. Water stargrass, an aquatic plant that flowers at times of low water levels (photo: TRCA 2016)

Hydrological and nutrient disturbances can also encourage invasive species that displace some of the smaller and more sensitive wetland species. Purple loosestrife (*Lythrum salicaria*) is now quite abundant in the thicket swamps and marshes fringing the lake. Invasive species – notably common buckthorn, are also a threat to upland flora of concern at this site such as running serviceberry (*Amelanchier spicata*), long-headed thimbleweed (*Anemone cylindrica*), and glabrate fireberry hawthorn (*Crataegus chrysocarpa* var. *phoenicea*). Butternut (*Juglans cinerea*), is dying off due to the introduced butternut canker disease (*Sirococcus clavigignenti-juglandacearum*). By 2016, it was recorded at only one location, in poor condition.

Increased human traffic into a natural area results in disturbance caused by trampling and also facilitates incursion of invasive species that compete with the existing native flora. The heaviest trampling is around the field centre and dormitories on the east side of the lake. Pedestrian traffic diminishes in intensity and frequency as one goes further from the field centre. It is almost entirely due to students and other groups using the field centre facility, since the Lake St. George Field Centre is not open to the public. There is a trail going around the lake, but parts of the north part of the property have almost no pedestrian intrusion aside from infrequently groomed cross-country ski trails.

Habitat fragmentation can lead to increased populations of herbivores such as white-tailed deer (*Odocoileus virginianus*); deer have had significant impacts in parts of the TRCA jurisdiction such as Rouge Park. Evidence of deer browse was seen across the property, and was particularly intense in the swamp and plantation area in the southeast corner east of the driveway and north of Bethesda Road. In places, the understorey was entirely removed and there were areas of flattened grass from deer herd bedding areas.

In addition to being sensitive to land use impacts, all of the species of concern can be considered habitat specialists, scoring relatively high in *habitat dependence*. Habitat dependence scores are shown on Map 12. Roughly, they are found in seven or fewer vegetation cohorts (groupings of vegetation types with similar floristic characteristics) (TRCA 2016). They will not readily recover when these habitats are lost or altered. Lake St. George has habitat specialists corresponding to all of its main habitat types.

The vast majority (50 out of 60) of the flora species of concern at Lake St. George are wetland and aquatic species. Aquatic species occur in Lake St. George as well as in the dug-out habitat restoration ponds northwest of the lake. Some examples include fragrant white water lily, knotty pondweed, large-leaved pondweed (*Potamogeton amplifolius*), and small bladderwort (*Utricularia minor*).

Species of marshes are particularly well-represented. The lake is ringed with swamp loosestrife (*Decodon verticillatus*) which tends to be in slightly deeper water than purple loosestrife. Also prominent in the fringe around the lake are hard-stemmed bulrush (*Schoenoplectus acutus*), water sedge (*Carex aquatilis*) and water horsetail (*Equisetum fluviatile*). Hummocks in the wetlands surrounding the lake have occasional fen species such as northern white violet (*Viola macloskeyi*) and bristle-stalked sedge (*Carex leptalea*) though the fen component may have diminished since the 1990s (see Section 4.4.3). The rather different deciduous swamps in kettle depressions have such species as Tuckerman's sedge (*Carex tuckermanii*) and moonseed (*Menispermum canadense*). Cuckoo-flower grows in damp wooded areas around the lake transitional between swamp, successional habitat, and forest. A few very old tamarack can be found around the edges of swamps. Unlike those in the plantations, these definitely represent a naturally-occurring population.

Upland species of concern are not well-represented at Lake St. George Field Centre, because most of these lands had been under cow pasture or row crops for much of the 20th century. Hence the upland areas are dominated by generalist species both native and exotic. However, there are a few places often associated with old hedgerows or dry open areas that have more native species. For example, long-headed thimbleweed and running serviceberry occur north of the lake, while there is a patch of snowberry (*Symphoricarpos albus* var. *albus*) along the laneway leading into the field centre. These represent what's left of dry upland communities at Lake St. George (such communities are more prominent to the south at West Gormley and Jefferson Forest). Post-agricultural successional species of concern include American bittersweet (*Celastrus scandens*), glabrate fireberry hawthorn, variable hawthorn (*Crataegus macrosperma*), and Canada plum (*Prunus nigra*). There are also the myco-heterotrophs Indian pipe (*Monotropa uniflora*) and

pinemap (*Hypopitys monotropa*), which have spread into young forests and plantations. (The term indicates plants that are parasitic on fungi that in turn have mycorrhizal associations with trees – hence these species have an added layer of habitat specialization. Their presence implies a robust, healthy fungal association in the forest).

Spring ephemerals seem to be almost absent from Lake St. George Field Centre. The trilliums and Dutchman’s breeches (*Dicentra cucullaria*) found near Davies Hall were almost certainly planted by the Davies family. Even the trout-lily (*Erythronium americanum*), an L5 spring ephemeral, has not spread much into younger wooded areas.

Appendix 2 lists plant species by ranks and locations are shown on Map 11. The ranks are based on sensitivity to human disturbance associated with development; and habitat dependence, as well as on rarity (TRCA 2016).

4.4.3 Earlier Surveys

The MNR survey, mostly from 1996, recorded a total of 311 species, while the quick TRCA survey in 2001 (which didn’t record a comprehensive species list) recorded 133 species. The proportion of species of conservation concern was comparable, although 19 species found in the earlier surveys were not observed in 2016. These historic records are included in Appendix 2. The reasons for their seeming absence probably vary. Swamp thistle (*Cirsium muticum*) and small yellow sedge (*Carex cryptolepis*) were subject to a targeted search in their likely locations and are likely no longer present. The wetland communities bordering the edge of the lake have been subject to fluctuating water levels in recent decades due to beaver dams and weather conditions. There may be a trend of decline for fen specialist species which are or were in the thicket swamps and marshes around the lake but figure prominently in the list of species missing in the 2016 survey. There is also a fairly high density of the invasive purple loosestrife (*Lythrum salicaria*) which could affect some native species populations. Swamp thistle and small yellow sedge are now possibly extirpated from the TRCA jurisdiction, since the only known population of the former was restricted to a couple of small plants at Lambton Woods in Toronto in 2007; while the latter was observed in 2001 at Bolton Tract but not observed when the area was re-surveyed in 2015. Common juniper (*Juniperus communis*) found in 1996 also likely succumbed to vegetational changes with increased woody cover and shading of former pasture lands.

Some of the plants observed in the earlier surveys are likely still present but may have been overlooked in 2016 because the lakeshore presents difficult terrain with many hiding places for cryptic species such as marsh wild timothy (*Muhlenbergia glomerata*) (under fallen woody debris, for example).

Other species not seen in the last 15 years at Lake St. George such as yellow water crowfoot (*Ranunculus flabellaris*) and bog buckbean (*Menyanthes trifoliata*) were found in 2016 just outside the TRCA property on lands belonging to Bloomington Downs Golf Club. The MNR Lake St. George ANSI boundary is not quite the same as the TRCA Lake St. George Field Centre

boundary, so they may have originally been outside the TRCA property line even if they were recorded by MNRF.

4.4.4 Invasive Species

Lake St. George Field Centre supports 159 non-native species (including 20 planted species). Depending on the habitat, the majority of exotic species found are weedy perennial herbaceous plants that exhibit only mild to moderate degrees of aggressiveness. However, a select few are highly invasive in nature, possessing the ability to displace their native counterparts if conditions prove favourable.

Common buckthorn is extremely abundant, and has taken over many of the former agricultural lands. On the other hand, the extensive buckthorn stands often have a native understorey of generalist species, including in some cases regeneration of cedar (*Thuja occidentalis*). While not excluding native species altogether, the buckthorn at Lake St. George does seem to be slowing down the return of old pasture to more native forest, as well as crowding out species of open habitats. Norway maple (*Acer platanoides*) was planted extensively around Davies Hall in the past and dominates some of the second-growth forest in its vicinity. Manitoba maple (*A. negundo*) occurs in several patches on the east side of the property near the dorms. Some attempts have been made at cutting them, but there was extensive resprouting of the stumps. Garlic mustard (*Alliaria petiolata*) is prominent in the ground layer of these stands.

It is noteworthy that almost no native trees with the exception of cedar and trembling aspen have volunteered to colonize into former agricultural fields from adjacent relict hedgerows. The majority of the non-planted regeneration has been of the abovementioned invasive trees. This could be due to altered mycorrhizal communities in the soil of these old fields that favours them.

Purple loosestrife is abundant in the wetlands fringing Lake St. George. In 2016, it appears to have had little effective control from the beetles that were imported to eat it in the late 1990s. Beetle populations seem to fluctuate naturally at any given location based on weather and water conditions. If there is a large enough fluctuation downward that lasts long enough, this could allow purple loosestrife to regain its dominance. This seems to be the case at Lake St. George, where the wetlands have less native biodiversity than might be expected for an otherwise high-quality kettle lake. An additional consideration is the possible impact of loosestrife beetles on the native swamp loosestrife, though this is not a preferred host.

Emerald ash borer (*Agrilus planipennis*) (EAB) is starting to kill the ash at Lake St. George. Since there are extensive ash stands at the Field Centre, especially Red Ash Mineral Deciduous Swamp (SWD2-2) north of the lake, we can expect extensive canopy dieback and openings for invasive plants such as buckthorn.

Common reed, seen extensively throughout the GTA, is currently only seen in a couple of small to moderate patches at the southeast and southwest corners of the lake. This species is likely to become a severe threat to the lake's wetlands (the locations were mapped). There are also

moderate populations of hybrid cattail (*Typha x glauca*) and reed canary grass (*Phalaris arundinacea*) around the lake. A small population of European alder (*Alnus glutinosa*) occurs on the east side of the lake.

Ornamental groundcovers have become problematic where there had been old gardens: around the Davies Hall and also near Bayview Avenue. Such groundcovers include periwinkle (*Vinca minor*), goutweed (*Aegopodium podagraria*), lily-of-the-valley (*Convallaria majalis*), English ivy (*Hedera helix*), and English violet (*Viola odorata*). Any of these are capable of monopolizing forest ground layers.

Two new occurrences for the TRCA jurisdiction were noted among exotic species (aside from obvious garden escapes): Siberian cranesbill (*Geranium sibiricum*) and a pondweed hybrid. One of the parents of the hybrid is curly pondweed (*Potamogeton crispus*), while the other is unknown but likely *P. pusillus* var. *tenuissimus* or *P. foliosus*.

4.5 Fauna Species Findings for Lake St. George Field Centre

4.5.1 Fauna Species Representation

The TRCA fauna surveys at the Lake St. George Field Centre in 2014 (and subsequent observations in 2015 and 2016) documented a total of 57 bird species, 9 mammals, and 7 herpetofauna species, bringing the total number of possible breeding vertebrate fauna species identified by the TRCA to 73 (Table 5). These figures are similar to other study areas in the same urban-rural interface zone. For example, a 2014 inventory conducted at Heart Lake CA lists 76 vertebrate fauna species and a 2016 inventory of the TRCA property at Milne Reservoir recorded a total of 78 vertebrate fauna species. Refer to Appendix 3 for a list of the fauna species and their corresponding L-ranks.

4.5.2 Fauna Species of 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 3.0. Since the subject site is situated close to the urban zone this report also considers 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 the Lake St. George Field Centre in 2014 reported 13 bird species of regional concern (L1 to L3), including two L2 bird species: broad-winged hawk (*Buteo platypterus*) and ovenbird (*Seiurus aurocapillus*), and 21 of urban concern (L4). In addition, there were 7 herpetofauna and 7 mammal species of regional and urban concern, including three L2 species: grey treefrog (*Hyla versicolor*), spring peeper (*Pseudacris crucifer crucifer*), and wood frog (*Lythobates sylvatica*). The total number of L1 to L4 ranked species is 48 species. Locations of these breeding fauna are depicted on Map 13.

Table 5. Summary of Fauna Species of Regional and Urban Concern at Lake St. George Field Centre, 2014.

Fauna	Number of Species	Number of Species of Regional and Urban Concern (L1 to L4 rank)
birds	57	34
herps	7	7
mammals	9	7
TOTALS	73	48

Local occurrence is one of 7 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 and Forestry (OMNRF) (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 2016).

Fauna surveys at the Lake St. George Field Centre documented four fauna species considered regionally rare: broad-winged hawk; golden-crowned kinglet (*Regulus satrapa*), long-eared owl (*Asio otus*), osprey (*Pandion haliaetus*), little brown bat (*Myotis lucifugus*) and big brown bat (*Eptesicus fuscus*). The long-eared owl is one of only nine breeding records within the TRCA jurisdiction and along with the two bat species, the only species present at Lake St. George with a local occurrence score of four or above. A maternity roost of little brown bats is located in the Field Centre barn, with 45 individuals recorded by the OMNRF in 2015 (pers comm). A small number of big brown bats were also observed foraging in the vicinity. Broad-winged hawk and osprey were both observed flying over the Field Centre and so are likely nesting within the vicinity, of which there are confirmed records for both species.

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 (*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 5) for this criterion. At the Lake St. George Field Centre many of the species that are ranked L1 to L4 receive this score (35 of the 46 species) and are therefore considered sensitive to one or more of the impacts associated with development (Map 8).

Six of the fifteen L1 to L3 ranked bird species considered sensitive to development habitually nest on or near to the ground and as such are highly susceptible to ground-borne disturbance, e.g. hikers and off-leash dogs. Four of the sensitive ground-nesters are primarily associated with forested or forest-edge habitat and it seems that in these habitats ground-nesters have suffered from the impacts of the matrix influences that proximity to human activity imposes. Veery (*Catharus fuscescens*), white-throated sparrow (*Zonotrichia albicollis*) and black and white warbler (*Mniotilta varia*) were reported on territories in 2000 and 2001, but subsequently have not been recorded at the Field Centre. On the other hand, ruffed grouse (*Bonasa umbellus*) were observed in 2001 and though initially were not recorded in the 2014 visit, were observed in 2016 by TRCA flora biologists. Also, recordings were observed in 2014 of single territories of three previously unrecorded forest and forest-edge low nesting species; ovenbird, Nashville warbler (*Oreothlypis ruficapilla*), and winter wren (*Troglodytes hiemalis*). Mid-level nesting species such as wood thrush (*Hylocichla mustelina*) and yellow-billed cuckoo (*Coccyzus americanus*) are also negatively affected by ground-borne disturbance, though to a lesser extent. These two species were recorded on one territory each. Canopy forest nesting species of note include long-eared owl, golden-crowned kinglet and the Provincially classified Species at Risk (listed as Special Concern); eastern wood-pewee (*Contopus virens*). Canopy nesting species are less susceptible to disturbance than lower nesting species and therefore local populations tend to be more stable. The lack of scarlet tanager (*Piranga olivacea*) records in 2014 seem to contradict this, however there is no ideal breeding habitat (mature sugar maple dominated forest) in the study area and the record in 2001 may have been a non-breeding male. Ideal breeding habitat is present to the south at the Oak Ridges Corridor Conservation Reserve East (ORCCRE).

The fifth and sixth low-nesting L1 to L3 ranked bird species, northern waterthrush (*Parkesia noveboracensis*), and American woodcock (*Scolopax minor*) nest in swamps and wetlands respectively; habitat that are not as much visited by such ground-borne disturbances. Northern waterthrush had not been previously observed before the sole 2014 record and American woodcock was recorded on five territories in 2001 and only one territory in 2014. However, two more individuals were observed in 2014 before the threshold date for fauna inclusion. The cryptic nature of this species and the propensity of observations within the breeding season resulting from animals flushed from their nests suggest that more than one territory may still be present. A further low-nesting species, Virginia rail (*Rallus limicola*), was observed in 1996 in the wetland south-west of the kettle lake. The lack of observations since may mean this species no longer breeds study area, however most records of Virginia rails are obtained through playback response and this technique does not guarantee replies from the target species. The presence of two alder flycatchers (*Empidonax alnorum*) (Figure 5) and eight swamp sparrow (*Melospiza georgiana*) territories throughout the wetlands suggests they are still functioning well enough to potentially support Virginia rail.



Figure 5: Alder flycatcher, a small *Empidonax* species that breeds in wetland thickets
(Photo: TRCA 2014)

One low-nesting meadow bird species was recorded in the study area, the L4 species savannah sparrow (*Passerculus sandwichensis*), in the small meadow fragments within the young white pine plantation to the east of the education centre. Historically, bobolink (*Dolichonyx oryzivorus*), a Provincial Species at Risk, Threatened) were observed in the meadow to the south of the lake. Since this observation in 2001, young white pines have grown in the area, reducing the size of prime bobolink habitat.

Certain matrix influences associated with human activity do not impact the breeding fauna in the study area to the extent of similar habitats nearby. Although Lake St. George Field Centre is intersected by many connecting trails, it is not open to the public and caters to guided education groups. Dog walking (including off-leash) and off-trail biking are highly prohibited (although there is evidence of the former) and the presence of the busy road Bayview Avenue between the residential development to the west and the study area, mitigate any influx of ground-foraging predators subsidized by these local residences (house cats, raccoons). Human traffic alone can transfer many of the negative influences associated with urbanization 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. 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 two most locally abundant sensitive species, red-eyed vireo (*Vireo olivaceus*) and common yellowthroat (*Geothlypis trichas*) – 17 and 14 territories respectively – are 2 species that would be somewhat more resilient to the types of negative matrix influence associated with human interaction. Red-eyed vireos are forest canopy nesters that are known to be resilient to human disturbance even within the urban matrix. Common yellowthroats are a low-level wetland nesting species of dense shrub habitats and as long as the shrub habitat is not removed, and as long as nests are not repeatedly and frequently disturbed, this species is quite capable of maintaining the population currently found at Lake St. George Field Centre. It should be noted that the TRCA fauna inventory assesses the presence of species, i.e. the number of territories of each species at the site, but does not give any indication of the success of nesting attempts. However, the fact that there are multiple territories of these 2 species on site suggests that local breeders are successfully returning and recruiting to maintain a viable local population.

As far as the non-avian species are concerned, all of the seven herpetofauna are considered sensitive to development. The sensitivity of these species varies considerably but again the majority of them are impacted by ground-borne disturbances at some stage of their life cycles. Frogs and toads are very sensitive to water quality in their native wetlands: run-off from roads and trails can carry road-salt and oils into the breeding habitats; and intrusion into those ponds (off-leash dogs, humans, etc.) can increase turbidity which in turn can severely limit the success of spawning. Meanwhile, those species which spend a large proportion of their lives foraging across forest floors – wood frogs, grey treefrogs, spring peepers, and various snake species – are prone to predation, disturbance and collection from various human activities. Compaction of soil through excessive trail use by hikers can have considerable impact on species that are adapted to living underground (fossorial lifestyle) such as star-nosed mole (*Condylura cristata*). This species was observed in 2000 (OMNR 2001) with no records since, however due to its fossorial habits this species is rarely recorded on TRCA inventories and we must assume that the population density is greater than current data shows. The same consideration may be attributed to other cryptic small mammals found in 2000 and not since, such as the nocturnal northern short-tailed shrew (*Blarina brevicauda*), common shrew (*Sorex cinereus*), and ermine (*Mustela erminea*), all species of regional conservation concern (Appendix 3).

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).

Twenty-two of the species of regional and urban concern that were identified are considered area sensitive (Map 5); all of these species – including 10 bird species ranked L1 to L3 - require at least 5 ha of habitat. Two of the area sensitive bird species score 4+ points in this criterion and as such require at least 20 ha of continuous habitat; broad-winged hawk and ovenbird. Broad-winged hawk scores the maximum 5 points, requiring over 100 ha of continuous natural habitat.

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.

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). 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.

All seven herpetofauna species and five of the mammal species of regional or urban concern are considered sensitive to patch isolation. Typically, birds are considerably less affected by this criterion. The main obstruction to movement across the local landscape is the presence of Bayview Avenue which creates a major barrier to east-west movement for terrestrial species such as mammals, frogs and snakes; however, since there is little natural habitat to the west of the site, this barrier probably has very little impact on the site as far as dispersal and recruitment of fauna species is concerned. The more significant directions for such movements to and from the site are to the south (connection to the Oak Ridges Moraine through ORCCRE) over Bethesda Sideroad. Although Bethesda Sideroad has lower traffic volume in relation to Bayview Avenue, the imminent construction of a subdivision on the south-east corner of the intersection of these two roads will increase traffic, creating added pressure on terrestrial movement.

Four herpetofauna species have been recorded historically in the study area, with no subsequent observations. Common snapping turtle (*Chelydra serpentina serpentina*) and midland painted turtle (*Chrysemys picta marginata*) have not been observed since 2000, although they persist in wetlands within the surrounding Town of Richmond Hill area. The two amphibian species that have failed to persist are bullfrog (*Lithobates catesbeiana*) and western chorus frog (*Pseudacris triseriata*). Present in numerous local kettle lakes, bullfrog were last observed at Lake St. George in 1996, the nearest recent observations being at Phyllis Rawlinson Park (2014) and Swan Lake (2009). Western chorus frog was still present along the Bayview extension corridor as recently as 2004 but there have been no further records since then. Historically, it appears that the species occurred primarily in the more open landscape of the north-west quarter of the Town of Richmond Hill. This is in keeping with chorus frogs' preference – at least within the Toronto region - for the small ephemeral wetlands that are associated with the spring thaw on open farmland. Presumably, the small populations that were still being reported through the 1990s and early 2000s were persisting in isolated remnants of what was once a loose but connected network of such ephemeral wetlands, much as what still occurs on the Peel clay plain in the western part of the Toronto region (the last regional bastion of this gradually disappearing species).

Fauna species that score greater than three points under the *habitat dependence* criterion are considered habitat specialists (Map 14). 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. Eleven fauna species that occur in the study area are considered habitat specialists including 9 species of regional concern. This compares favourably to sites within similar urban/rural zones such as Heart Lake CA (10 habitat specialist fauna species). Of the 9 habitat dependent bird species present at Lake St. George Field Centre, 7 are dependent on various types of forest, including ovenbird (Figure 6) and golden-crowned kinglet. As the young mixed coniferous forest matures, the size of optimal breeding habitat for these 2 sensitive forest dependent species will likely increase. The relatively high number of forest dependent species suggests that the forest patches at Lake St. George Field Centre are presently functioning at a fairly high level as far as avifauna is concerned.



Figure 6: Ovenbird, a sensitive ground-nesting forest dependent species recorded in one location at Lake St. George Field Centre (photo: TRCA 2013)

A site's species list presents only the species' richness, i.e. it indicates only the presence or absence of species at a site but indicates neither the breeding success nor the population stability of each species at the site. A healthy functioning system will accommodate a whole suite of species that are adapted to the habitat types at the site, and will allow those particular species to thrive and breed successfully. As the quality of the habitat patch improves so will the representation of flora and fauna species associated with that habitat. In this way, representation biodiversity is an excellent measure of the health of a natural system. Thus it certainly seems that the study area is functioning at a reasonable level, with a good representation of habitat dependent forest species. The loss of low or ground nesting bird species such as veery and white-throated sparrow suggests future management of the site may be needed to address the issue of visitor pressure on the forest blocks. Due to the lack of public access and fairly neutral matrix influences from the golf courses and agricultural land to the north and east indicates that continued management along current techniques should maintain the current diversity of regional and urban species of concern.

5.0 Summary and Recommendations

The recommendations for the Lake St. George Field Centre 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 within the regional context, followed by specific recommendations.

5.1 Site Summary

1. The site is located on the Oak Ridges Moraine in the Humber River watershed, at the intersection of Bethesda Sideroad and Bayview Avenue. It is a major part of the regional natural heritage system. Its natural cover fills an important function in helping to maintain a viable east-west connection across the Oak Ridges Moraine, and to the rivers flowing south into Toronto and north into Lake Simcoe.
2. Lake St. George, the centrepiece of the site, is one of the most intact and undisturbed kettle lakes in the TRCA jurisdiction, with almost its entire catchment area being natural cover; most of the catchment area is within the TRCA field centre property.
3. Lake St. George Field Centre is uniquely protected because not only is it TRCA property (hence secure from urban development) but also it is not open to the general public. Its focus is as an educational facility, and people can visit the site by appointment. The high degree of protection allows for a wide range of vegetation communities, flora and fauna species to be at the site.
4. Seventy-five vegetation types were observed, ranging from forest and plantation to shallow marsh and aquatic communities. The site includes 5 aquatic, 26 wetland, 13 forest, 19 plantation, 11 successional and 1 meadow vegetation community types. Wetlands (marshes and swamps), young forests, and plantations preponderate.
5. Four hundred and one naturally occurring flora species were observed. Amongst them were 60 species of regional concern (ranked L3) and 77 species of urban concern (ranked L4). The vast majority of species of concern at this site are associated with wetland and aquatic habitats and include large populations of cuckoo-flower, swamp loosestrife, and knotted pondweed. A few, such as swamp thistle and small yellow sedge, have not been seen since the 1990s.
6. The 73 species of vertebrate fauna observed is a total which is to be expected given the location of the site in the urban-rural interface landscape. This compares favourably to similar study sites such as Heart Lake CA.
7. The presence in 2014 of six low and ground-nesting forest species such as ovenbird and ruffed grouse and other forest type species suggest the forest areas are functioning at a fairly high level in terms of avifauna support.

8. The presence of a little brown bat maternity roost at the Field Centre barn is significant locally and nationally due to the increasing pressures on these species from the fungal disease White Nose Syndrome (WNS).

5.2 Site Recommendations

The recommendations primarily address objectives of protecting regional biodiversity in the TRCA jurisdiction. In order to at least maintain and preferably enhance the current level of biodiversity at Lake St. George Field Centre, the overall integrity of the natural heritage system that includes the site must be protected. Therefore, at the landscape scale, in keeping with the TNHSS, connections to other natural habitat patches in the landscape need to be enhanced and maintained. Furthermore, the recommendations highlight the issues that may occur with any increased public use as the urban landscape continues to expand. Management should strive to address this potential increase in negative matrix influence and ensure that effective mitigation is included as part of any future management plans. This includes strategic placement of any interpretive signage, managing public use, allowing healthy dynamic natural processes to proceed, and controlling invasive species.

The following recommendations address the above natural heritage concerns, with an emphasis upon bolstering the existing natural features on site. Thus, we recommend overall that 1) existing habitats and features be protected and enhanced; 2) that public use be managed; and 3) that invasive species be controlled.

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*. This is especially true for the wetland communities that rely on Lake St. George's intact hydrology and the habitat requirements of low and ground nesting forest bird species such as ovenbird and ruffed grouse. This implies improving existing habitat and expanding it where possible.

- a. The Lake St. George property owned by TRCA has already been extensively naturalized, with the vast majority of the site (aside from areas directly used by the field centre) now under some form of natural cover. Therefore, the next steps should be to look at *expanding linkages off-site* and *improve the quality* of the natural cover already on site.
- b. In choosing areas for natural restoration, focus on expanding connectivity to the north and east along Bethesda Road through the existing wetlands to Haynes Lake and Bloomington Wetland; south across Bethesda Road to the ORCCRE which includes Swan Lake and West Gormley; and west to Lake Wilcox and the East

- Humber River valley. Include *land acquisition* and *stewardship* as options in such a strategy.
- c. The small areas of land outside the Lake St. George Field Centre to the north that lie within Lake St. George's catchment area could be targeted for stewardship to maintain natural cover.
 - d. Bayview Avenue and Bethesda Road present significant habitat barriers. This will intensify when Bethesda Road is paved and widened. Therefore any road widening or upgrading projects could be preceded by the early initiation of a road ecology program to investigate the potential impacts of such work on the migration and dispersal behaviours of local herpetofauna and mammal populations. This may lead to the *incorporating of wildlife crossings (e.g. amphibian tunnels)* into any Bethesda Road plans. Bayview Avenue already has some crossings, but improvements could be made in the vicinity of where the East Humber River crosses it, along with maintaining existing crossings.
 - e. The young forests and plantations at the Lake St. George Field Centre should be slowly directed toward native biodiversity through a blend of *underplanting and seeding of native species*; removal of invasives (see Recommendation #3), and perhaps mycorrhizal interventions.
 - f. The need to underplant younger forests and treed swamps with native species becomes more urgent in the stands of ash (e.g. Red Ash Mineral Deciduous Swamp). As the overstorey dies from EAB infestation, we should strive to ensure that the regeneration is dominated by native species.
 - g. Given the management requirement to remove hazard trees (including those affected by EAB) in the vicinity of trails, providing properly protected and fully-monitored nest-boxes would enhance opportunities for species such as great-crested flycatcher (*Myiarchus crinitus*), and increase the likelihood of recruitment of other cavity-nesters such as eastern screech-owl (*Megascops asio*). Ensuring dead snags are left standing would promote recruitment of species such as pileated woodpecker (*Dryocopus pileatus*), and red-bellied woodpecker (*Melanerpes carolinus*).
 - h. The remaining areas of native meadow communities can provide foraging opportunities for monarch butterflies and migrant songbirds in the fall (primarily sparrows). They are also an important educational feature and could be maintained in open condition. In addition, hawthorn diversity and health can be maintained by removing invasive species such as buckthorn and Manitoba maple.

- i. Areas selected for restoration such as weedy plantations to be upgraded should have soil and moisture assessments conducted in order to help determine suitable lists of species for planting.
- j. Conduct ongoing comprehensive bat surveys to determine the size and integrity of any bat roosts in the study area, including within the Field Centre barn and surrounding buildings. From these data ensure roosts are preserved and protected.

2. Manage Public Use

Although Lake St. George Field Centre is not open to the public, visitor pressure is likely to increase in the future, and it is important that this increase in use does not impact sensitive habitat features such as the wetlands that support the most significant fauna communities.

- a. The site's existing status as not accessible to the general public except by appointment should be maintained to preserve it as a nature reserve and educational facility. This may require *inspection of the existing fence lines* and their repair where required to minimize illicit use.
- b. Hikers and dog-walkers are currently having little impact on the site. However, if there is any intention to encourage greater public use of the natural habitats within the study area it is important to establish very definite rules on the presence of dogs. Wherever dog-walkers have access, it follows that there will be an expectation that animals will be allowed to roam off-leash – despite local by-laws to the contrary. If such a use is allowed to embed itself at the site, there is a considerable risk that the more terrestrial frog populations will suffer; furthermore, any benefits gained by increasing forest patch sizes will be off-set by the increased impact of such use on low and ground-nesting bird species. Terrestrial educational outings during the breeding bird season (early-May to mid-July) should be restricted to trail use only to lessen impacts on low and ground-nesting bird species.
- c. Involving educational guests and the community in any restoration efforts will enhance feelings of good stewardship, which in turn will result in more ecologically positive behaviour, e.g. provision of adequate natural cover buffers and corridors along water courses, proper disposal of yard waste; and plant identification.

3. Control Invasive Species

Several invasive plant species are threats to the native biodiversity at Lake St. George Field Centre. *It is essential that well-planned and realistic measures be undertaken to control*

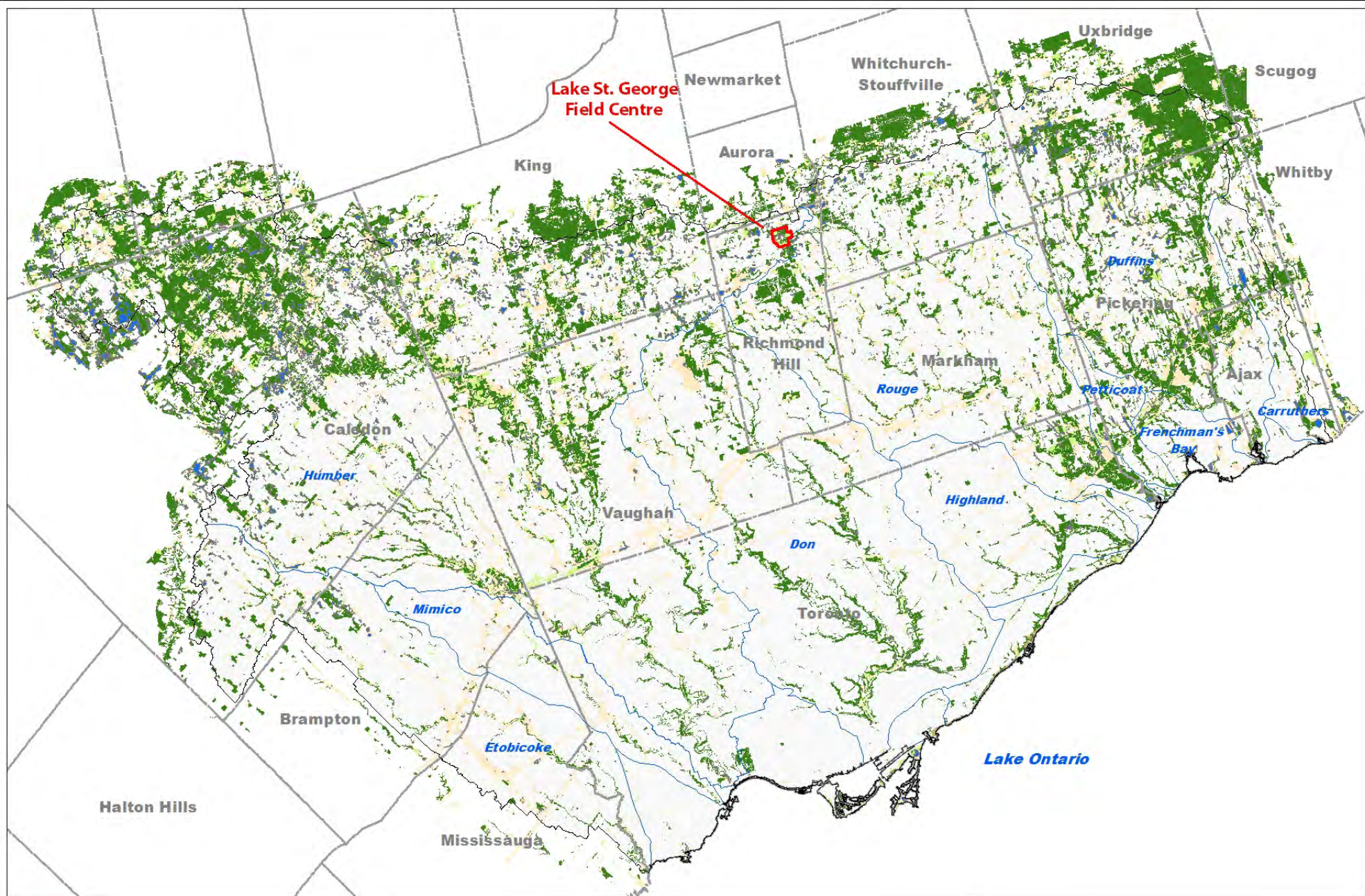
invasive species. Management for invasive species will need to be tailored to the individual species in question, depending on how wide-spread and established they are. For example, common buckthorn would not necessarily be a top priority for eradication since it is so pervasive and to some extent is integrated with the native vegetation at this site.

- a. Certain invasive species such as common reed, dog-strangling vine, periwinkle, goutweed, and Norway maple are currently present in localized populations but have the potential to become catastrophic to the ecosystem. For example, there are two patches of common reed along the shoreline of Lake St. George which could eventually overwhelm the entire wetland fringe. These localized populations should be the first priority for eradication while it is still possible to do so.
- b. In general, take a proactive management approach to invasive species control. Pre-assess areas targeted for restoration plantings or trail repair and remove existing exotic populations. This would include local removal of Norway maple, Manitoba maple, buckthorn, and other species that are invading young plantations.
- c. In young forests with a buckthorn understorey, gradually thin the buckthorn saplings, focusing on the female (berry-producing) plants. Replace with native tree saplings.
- d. Monitor the purple loosestrife situation around Lake St. George, which is currently in a phase of low beetle population and high purple loosestrife vigour (i.e. ineffective control of the invasive plant). Consider releasing more beetles if conditions warrant it.

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Map 1:
Lake St. George Field Centre in the
Context of Regional Natural Cover

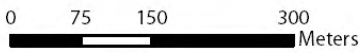
Natural Cover *

- | | | | |
|---|--------------|---|------------------------------|
|  | Forest |  | Lake St. George Field Centre |
|  | Successional |  | TRCA Jurisdiction |
|  | Meadow |  | Watershed |
|  | Wetland |  | Municipal Boundary |
|  | Beach/Bluff | | |

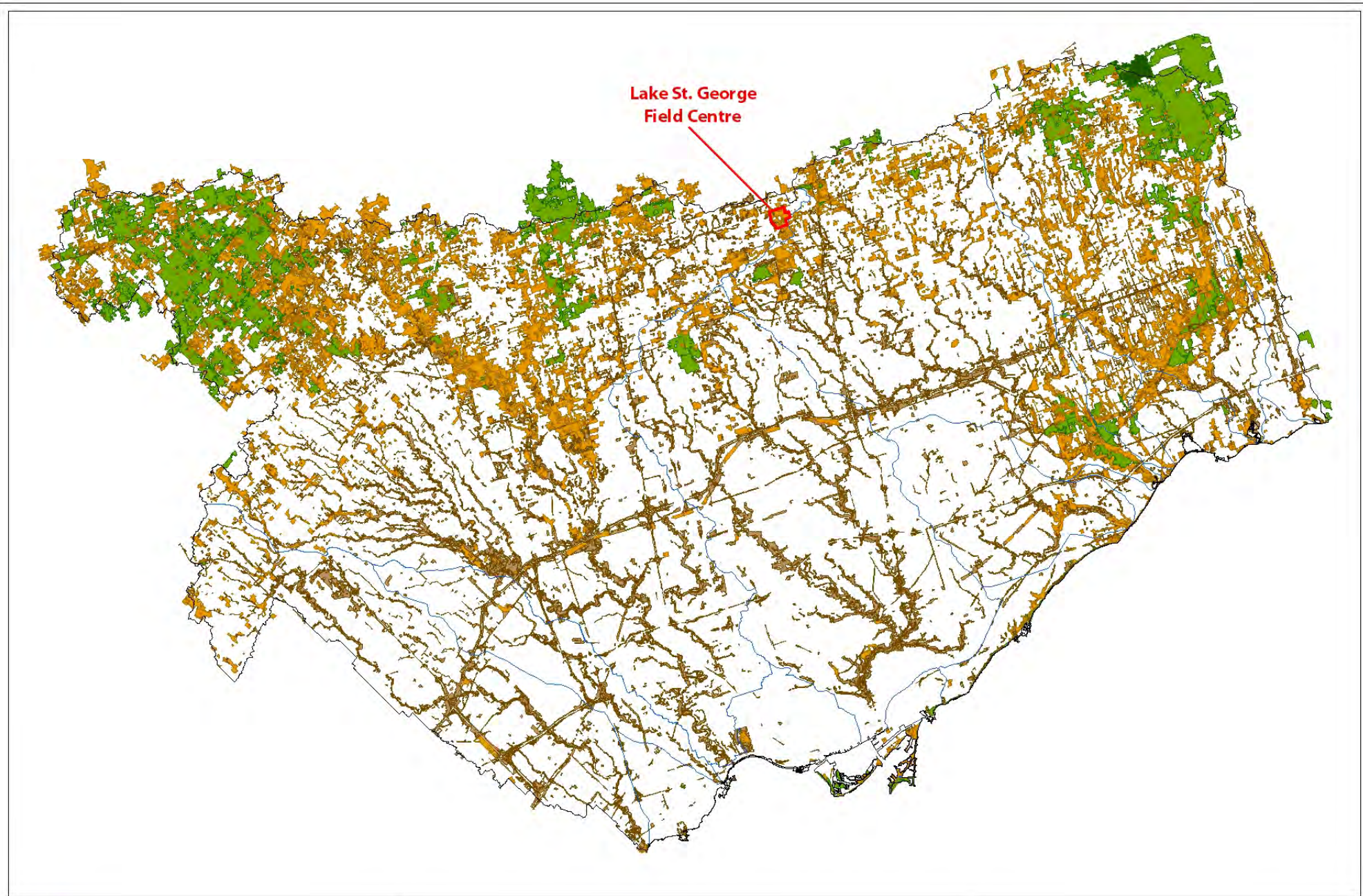


**Map 2:
Lake St. George
Field Centre**

- Study Area
- Watercourse



January 2017
Orthophoto: Spring 2015, First Base Solutions



Lake St. George
Field Centre

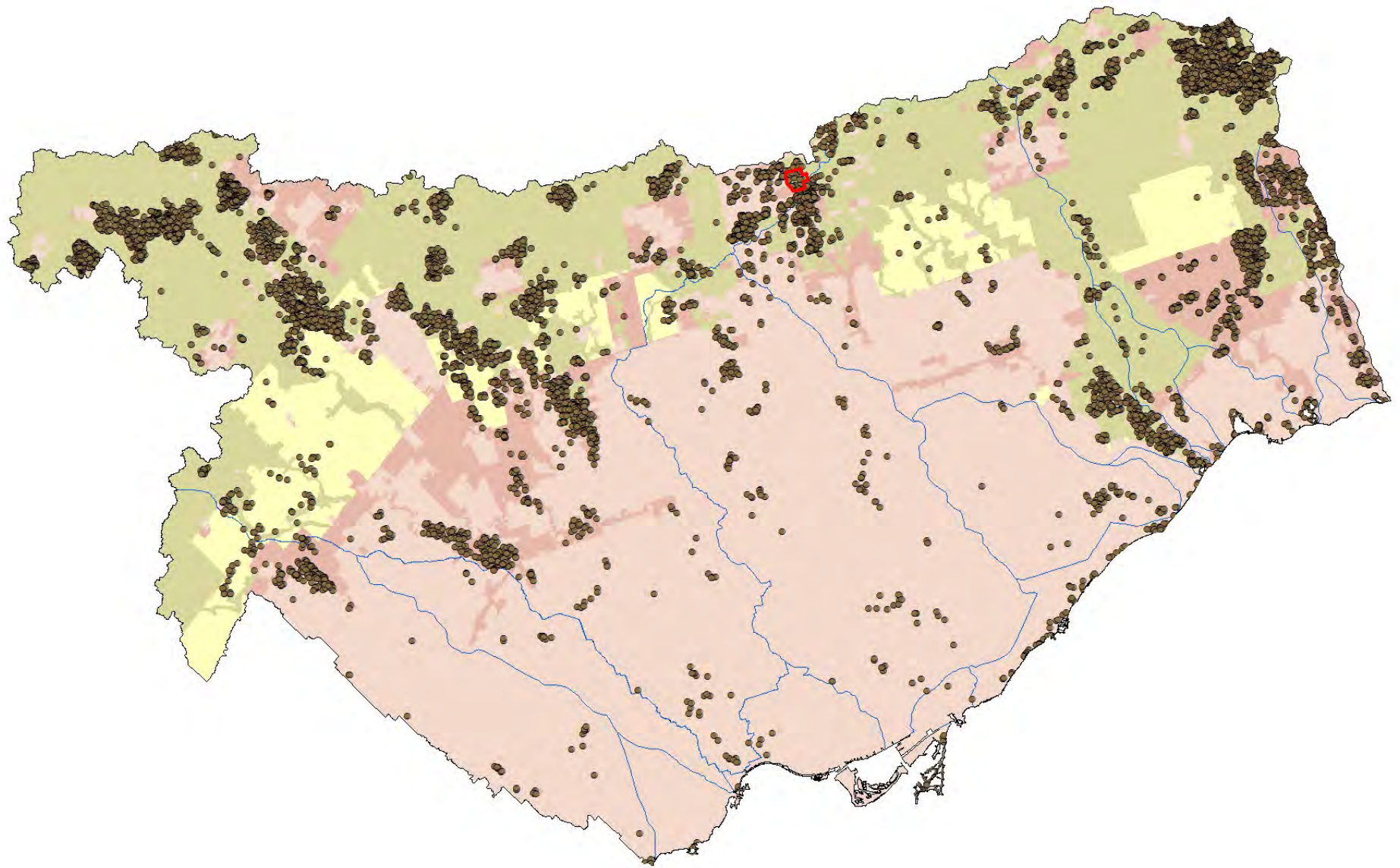


Map 3: Regional Natural System Habitat Patch Quality

Habitat Patch Quality *

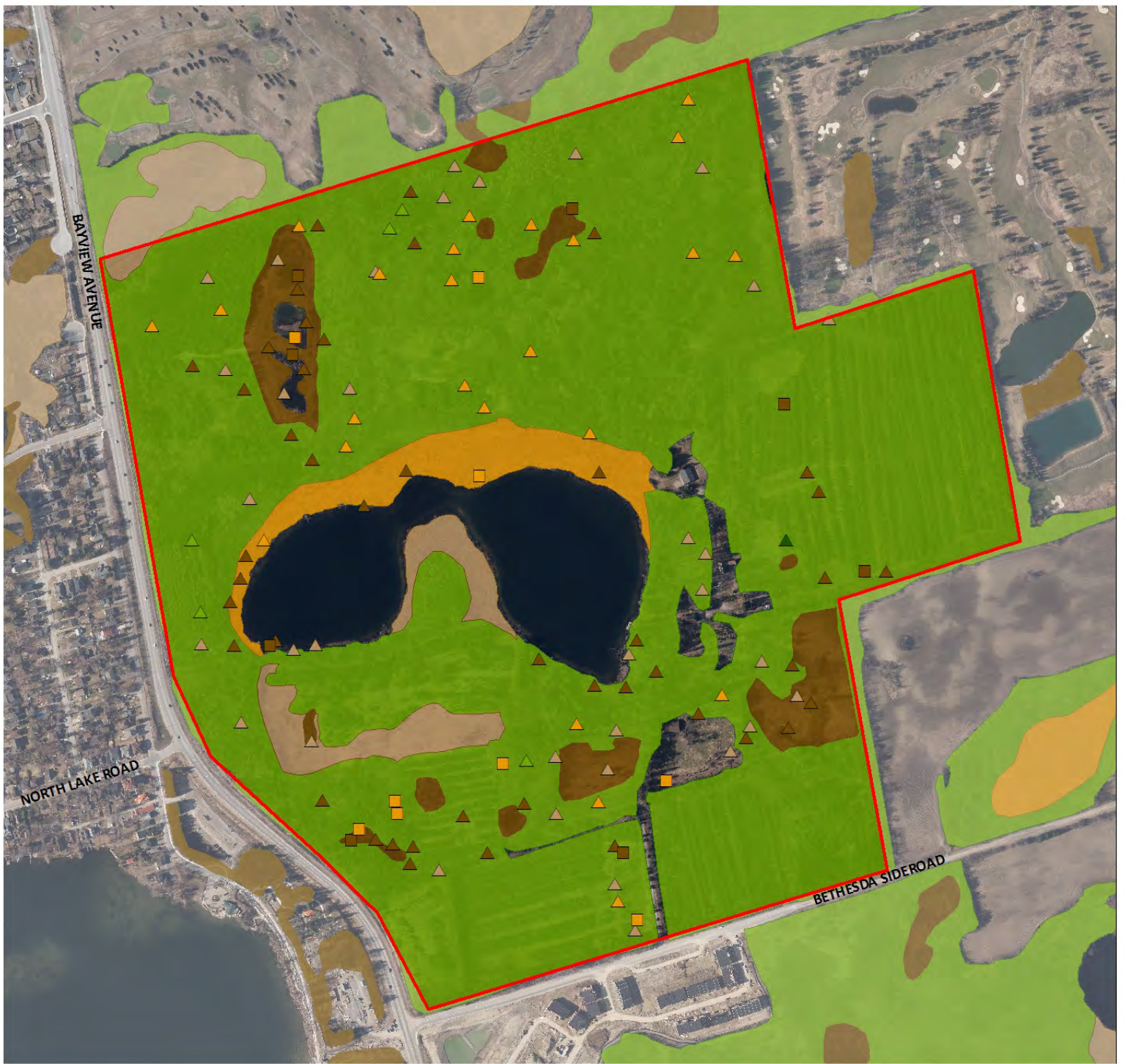
-  L1 - Excellent
-  L2 - Good
-  L3 - Fair
-  L4 - Poor
-  L5 - Very Poor

-  Lake St. George Field Centre
-  TRCA Jurisdiction
-  Watershed



Map 4: Distribution of Fauna Regional Species of Concern

-  Fauna Species of Concern (L1 - L3)
-  Lake St. George Field Centre
-  TRC A 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

□ Lake St. George Field Centre

Habitat Patch Size Scores *

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



0 75 150 300 Meters

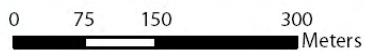
Date: January 2017

Orthophoto: Spring 2015, First Base Solutions

*Landscape analysis based on 2013 Orthophotography

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

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



Date: January 2017
 Orthophoto: Spring 2015, First Base Solutions

Map 6: Interior Forest at Lake St. George Field Centre

-  Lake St. George Field Centre
-  Forest
- Forest Interior**
-  100m-200m
-  200m-300m



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

Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor
- Flora Species
- ⊕ Planted Flora Species
- Lake St. George Field Centre



0 75 150 300 Meters

Date: January 2017

Orthophoto: Spring 2015, First Base Solutions

* Landscape analysis based on 2013 Orthophotography

**Map 7:
Scores for Matrix Influence
and Flora Sensitivity to
Development**

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



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

Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor
- △ Fauna Species
- Frog Species
- Lake St. George Field Centre

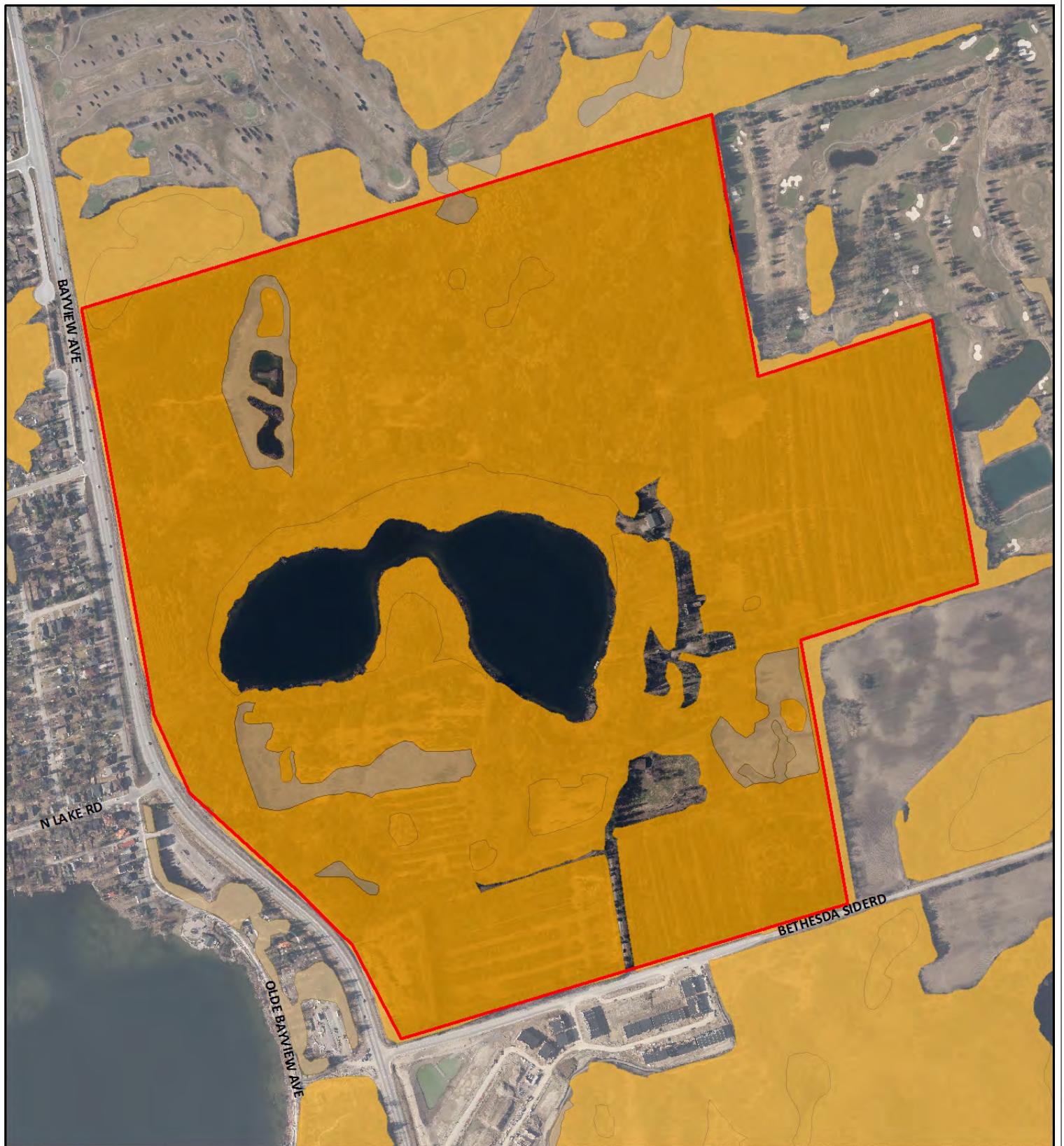


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Date: January 2017
 Orthophoto: Spring 2015, First Base Solutions
 *Landscape analysis based on 2013 Orthophotography

**Map 8:
 Scores for Matrix Influence
 and Fauna Sensitivity to
 Development**

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



0 75 150 300
Meters

Date: January 2017
Orthophoto: Spring 2015, First Base Solutions
*Landscape analysis based on 2013 Orthophotography

Map 9: Habitat Patch Quality

Habitat Patch Quality *

- L1 - Excellent
 - L2 - Good
 - L3 - Fair
 - L4 - Poor
 - L5 - Very Poor
- Lake St. George Field Centre









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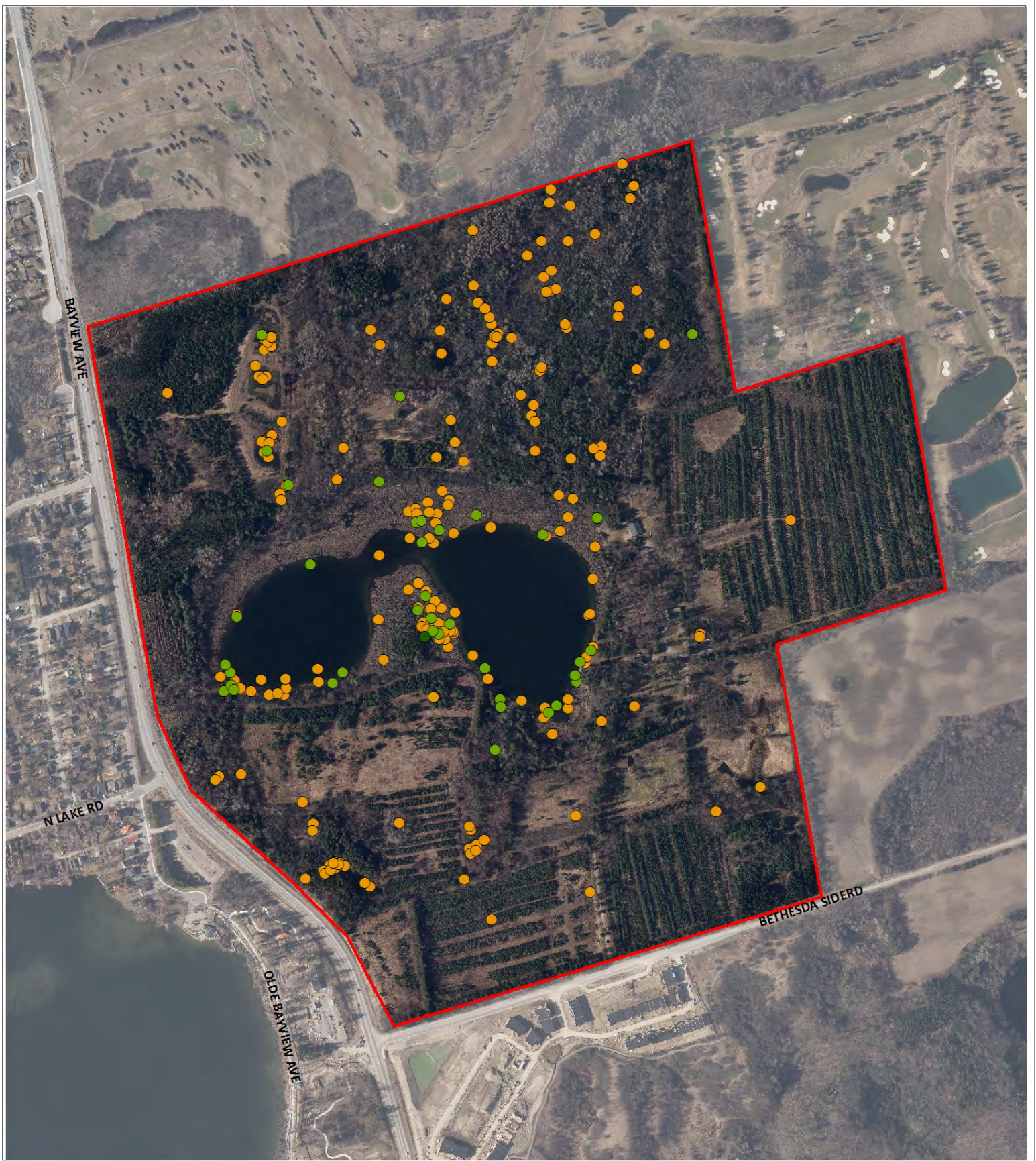
Map 10: Vegetation Communities with their Associated Local Ranks

Vegetation Community Ranks

	L1		L4
	L2		L5
	L3		L+

 Lake St. George Field Centre

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



0 75 150 300 Meters

Date: January 2017
 Orthophoto: Spring 2015, First Base Solutions

Map 11: Location of Flora Species of Concern

Flora Species of Concern (L1-L3)

- L1
- L2
- L3

Lake St. George Field Centre



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

Lake St. George Field Centre



0 75 150 300 Meters

Date: January 2017
 Orthophoto: Spring 2015, First Base Solutions

**Map 12:
 Flora Species Habitat
 Dependence Scores**

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



0 75 150 300
 Meters

Date: January 2017
 Orthophoto: Spring 2015, First Base Solutions

Map 13: Locations of Fauna Species of Concern

**Fauna Species of
 Concern**

▲ L1 ▲ L3
 ▲ L2 ▲ L4

**Frog Species of
 Concern**

■ L1 ■ L3
 ■ L2 ■ L4

□ Lake St. George Field Centre



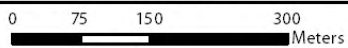
Fauna Habitat Dependence Scores

- ▲ ■ 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

□ Lake St. George Field Centre



Date: January 2017
Orthophoto: Spring 2015, First Base Solutions

**Map 14:
Fauna Species Habitat
Dependence Scores**

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

Appendix 1: Vegetation Communities at Lake St. George Field Centre (2016)

ELC Code	Vegetation Type <i>(* indicates present as inclusion and/or complex only)</i>	Tot. area # ha	Scores			Local Rank Apr-16
			Local Occur.	Geophy. Requir.	2016 Score	
	Forest					
FOC4-1	Fresh-Moist White Cedar Coniferous Forest	2.5	2.0	2.0	4.0	L4
FOC4-A	Fresh-Moist White Cedar - White Pine Coniferous Forest	4.1	2.5	1.0	3.5	L4
FOM7-1	Fresh-Moist White Cedar - Sugar Maple Mixed Forest	2.0	2.5	2.0	4.5	L4
FOM7-2	Fresh-Moist White Cedar - Hardwood Mixed Forest	4.8	1.5	2.0	3.5	L4
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest	0.1	1.0	0.0	1.0	L5
FOD5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest	0.4	1.5	2.0	3.5	L4
FOD5-6	Dry-Fresh Sugar Maple - Basswood Deciduous Forest	0.3	2.5	0.0	2.5	L5
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest	0.4	1.5	0.0	1.5	L5
FOD7-a	Fresh-Moist Manitoba Maple Lowland Deciduous Forest	2.3	1.5	0.0	1.5	L5
FOD7-b	Fresh-Moist Norway Maple Deciduous Forest	0.9	3.0	0.0	3.0	L+
FOD7-c	Fresh-Moist Exotic Lowland Deciduous Forest	4.7	2.0	0.0	2.0	L+
FOD7-F	Fresh-Moist Basswood Lowland Deciduous Forest	1.6	3.0	1.0	4.0	L4
FOD8-1	Fresh-Moist Poplar Deciduous Forest	5.3	1.5	0.0	1.5	L5
CUP1-3	Black Walnut Deciduous Plantation	0.9	3.0	0.0	3.0	L5
CUP1-4	Hybrid Poplar Deciduous Plantation	0.4	2.0	0.0	2.0	L5
CUP1-5	Silver Maple Deciduous Plantation	0.4	3.0	0.0	3.0	L5
CUP1-7	Red (Green) Ash Deciduous Plantation	0.3	3.0	0.0	3.0	L5
CUP1-c	Black Locust Deciduous Plantation	0.8	2.0	0.0	2.0	L+
CUP2-1A	Black Walnut - Conifer Mixed Plantation	6.2	3.5	0.0	3.5	L5
CUP2-A	Restoration Mixed Plantation	18.6	2.0	0.0	2.0	L5
CUP2-b	Black Locust - Conifer Mixed Plantation	1.1	3.0	0.0	3.0	L+
CUP2-c	Norway Maple - Conifer Mixed Plantation	0.2	3.0	0.0	3.0	L+
CUP3-1	Red Pine Coniferous Plantation	0.5	1.5	0.0	1.5	L5
CUP3-3	Scots Pine Coniferous Plantation	0.3	2.0	0.0	2.0	L+
CUP3-6	European Larch Coniferous Plantation	1.5	3.0	0.0	3.0	L+
CUP3-8	White Spruce - European Larch Coniferous Plantation	0.5	3.0	0.0	3.0	L5
*CUP3-9	*Norway Spruce - European Larch Coniferous Plantation	*c	3.5	0.0	3.5	L+

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ELC Code	Vegetation Type <i>(* indicates present as inclusion and/or complex only)</i>	Tot. area # ha	Scores			Local Rank Apr-16
			Local Occur.	Geophy. Requir.	2016 Score	
CUP3-A	Restoration Coniferous Plantation	2.8	2.5	0.0	2.5	L5
CUP3-C	White Spruce Coniferous Plantation	3.8	2.0	0.0	2.0	L5
CUP3-e	Norway Spruce Coniferous Plantation	0.3	2.0	0.0	2.0	L+
CUP3-G	White Cedar Coniferous Plantation	0.7	2.0	0.0	2.0	L5
CUP3-H	Mixed Conifer Coniferous Plantation	4.0	1.5	0.0	1.5	L5
	Successional					
CUT1-A2	Native Mixed Sapling Regeneration Thicket	0.1	2.5	0.0	2.5	L5
CUT1-b	Buckthorn Deciduous Thicket	1.0	2.0	0.0	2.0	L+
*CUT1-E	*Red Osier Dogwood Deciduous Thicket	*c	2.5	0.0	2.5	L5
CUT1-G	Willow Deciduous Thicket	0.1	3.5	0.0	3.5	L4
CUS1-A1	Native Deciduous Successional Savannah	0.9	1.5	0.0	1.5	L5
CUS1-A2	White Pine Successional Savannah	0.7	2.5	1.0	3.5	L4
*CUW1-A1	*White Cedar Successional Woodland	*c	2.5	1.0	3.5	L4
CUW1-A2	White Pine Successional Woodland	0.7	2.5	1.0	3.5	L4
CUW1-A3	Native Deciduous Successional Woodland	3.4	1.0	0.0	1.0	L5
CUW1-b	Exotic Successional Woodland	1.1	1.0	0.0	1.0	L+
CUW1-D	Hawthorn Successional Woodland	0.7	2.0	0.0	2.0	L5
	Wetland					
SWC1-1	White Cedar Mineral Coniferous Swamp	0.3	2.5	2.0	4.5	L4
SWM1-1	White Cedar - Hardwood Mineral Mixed Swamp	1.4	1.5	2.0	3.5	L4
SWD2-2	Red (Green) Ash Mineral Deciduous Swamp	3.4	2.0	2.0	4.0	L4
SWD3-2	Silver Maple Mineral Deciduous Swamp	1.3	2.0	2.0	4.0	L4
SWD3-4	Manitoba Maple Mineral Deciduous Swamp	0.1	3.0	1.0	4.0	L4
SWD4-1	Willow Mineral Deciduous Swamp	4.1	2.0	1.0	3.0	L4
SWD4-3	Paper Birch - Poplar Mineral Deciduous Swamp	0.6	2.0	2.0	4.0	L4
SWD6-2	Silver Maple Organic Deciduous Swamp	0.3	3.5	3.0	6.5	L2
SWD7-A	Willow Organic Deciduous Swamp	0.1	3.5	2.0	5.5	L3
SWT2-2	Willow Mineral Thicket Swamp	3.9	2.0	2.0	4.0	L4

Appendix 1: Vegetation Communities at Lake St. George Field Centre (2016)

ELC Code	Vegetation Type <i>(* indicates present as inclusion and/or complex only)</i>	Tot. area # ha	Scores			Local Rank Apr-16
			Local Occur.	Geophy. Requir.	2016 Score	
SWT2-5	Red-osier Mineral Thicket Swamp	0.2	2.0	2.0	4.0	L4
SWT3-2	Willow Organic Thicket Swamp	0.2	2.5	3.0	5.5	L3
FES2-A	Willow Shrub Mineral Fen	1.3	4.5	3.0	7.5	L2
MAM2-2	Reed Canary Grass Mineral Meadow Marsh	0.6	1.0	1.0	2.0	L+
MAM2-6	Broad-leaved Sedge Mineral Meadow Marsh	0.1	3.0	2.0	5.0	L3
*MAM2-7	*Horsetail Mineral Meadow Marsh	*i	3.0	2.0	5.0	L3
MAM2-C	Rush Mineral Meadow Marsh	0.1	3.5	2.0	5.5	L3
MAM3-5	Narrow-leaved Sedge Organic Meadow Marsh	0.04	4.0	3.0	7.0	L2
MAS2-1b	Narrow-Leaved Cattail Mineral Shallow Marsh	0.9	1.0	0.0	1.0	L+
MAS2-3	Narrow-leaved Sedge Mineral Shallow Marsh	0.01	4.0	1.0	5.0	L3
MAS2-4	Broad-leaved Sedge Mineral Shallow Marsh	0.02	3.0	2.0	5.0	L3
MAS2-9	Forb Mineral Shallow Marsh	0.1	2.5	1.0	3.5	L4
MAS3-1b	Narrow-leaved Cattail Organic Shallow Marsh	0.7	3.0	1.0	4.0	L+
MAS3-2	Bulrush Organic Shallow Marsh	0.3	3.5	3.0	6.5	L2
MAS3-10	Forb Organic Shallow Marsh	0.04	4.0	3.0	7.0	L2
MAS3-12	Swamp Loosestrife Organic Shallow Marsh	0.7	4.0	3.0	7.0	L2
	Aquatic					
*SAM1-2	*Duckweed Mixed Shallow Aquatic	*c	2.0	2.0	4.0	L4
SAM1-4	Pondweed Mixed Shallow Aquatic	0.1	3.0	2.0	5.0	L3
SAM1-5	Bur-reed Mixed Shallow Aquatic	0.1	5.0	2.0	7.0	L2
SAM1-A	Water Lily - Bullhead Lily Mixed Shallow Aquatic	2.6	2.5	2.0	4.5	L4
OAO1	Open Aquatic (deep or riverine unvegetated)	7.9	1.5	0.0	1.5	L5

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			Local Occur.	Geophy. Requir.	2016 Score	
	Meadow					
CUM1-A	Native Forb Meadow	6.0	1.0	0.0	1.0	L5

Legend

L1-L3: community of regional conservation concern
L4: community of conservation concern in urban area
L5: community not of conservation concern at this time
L+: community of predominantly introduced species
*c,i: community present only as complex (c) or inclusion (i)

Appendix 2: Flora Species at Lake St. George Field Centre (2016 and historical)

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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Cirsium muticum</i>	swamp thistle	5	5	4	5	19	L1	e		x
<i>Amelanchier spicata</i>	running serviceberry	4	4	4	5	17	L2	x		x
<i>Calla palustris</i>	water arum	3	5	4	5	17	L2	x	x	
<i>Cardamine nymanii</i>	cuckoo-flower	5	4	5	4	18	L2	xpn	x	x
<i>Carex aquatilis</i>	water sedge	3	4	5	5	17	L2	x		
<i>Carex cryptolepis</i>	small yellow sedge	5	3	5	4	17	L2	e		x
<i>Decodon verticillatus</i>	swamp loosestrife	4	5	4	5	18	L2	x	x	x
<i>Heteranthera dubia</i>	water star-grass	5	3	5	5	18	L2	x		
<i>Hypericum fraseri</i>	marsh St. John's-wort	3	5	4	5	17	L2	x		
<i>Menyanthes trifoliata</i>	bog buckbean	4	4	5	5	18	L2		x	
<i>Nymphaea odorata</i> ssp. <i>odorata</i>	fragrant water-lily	4	4	5	4	17	L2	x		x
<i>Potamogeton nodosus</i>	knotty pondweed	5	4	5	4	18	L2	x		x
<i>Pyrola asarifolia</i>	pink pyrola	3	4	5	5	17	L2			x
<i>Ranunculus flabellaris</i>	yellow water crowfoot	4	4	4	5	17	L2			x
<i>Utricularia minor</i>	small bladderwort	4	4	5	5	18	L2	x		
<i>Anemone cylindrica</i>	long-fruited thimbleweed	3	4	3	4	14	L3	x		
<i>Bidens discoidea</i>	small beggar's-ticks	4	2	4	4	14	L3	x		
<i>Campanula aparinoides</i>	marsh bellflower	3	4	5	4	16	L3	x	x	x
<i>Carex atherodes</i>	awned sedge	3	3	5	4	15	L3	x		x
<i>Carex comosa</i>	bristly sedge	2	3	5	4	14	L3			x
<i>Carex diandra</i>	lesser panicled sedge	3	4	5	4	16	L3	x		
<i>Carex flava</i>	yellow sedge	3	3	5	4	15	L3		x	x
<i>Carex interior</i>	fen star sedge	2	4	4	4	14	L3	x		x
<i>Carex leptalea</i>	bristle-stalked sedge	2	3	5	4	14	L3	x		x
<i>Carex tuckermanii</i>	Tuckerman's sedge	2	4	4	4	14	L3	x		
<i>Carex utriculata</i>	beaked sedge	2	3	4	5	14	L3	x	x	
<i>Celastrus scandens</i>	American bittersweet	2	4	3	5	14	L3	x		x
<i>Chelone glabra</i>	turtlehead	2	3	4	5	14	L3		x	
<i>Chrysosplenium americanum</i>	golden saxifrage	2	3	5	4	14	L3		x	
<i>Circaea alpina</i>	smaller enchanter's nightshade	2	4	5	4	15	L3	x		
<i>Comarum palustre</i>	marsh cinquefoil	3	4	4	5	16	L3	x	x	x
<i>Cornus obliqua</i>	silky dogwood	3	3	5	3	14	L3	xpn		
<i>Crataegus chrysoarpa</i> var. <i>phoenicea</i>	glabrate fireberry hawthorn	3	3	4	4	14	L3	x		
<i>Crataegus macrosperma</i>	variable hawthorn	4	3	5	3	15	L3	x		
<i>Cyperus bipartitus</i>	two-parted umbrella-sedge	3	3	4	4	14	L3			x
<i>Cypripedium parviflorum</i> var. <i>makasin</i>	smaller yellow lady's slipper	2	4	4	5	15	L3	x	x	x
<i>Dryopteris clintoniana</i>	Clinton's wood fern	2	4	5	4	15	L3	x		
<i>Eleocharis palustris</i>	Small's spike-rush	2	4	5	3	14	L3	x		x
<i>Epilobium leptophyllum</i>	narrow-leaved willow-herb	2	5	4	4	15	L3	x	x	
<i>Equisetum fluviatile</i>	water horsetail	2	4	5	4	15	L3	x	x	x

Appendix 2: Flora Species at Lake St. George Field Centre (2016 and historical)

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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Equisetum scirpoides</i>	dwarf scouring-rush	2	4	5	5	16	L3	x	x	
<i>Galium tinctorium</i>	stiff marsh bedstraw	3	4	4	3	14	L3			x
<i>Glyceria borealis</i>	northern manna grass	2	3	5	5	15	L3	x		x
<i>Gymnocarpium dryopteris</i>	oak fern	1	3	5	5	14	L3	x		
<i>Hypopitys monotropa</i>	pinemap	2	4	5	5	16	L3	x		
<i>Ilex verticillata</i>	winterberry	2	4	4	5	15	L3	x	x	
<i>Iris versicolor</i>	blue flag	1	5	4	5	15	L3	xpn	x	x
<i>Juglans cinerea</i>	butternut	1	5	4	4	14	L3	x	x	x
<i>Juncus alpinoarticulatus</i>	Richardson's rush	4	3	4	3	14	L3			x
<i>Juniperus communis</i> var. <i>depressa</i>	common juniper	2	3	4	5	14	L3	e		x
<i>Larix laricina</i>	tamarack	2	4	4	4	14	L3	xpn		x
<i>Lemna trisulca</i>	star duckweed	2	4	5	3	14	L3	x		x
<i>Liparis loeselii</i>	Loesel's twayblade	2	3	5	5	15	L3	x		x
<i>Lobelia inflata</i>	Indian tobacco	2	4	4	4	14	L3			x
<i>Lobelia siphilitica</i>	great blue lobelia	2	3	4	5	14	L3	x		x
<i>Menispermum canadense</i>	moonseed	2	4	4	4	14	L3	x		x
<i>Monotropa uniflora</i>	Indian-pipe	2	4	5	5	16	L3	x	x	
<i>Muhlenbergia glomerata</i>	marsh wild Timothy	4	3	4	5	16	L3			x
<i>Najas flexilis</i>	bushy naiad	2	4	5	5	16	L3	x		x
<i>Nuphar variegata</i>	bullhead lily	2	4	5	3	14	L3	x	x	x
<i>Persicaria amphibia</i> var. <i>emersa</i>	swamp smartweed	4	3	4	3	14	L3	x		
<i>Potamogeton amplifolius</i>	large-leaved pondweed	3	4	5	4	16	L3	x		
<i>Potamogeton natans</i>	floating pondweed	2	4	5	3	14	L3	x		
<i>Potamogeton pusillus</i> ssp. <i>tenuissimus</i>	least pondweed	3	4	5	4	16	L3	x		
<i>Prunus nigra</i>	Canada plum	2	4	4	4	14	L3	x		
<i>Rumex britannica</i>	great water dock	3	3	4	4	14	L3	x		x
<i>Sagittaria cuneata</i>	arrowhead	3	4	5	4	16	L3	x		x
<i>Salix lucida</i>	shining willow	2	4	5	3	14	L3	xp		x
<i>Schoenoplectus acutus</i> var. <i>acutus</i>	hard-stemmed bulrush	3	3	5	4	15	L3	xpn	x	x
<i>Scirpus pendulus</i>	drooping bulrush	3	4	5	4	16	L3	x		
<i>Sparganium emersum</i>	green-fruited bur-reed	2	3	5	4	14	L3	xpn	x	x
<i>Spiranthes cernua</i>	nodding ladies' tresses	3	3	5	4	15	L3			x
<i>Symphoricarpos albus</i> var. <i>albus</i>	eastern snowberry	3	4	4	5	16	L3	x		
<i>Taxus canadensis</i>	Canada yew	1	4	4	5	14	L3			x
<i>Trientalis borealis</i>	star-flower	1	4	4	5	14	L3	x		
<i>Utricularia vulgaris</i>	common bladderwort	3	4	5	4	16	L3	x		x
<i>Veronica scutellata</i>	marsh speedwell	3	2	5	4	14	L3	x		
<i>Viburnum acerifolium</i>	maple-leaved viburnum	2	3	4	5	14	L3			x
<i>Viola blanda</i>	sweet white violet	2	4	4	5	15	L3			x
<i>Viola macloskeyi</i>	northern white violet	3	4	4	3	14	L3	x		

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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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Acer rubrum</i>	red maple	1	4	1	5	11	L4	x		x
<i>Acer saccharinum</i>	silver maple	1	2	5	3	11	L4	x	x	x
<i>Acer spicatum</i>	mountain maple	1	3	4	4	12	L4	x		
<i>Acer x freemanii</i>	hybrid swamp maple	2	3	5	2	12	L4	x		x
<i>Actaea pachypoda</i>	white baneberry	1	3	4	3	11	L4	x	x	
<i>Amelanchier arborea</i>	downy serviceberry	2	2	4	3	11	L4	x		
<i>Amelanchier laevis</i>	smooth serviceberry	2	2	4	3	11	L4	x		
<i>Asclepias incarnata</i> ssp. <i>incarnata</i>	swamp milkweed	1	3	4	4	12	L4	x	x	x
<i>Betula alleghaniensis</i>	yellow birch	1	4	3	5	13	L4	x	x	
<i>Betula papyrifera</i>	paper birch	1	4	2	4	11	L4	x	x	x
<i>Boehmeria cylindrica</i>	false nettle	2	4	4	3	13	L4	x		
<i>Calamagrostis canadensis</i>	Canada blue joint	1	3	4	4	12	L4	x	x	x
<i>Carex aurea</i>	golden-fruited sedge	1	2	4	4	11	L4	x	x	x
<i>Carex echinodes</i>	marsh straw sedge	3	3	2	3	11	L4	x		x
<i>Carex hystericina</i>	porcupine sedge	1	3	2	5	11	L4	x	x	x
<i>Carex intumescens</i>	bladder sedge	2	4	4	2	12	L4	x		
<i>Carex lacustris</i>	lake-bank sedge	2	3	3	4	12	L4	x		x
<i>Carex lupulina</i>	hop sedge	1	4	4	4	13	L4	x	x	x
<i>Carex peckii</i>	Peck's sedge	2	3	4	3	12	L4	x		
<i>Carex pellita</i>	woolly sedge	2	3	4	3	12	L4	x		x
<i>Carex projecta</i>	necklace sedge	2	2	4	3	11	L4	x		x
<i>Carex pseudocyperus</i>	pseudocyperus sedge	1	3	3	4	11	L4	x		x
<i>Carex retrorsa</i>	retorse sedge	1	3	3	4	11	L4	x	x	x
<i>Carex stricta</i>	tussock sedge	2	3	3	4	12	L4	x		x
<i>Carex tribuloides</i>	blunt broom sedge	3	2	4	3	12	L4	x		
<i>Carya cordiformis</i>	bitternut hickory	1	4	4	2	11	L4	x	x	
<i>Ceratophyllum demersum</i>	coontail	1	3	5	3	12	L4	x		x
<i>Cicuta bulbifera</i>	bulblet-bearing water-hemlock	1	3	4	3	11	L4	x	x	x
<i>Crataegus macracantha</i>	long-spined hawthorn	2	2	4	3	11	L4	x		x
<i>Danthonia spicata</i>	poverty oat grass	2	3	3	4	12	L4	x		x
<i>Dichanthelium acuminatum</i> ssp. <i>acuminatum</i>	hairy panic grass	2	3	3	3	11	L4	x		x
<i>Dryopteris cristata</i>	crested wood fern	1	4	4	4	13	L4	x		
<i>Dryopteris intermedia</i>	evergreen wood fern	1	4	4	3	12	L4	x	x	x
<i>Dryopteris x triploidea</i>	confusing hybrid wood fern	3	2	3	3	11	L4	x		
<i>Elodea canadensis</i>	common water-weed	1	3	5	3	12	L4	x	x	x
<i>Equisetum variegatum</i> ssp. <i>variegatum</i>	variegated scouring-rush	2	2	5	4	13	L4	x		x
<i>Eupatorium perfoliatum</i>	boneset	1	3	4	3	11	L4	x		x
<i>Fagus grandifolia</i>	American beech	1	4	3	4	12	L4			x
<i>Fraxinus nigra</i>	black ash	1	4	4	3	12	L4	x	x	
<i>Galium trifidum</i> ssp. <i>trifidum</i>	small bedstraw	2	4	4	3	13	L4	x		

Appendix 2: Flora Species at Lake St. George Field Centre (2016 and historical)

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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Impatiens pallida</i>	yellow touch-me-not	2	3	4	2	11	L4	x		x
<i>Juncus effusus</i>	soft rush	1	4	4	3	12	L4	x	x	x
<i>Juncus nodosus</i>	knotted rush	2	2	5	3	12	L4	x		x
<i>Juncus torreyi</i>	Torrey's rush	2	3	4	2	11	L4	x		
<i>Lactuca biennis</i>	tall blue lettuce	2	4	2	4	12	L4	x		
<i>Lycopus americanus</i>	cut-leaved water-horehound	1	4	3	3	11	L4	x		x
<i>Lysimachia thyrsoiflora</i>	tufted loosestrife	2	3	4	4	13	L4	x		x
<i>Maianthemum canadense</i>	Canada May-flower	1	4	1	5	11	L4	x		x
<i>Oryzopsis asperifolia</i>	white-fruited mountain-rice	2	4	3	4	13	L4		x	
<i>Persicaria amphibia</i> var. <i>stipulacea</i>	water smartweed	3	2	4	3	12	L4	x	x	x
<i>Pilea fontana</i>	spring clearweed	2	3	4	4	13	L4	x		
<i>Pinus strobus</i>	white pine	1	4	3	4	12	L4	xpn	x	x
<i>Polystichum acrostichoides</i>	Christmas fern	1	3	5	4	13	L4		x	
<i>Populus grandidentata</i>	large-toothed aspen	1	3	4	3	11	L4	x	x	x
<i>Potamogeton foliosus</i>	leafy pondweed	1	3	5	4	13	L4			x
<i>Prunus pensylvanica</i>	pin cherry	2	4	3	3	12	L4			x
<i>Pteridium aquilinum</i> var. <i>latiusculum</i>	eastern bracken	1	4	2	4	11	L4	x		
<i>Pyrola elliptica</i>	shinleaf	1	4	4	4	13	L4	x	x	x
<i>Quercus macrocarpa</i>	bur oak	1	4	3	3	11	L4	x		
<i>Quercus rubra</i>	red oak	1	4	2	4	11	L4	xpn		x
<i>Ranunculus pensylvanicus</i>	bristly buttercup	3	3	4	3	13	L4	x		
<i>Rosa blanda</i>	smooth wild rose	2	3	3	4	12	L4	x		x
<i>Rubus pubescens</i>	dwarf raspberry	1	3	3	5	12	L4	x	x	x
<i>Rudbeckia hirta</i>	black-eyed Susan	1	4	4	3	12	L4	x		x
<i>Sagittaria latifolia</i>	common arrowhead	1	2	5	4	12	L4	x		x
<i>Salix amygdaloides</i>	peach-leaved willow	1	2	5	3	11	L4	x		x
<i>Salix bebbiana</i>	Bebb's willow	1	3	3	4	11	L4	x		x
<i>Salix discolor</i>	pussy willow	1	3	4	3	11	L4	x		x
<i>Salix petiolaris</i>	slender willow	2	3	5	3	13	L4	x	x	x
<i>Schoenoplectus tabernaemontani</i>	soft-stemmed bulrush	1	2	5	3	11	L4	x	x	x
<i>Scirpus cyperinus</i>	woolly bulrush	2	3	3	5	13	L4	xpn	x	x
<i>Sisyrinchium montanum</i>	blue-eyed grass	1	3	4	5	13	L4	x		x
<i>Sium suave</i>	water-parsnip	2	2	4	4	12	L4	x	x	x
<i>Sphenopholis intermedia</i>	slender wedge grass	2	3	4	4	13	L4	x		
<i>Spiraea alba</i>	wild spiraea	2	4	4	3	13	L4	x	x	x
<i>Stuckenia pectinata</i>	sago pondweed	2	2	5	3	12	L4	x		
<i>Symphyotrichum urophyllum</i>	arrow-leaved aster	2	3	4	4	13	L4	x		
<i>Thelypteris palustris</i> var. <i>pubescens</i>	marsh fern	1	4	2	4	11	L4	x	x	x
<i>Thuja occidentalis</i>	white cedar	1	4	1	5	11	L4	xpn	x	x
<i>Trillium erectum</i>	red trillium	1	4	3	5	13	L4	xpr		x

Appendix 2: Flora Species at Lake St. George Field Centre (2016 and historical)

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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Trillium grandiflorum</i>	white trillium	1	3	4	5	13	L4	xpr		x
<i>Tsuga canadensis</i>	eastern hemlock	1	4	3	5	13	L4	x	x	
<i>Typha latifolia</i>	broad-leaved cattail	1	4	4	4	13	L4	x	x	x
<i>Viola cucullata</i>	marsh blue violet	2	3	4	4	13	L4			x
<i>Viola sororia</i> var. <i>affinis</i>	Le Conte's violet	2	4	4	3	13	L4	x		
<i>Acalypha rhomboidea</i>	three-seeded mercury	2	1	2	0	5	L5	x		
<i>Acer saccharum</i> ssp. <i>saccharum</i>	sugar maple	1	3	0	2	6	L5	x	x	x
<i>Achillea borealis</i> var. <i>borealis</i>	woolly yarrow	1	2	0	1	4	L5			x
<i>Actaea rubra</i> ssp. <i>rubra</i>	red baneberry	1	3	1	3	8	L5	x		x
<i>Agrimonia gryposepala</i>	agrimony	1	2	0	2	5	L5	x		x
<i>Alisma triviale</i>	common water-plantain	1	2	4	2	9	L5	x	x	x
<i>Ambrosia artemisiifolia</i>	common ragweed	1	1	3	0	5	L5	x	x	x
<i>Anemone canadensis</i>	Canada anemone	1	2	2	2	7	L5	x	x	x
<i>Anemone virginiana</i>	common thimbleweed	1	3	0	3	7	L5			x
<i>Antennaria howellii</i> ssp. <i>howellii</i>	Howell's pussytoes	2	2	3	3	10	L5			x
<i>Apocynum androsaemifolium</i>	spreading dogbane	1	3	2	4	10	L5	x		
<i>Apocynum cannabinum</i> var. <i>cannabinum</i>	hemp dogbane	3	2	2	2	9	L5	x		
<i>Apocynum cannabinum</i> var. <i>hypericifolium</i>	clasping-leaved hemp dogbane	2	2	3	2	9	L5	x		
<i>Aralia nudicaulis</i>	wild sarsaparilla	1	3	1	4	9	L5	x		x
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	1	3	2	3	9	L5	x		
<i>Asclepias syriaca</i>	common milkweed	1	2	0	2	5	L5	x	x	x
<i>Athyrium filix-femina</i> var. <i>angustum</i>	northeastern lady fern	1	3	1	3	8	L5	x	x	x
<i>Bidens cernua</i>	nodding bur-marigold	1	2	3	3	9	L5	x	x	x
<i>Bidens frondosa</i>	common beggar's-ticks	1	1	4	0	6	L5	x		x
<i>Bidens tripartita</i>	three-parted beggar's-ticks	2	2	4	2	10	L5	x		x
<i>Carex arctata</i>	nodding wood sedge	1	4	2	3	10	L5	x		x
<i>Carex bebbii</i>	Bebb's sedge	1	2	3	3	9	L5	x	x	x
<i>Carex blanda</i>	common wood sedge	1	2	1	2	6	L5			x
<i>Carex cristatella</i>	crested sedge	1	2	4	1	8	L5	x		x
<i>Carex gracillima</i>	graceful sedge	1	3	4	2	10	L5	x		
<i>Carex granularis</i>	meadow sedge	1	2	1	3	7	L5	x		x
<i>Carex pedunculata</i>	early-flowering sedge	1	3	3	3	10	L5		x	
<i>Carex radiata</i>	straight-styled sedge	1	2	2	2	7	L5	x		x
<i>Carex rosea</i>	curly-styled sedge	1	2	3	2	8	L5	x		x
<i>Carex stipata</i>	awl-fruited sedge	1	3	2	3	9	L5	x		x
<i>Carex vulpinoidea</i>	fox sedge	1	2	4	1	8	L5	x	x	x
<i>Cicuta maculata</i>	spotted water-hemlock	1	2	2	2	7	L5			x
<i>Circaea canadensis</i> ssp. <i>canadensis</i>	enchanter's nightshade	1	1	1	1	4	L5	x	x	x
<i>Clematis virginiana</i>	virgin's bower	1	2	2	3	8	L5	x		
<i>Clinopodium vulgare</i>	wild basil	2	3	1	3	9	L5			x

Appendix 2: Flora Species at Lake St. George Field Centre (2016 and historical)

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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Cornus alternifolia</i>	alternate-leaved dogwood	1	2	1	2	6	L5	x	x	x
<i>Cornus stolonifera</i>	red osier dogwood	1	2	0	3	6	L5	x	x	x
<i>Crataegus punctata</i>	dotted hawthorn	1	2	3	3	9	L5	x		
<i>Dryopteris carthusiana</i>	spinulose wood fern	1	3	2	2	8	L5	x	x	x
<i>Echinocystis lobata</i>	wild cucumber	1	2	3	1	7	L5	x		x
<i>Eleocharis erythropoda</i>	creeping spike-rush	1	2	4	1	8	L5	x	x	x
<i>Epilobium ciliatum</i> ssp. <i>ciliatum</i>	sticky willow-herb	1	2	2	2	7	L5	x		x
<i>Epilobium coloratum</i>	purple-leaved willow-herb	1	3	4	2	10	L5	x	x	
<i>Equisetum arvense</i>	field horsetail	1	2	1	1	5	L5	x	x	x
<i>Equisetum hyemale</i> ssp. <i>affine</i>	scouring-rush	2	2	2	2	8	L5	x		
<i>Erigeron annuus</i>	daisy fleabane	1	2	0	1	4	L5	x		x
<i>Erigeron canadensis</i>	horse-weed	2	1	2	0	5	L5	x		
<i>Erigeron philadelphicus</i> var. <i>philadelphicus</i>	Philadelphia fleabane	1	2	0	1	4	L5	x		x
<i>Erythronium americanum</i> ssp. <i>americanum</i>	yellow trout-lily	1	3	3	2	9	L5	x		x
<i>Eurybia macrophylla</i>	big-leaved aster	1	3	2	4	10	L5	x		x
<i>Euthamia graminifolia</i>	grass-leaved goldenrod	1	1	4	1	7	L5	x	x	x
<i>Eutrochium maculatum</i> var. <i>maculatum</i>	spotted Joe-Pye weed	1	2	3	3	9	L5	x	x	x
<i>Fragaria vesca</i> ssp. <i>americana</i>	woodland strawberry	2	2	2	2	8	L5	x		x
<i>Fragaria virginiana</i> ssp. <i>virginiana</i>	common wild strawberry	2	2	0	2	6	L5	x	x	x
<i>Fraxinus americana</i>	white ash	1	5	0	3	9	L5	x	x	x
<i>Fraxinus pennsylvanica</i>	red ash	1	5	0	3	9	L5	xpn	x	x
<i>Galium aparine</i>	cleavers	2	1	3	2	8	L5	x		
<i>Galium palustre</i>	marsh bedstraw	1	2	3	3	9	L5	x		x
<i>Galium triflorum</i>	sweet-scented bedstraw	2	2	2	2	8	L5	x		x
<i>Geum aleppicum</i>	yellow avens	1	3	3	2	9	L5	x		x
<i>Geum canadense</i>	white avens	1	2	1	2	6	L5	x		x
<i>Glyceria striata</i>	fowl manna grass	1	2	1	2	6	L5	x	x	x
<i>Hackelia virginiana</i>	Virginia stickseed	1	2	0	2	5	L5	x		
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	1	2	1	2	6	L5	x		x
<i>Impatiens capensis</i>	orange touch-me-not	1	2	0	2	5	L5	x	x	x
<i>Juglans nigra</i>	black walnut	1	1	2	1	5	L5	xpn		x
<i>Juncus articulatus</i>	jointed rush	1	2	4	2	9	L5	x	x	x
<i>Juncus dudleyi</i>	Dudley's rush	1	2	3	1	7	L5			x
<i>Juncus tenuis</i>	path rush	1	2	1	1	5	L5	x	x	x
<i>Leersia oryzoides</i>	rice cut grass	1	2	3	2	8	L5	x		x
<i>Lemna minor</i>	common duckweed	1	2	4	2	9	L5	x	x	x
<i>Lemna turionifera</i>	turion duckweed	2	2	3	3	10	L5	x		
<i>Lycopus uniflorus</i>	northern water-horehound	1	3	3	3	10	L5	x	x	x
<i>Lysimachia ciliata</i>	fringed loosestrife	1	2	2	2	7	L5	x		x
<i>Maianthemum racemosum</i> ssp. <i>racemosum</i>	false Solomon's seal	1	3	2	3	9	L5	x	x	x

Appendix 2: Flora Species at Lake St. George Field Centre (2016 and historical)

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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Matteuccia struthiopteris</i> var. <i>pensylvanica</i>	ostrich fern	1	2	2	2	7	L5	x	x	x
<i>Mentha canadensis</i>	wild mint	1	2	3	2	8	L5	x	x	x
<i>Muhlenbergia mexicana</i> var. <i>mexicana</i>	common muhly grass	2	2	0	1	5	L5			x
<i>Oenothera biennis</i>	common evening-primrose	1	1	1	1	4	L5	x		x
<i>Onoclea sensibilis</i>	sensitive fern	1	3	1	3	8	L5	x	x	x
<i>Ostrya virginiana</i>	ironwood	1	3	2	2	8	L5	x		x
<i>Oxalis stricta</i>	common yellow wood-sorrel	1	1	1	1	4	L5	x		x
<i>Panicum capillare</i>	panic grass	2	1	4	1	8	L5	x		
<i>Parthenocissus vitacea</i>	thicket creeper	1	2	0	1	4	L5	x	x	x
<i>Physalis heterophylla</i>	clammy ground-cherry	2	2	3	3	10	L5			x
<i>Pilea pumila</i>	dwarf clearweed	1	2	1	1	5	L5	x		
<i>Plantago rugelii</i>	red-stemmed plantain	1	2	0	1	4	L5	x		x
<i>Poa palustris</i>	fowl meadow-grass	1	2	3	2	8	L5	x		x
<i>Podophyllum peltatum</i>	May-apple	1	3	3	2	9	L5			x
<i>Populus balsamifera</i>	balsam poplar	1	2	3	2	8	L5	x	x	x
<i>Populus deltoides</i>	cottonwood	1	1	4	1	7	L5			x
<i>Populus tremuloides</i>	trembling aspen	1	3	1	3	8	L5	x	x	x
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	heal-all (native)	1	2	3	2	8	L5	x		x
<i>Prunus serotina</i>	black cherry	1	2	0	2	5	L5	x	x	
<i>Prunus virginiana</i> var. <i>virginiana</i>	choke cherry	1	2	0	1	4	L5	x	x	x
<i>Ranunculus abortivus</i>	kidney-leaved buttercup	1	3	1	2	7	L5	x		x
<i>Ranunculus recurvatus</i> var. <i>recurvatus</i>	hooked buttercup	1	3	2	3	9	L5	x		
<i>Ranunculus sceleratus</i>	cursed crowfoot	1	2	3	2	8	L5	x		
<i>Rhus typhina</i>	staghorn sumach	1	1	2	2	6	L5	x	x	x
<i>Ribes americanum</i>	wild black currant	1	3	2	2	8	L5	x		x
<i>Ribes cynosbati</i>	prickly gooseberry	1	3	2	2	8	L5	x		x
<i>Rubus allegheniensis</i>	common blackberry	1	3	0	1	5	L5	x		x
<i>Rubus idaeus</i> ssp. <i>strigosus</i>	wild red raspberry	1	1	0	1	3	L5	x		x
<i>Rubus occidentalis</i>	wild black raspberry	1	1	0	1	3	L5	x		x
<i>Rubus odoratus</i>	purple-flowering raspberry	2	2	2	2	8	L5	x		
<i>Salix eriocephala</i>	narrow heart-leaved willow	1	1	3	1	6	L5	x	x	x
<i>Salix interior</i>	sandbar willow	1	1	5	2	9	L5	x		
<i>Sambucus canadensis</i>	common elderberry	1	3	2	2	8	L5	x		x
<i>Sambucus racemosa</i> ssp. <i>pubens</i>	red-berried elder	1	3	2	2	8	L5	x		x
<i>Sanguinaria canadensis</i>	bloodroot	1	3	0	3	7	L5	x		x
<i>Scirpus atrovirens</i>	black-fruited bulrush	1	2	4	2	9	L5	x	x	x
<i>Scutellaria galericulata</i>	common skullcap	2	2	3	2	9	L5	x		x
<i>Scutellaria lateriflora</i>	mad-dog skullcap	2	2	3	3	10	L5	x		x
<i>Smilax herbacea</i>	carrion-flower	2	3	2	2	9	L5	x		x
<i>Solanum ptychanthum</i>	American black nightshade	3	1	4	0	8	L5	x		

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								2016	2001	1996
<i>Solidago altissima</i>	tall goldenrod	1	2	0	0	3	L5	x	x	x
<i>Solidago canadensis</i> var. <i>canadensis</i>	Canada goldenrod	1	2	0	1	4	L5	x		x
<i>Solidago flexicaulis</i>	zig-zag goldenrod	1	1	3	2	7	L5	x		
<i>Solidago nemoralis</i> ssp. <i>nemoralis</i>	grey goldenrod	2	2	2	2	8	L5	x		x
<i>Solidago rugosa</i> ssp. <i>rugosa</i>	rough-stemmed goldenrod	2	3	2	3	10	L5	x		x
<i>Symphotrichum cordifolium</i>	heart-leaved aster	1	1	0	2	4	L5	x	x	x
<i>Symphotrichum ericoides</i> var. <i>ericoides</i>	heath aster	1	1	2	1	5	L5	x		
<i>Symphotrichum lanceolatum</i> var. <i>lanceolatum</i>	panicled aster	1	2	3	1	7	L5	x	x	x
<i>Symphotrichum lateriflorum</i> var. <i>lateriflorum</i>	calico aster	1	2	3	2	8	L5	x		x
<i>Symphotrichum novae-angliae</i>	New England aster	1	2	2	1	6	L5	x	x	x
<i>Symphotrichum puniceum</i> var. <i>puniceum</i>	swamp aster	1	2	2	2	7	L5	x		x
<i>Thalictrum dioicum</i>	early meadow rue	1	3	3	2	9	L5	x		
<i>Tilia americana</i>	basswood	1	3	2	3	9	L5	x		x
<i>Toxicodendron radicans</i> var. <i>radicans</i>	poison ivy (vine form)	2	2	4	2	10	L5		x	x
<i>Toxicodendron radicans</i> var. <i>rydbergii</i>	poison ivy (shrub form)	1	2	0	2	5	L5	x		x
<i>Ulmus americana</i>	white elm	1	4	0	2	7	L5	x	x	x
<i>Urtica dioica</i> ssp. <i>gracilis</i>	American stinging nettle	1	3	2	2	8	L5	x		x
<i>Verbena urticifolia</i>	white vervain	1	2	2	2	7	L5	x		
<i>Viburnum lentago</i>	nannyberry	1	3	1	2	7	L5	x		x
<i>Viola labradorica</i>	dog violet	1	2	0	2	5	L5	x		x
<i>Viola pubescens</i> var. <i>scabriuscula</i>	smooth yellow violet	2	4	1	2	9	L5	x		x
<i>Viola sororia</i> var. <i>sororia</i>	common blue violet	1	2	0	2	5	L5	x		x
<i>Vitis riparia</i>	riverbank grape	1	1	0	0	2	L5	x		x
<i>Acer platanoides</i>	Norway maple	1	ns	ns	ns	1	L+	x	x	x
<i>Acer tataricum</i> ssp. <i>ginnala</i>	Amur maple	2	ns	ns	ns	2	L+	x		
<i>Aegopodium podagraria</i>	goutweed	2	ns	ns	ns	2	L+	x		
<i>Aesculus glabra</i>	Ohio buckeye	4	ns	ns	ns	4	L+	x		
<i>Aesculus hippocastanum</i>	horse-chestnut	2	ns	ns	ns	2	L+	x		
<i>Agrostis gigantea</i>	redtop	1	ns	ns	ns	1	L+		x	x
<i>Alliaria petiolata</i>	garlic mustard	1	ns	ns	ns	1	L+	x		
<i>Alnus glutinosa</i>	European alder	2	ns	ns	ns	2	L+	x		
<i>Amaranthus powellii</i>	Powell's pigweed	5	ns	ns	ns	5	L+			x
<i>Arctium lappa</i>	great burdock	1	ns	ns	ns	1	L+	x		
<i>Arctium minus</i>	common burdock	1	ns	ns	ns	1	L+	x		x
<i>Artemisia biennis</i>	biennial wormwood	3	ns	ns	ns	3	L+	x		
<i>Asparagus officinalis</i>	asparagus	2	ns	ns	ns	2	L+			x
<i>Barbarea vulgaris</i>	winter cress	1	ns	ns	ns	1	L+			x
<i>Berberis thunbergii</i>	Japanese barberry	2	ns	ns	ns	2	L+	x		x
<i>Berberis vulgaris</i>	common barberry	3	ns	ns	ns	3	L+	x		
<i>Betula pendula</i>	European white birch	2	ns	ns	ns	2	L+	x		

Appendix 2: Flora Species at Lake St. George Field Centre (2016 and historical)

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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Bromus inermis</i>	smooth brome grass	1	ns	ns	ns	1	L+	x		x
<i>Campanula rapunculoides</i>	creeping bellflower	1	ns	ns	ns	1	L+	x		
<i>Capsella bursa-pastoris</i>	shepherd's purse	2	ns	ns	ns	2	L+	x		
<i>Caragana arborescens</i>	Siberian pea-shrub	3	ns	ns	ns	3	L+	x		
<i>Carex spicata</i>	spiked sedge	1	ns	ns	ns	1	L+	x	x	
<i>Cerastium fontanum</i>	mouse-ear chickweed	1	ns	ns	ns	1	L+	x		x
<i>Chelidonium majus</i>	celandine	1	ns	ns	ns	1	L+	x		x
<i>Chenopodium album</i>	lamb's quarters	1	ns	ns	ns	1	L+			x
<i>Cichorium intybus</i>	chicory	1	ns	ns	ns	1	L+	x		x
<i>Cirsium arvense</i>	creeping thistle	1	ns	ns	ns	1	L+	x	x	x
<i>Cirsium vulgare</i>	bull thistle	1	ns	ns	ns	1	L+	x		x
<i>Convallaria majalis</i>	lily-of-the-valley	1	ns	ns	ns	1	L+	x		x
<i>Convolvulus arvensis</i>	field bindweed	2	ns	ns	ns	2	L+	x		
<i>Crataegus monogyna</i>	English hawthorn	1	1	4	ns	6	L+	x	x	x
<i>Crataegus x ninae-celottiae</i>	English - dotted hybrid hawthorn	3	ns	ns	ns	3	L+	x		
<i>Crepis tectorum</i>	narrow-leaved hawk's beard	3	ns	ns	ns	3	L+			x
<i>Cynanchum rossicum</i>	dog-strangling vine	1	ns	ns	ns	1	L+	x		
<i>Cynoglossum officinale</i>	hound's tongue	2	ns	ns	ns	2	L+	x		
<i>Dactylis glomerata</i>	orchard grass	1	ns	ns	ns	1	L+	x	x	x
<i>Daucus carota</i>	Queen Anne's lace	1	ns	ns	ns	1	L+	x	x	x
<i>Dianthus barbatus</i>	sweet William	5	ns	ns	ns	5	L+	x		
<i>Echium vulgare</i>	viper's bugloss	2	ns	ns	ns	2	L+			x
<i>Elaeagnus umbellata</i>	autumn olive	2	ns	ns	ns	2	L+	x		
<i>Elymus repens</i>	quack grass	1	ns	ns	ns	1	L+	x		x
<i>Epilobium hirsutum</i>	European willow-herb	2	ns	ns	ns	2	L+			x
<i>Epilobium parviflorum</i>	small-flowered willow-herb	1	ns	ns	ns	1	L+	x		x
<i>Epipactis helleborine</i>	helleborine	1	ns	ns	ns	1	L+	x	x	
<i>Erysimum cheiranthoides</i>	wormseed mustard	2	ns	ns	ns	2	L+	x		x
<i>Erysimum hieraciifolium</i>	hawkweed-leaved mustard	4	ns	ns	ns	4	L+	x		
<i>Festuca rubra</i> ssp. <i>rubra</i>	red fescue	1	ns	ns	ns	1	L+	x		
<i>Festuca trachyphylla</i>	hard fescue	3	ns	ns	ns	3	L+			x
<i>Galeopsis tetrahit</i>	hemp-nettle	2	ns	ns	ns	2	L+	x		x
<i>Galium mollugo</i>	white bedstraw	2	ns	ns	ns	2	L+	x		
<i>Galium verum</i>	yellow bedstraw	2	ns	ns	ns	2	L+	x		x
<i>Geranium sibiricum</i>	Siberian crane's bill	5	ns	ns	ns	ns	L+	x		
<i>Geum urbanum</i>	urban avens	1	ns	ns	ns	1	L+	x		x
<i>Glechoma hederacea</i>	creeping Charlie	1	ns	ns	ns	1	L+	x		
<i>Hedera helix</i>	English ivy	3	ns	ns	ns	3	L+	x		
<i>Hemerocallis fulva</i>	orange day-lily	1	ns	ns	ns	1	L+	x		x
<i>Hesperis matronalis</i>	dame's rocket	1	ns	ns	ns	1	L+	x		x

Appendix 2: Flora Species at Lake St. George Field Centre (2016 and historical)

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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Hylotelephium telephium</i>	live-forever	3	ns	ns	ns	3	L+	xcf		
<i>Hypericum perforatum</i>	common St. John's-wort	1	ns	ns	ns	1	L+	x		x
<i>Inula helenium</i>	elecampane	1	ns	ns	ns	1	L+	x		x
<i>Iris pseudacorus</i>	yellow flag	2	ns	ns	ns	2	L+	x		
<i>Lactuca serriola</i>	prickly lettuce	1	ns	ns	ns	1	L+	x		
<i>Leonurus cardiaca</i> ssp. <i>cardiaca</i>	motherwort	1	ns	ns	ns	1	L+	x		x
<i>Leucanthemum vulgare</i>	ox-eye daisy	1	ns	ns	ns	1	L+	x		x
<i>Linaria vulgaris</i>	butter-and-eggs	1	ns	ns	ns	1	L+	x		x
<i>Lolium arundinaceum</i>	tall fescue	2	ns	ns	ns	2	L+			x
<i>Lolium perenne</i>	perennial rye	2	ns	ns	ns	2	L+	x		
<i>Lolium pratense</i>	meadow fescue	1	ns	ns	ns	1	L+	x		x
<i>Lonicera morrowii</i>	Morrow's honeysuckle	1	ns	ns	ns	1	L+	x		
<i>Lonicera tatarica</i>	Tartarian honeysuckle	1	ns	ns	ns	1	L+			x
<i>Lonicera x bella</i>	shrub honeysuckle	1	ns	ns	ns	1	L+	x		
<i>Lotus corniculatus</i>	bird's foot trefoil	1	ns	ns	ns	1	L+	x	x	x
<i>Lycopus americanus x europaeus</i>	hybrid water-horehound	3	ns	ns	ns	3	L+	x		
<i>Lycopus europaeus</i>	European water-horehound	2	ns	ns	ns	2	L+	x		
<i>Lysimachia nummularia</i>	moneywort	1	ns	ns	ns	1	L+	x		
<i>Lythrum salicaria</i>	purple loosestrife	1	ns	ns	ns	1	L+	x		x
<i>Malus pumila</i>	apple	1	ns	ns	ns	1	L+	x	x	x
<i>Malva moschata</i>	musk mallow	3	ns	ns	ns	3	L+	x		
<i>Matricaria discoidea</i>	pineappleweed	2	ns	ns	ns	2	L+	x		
<i>Medicago lupulina</i>	black medick	1	ns	ns	ns	1	L+	x		x
<i>Melilotus albus</i>	white sweet clover	1	ns	ns	ns	1	L+	x		x
<i>Melilotus officinalis</i>	yellow sweet clover	1	ns	ns	ns	1	L+	x		
<i>Mentha x gentilis</i>	red mint	4	ns	ns	ns	4	L+	x		
<i>Mycelis muralis</i>	wall lettuce	3	ns	ns	ns	3	L+	x		
<i>Myosotis scorpioides</i>	true forget-me-not	1	ns	ns	ns	1	L+	x	x	x
<i>Myosotis sylvatica</i>	woodland forget-me-not	2	ns	ns	ns	2	L+	x		x
<i>Nepeta cataria</i>	catnip	1	ns	ns	ns	1	L+			x
<i>Oenothera fruticosa</i> ssp. <i>tetragona</i>	sundrops	5	ns	ns	ns	5	L+	x		
<i>Persicaria maculosa</i>	lady's thumb	1	ns	ns	ns	1	L+	x		x
<i>Phleum pratense</i>	Timothy grass	1	ns	ns	ns	1	L+	x	x	x
<i>Phragmites australis</i> ssp. <i>australis</i>	common reed	1	ns	ns	ns	1	L+	x		
<i>Picris hieracioides</i>	hawkweed oxtongue	3	ns	ns	ns	3	L+	x		x
<i>Pilosella caespitosa</i>	yellow hawkweed	1	ns	ns	ns	1	L+	x	x	x
<i>Pilosella piloselloides</i>	smooth yellow hawkweed	2	ns	ns	ns	2	L+			x
<i>Pilosella x floribunda</i>	smoothish hawkweed	3	ns	ns	ns	3	L+	x		
<i>Pinus sylvestris</i>	Scots pine	1	ns	ns	ns	1	L+	xpn	x	x
<i>Plantago lanceolata</i>	English plantain	1	ns	ns	ns	1	L+	x		x

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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 (Apr-16)	Date Observed		
								2016	2001	1996
<i>Plantago major</i>	common plantain	1	ns	ns	ns	1	L+	x	x	x
<i>Poa annua</i>	annual blue grass	3	ns	ns	ns	3	L+	x		x
<i>Poa compressa</i>	flat-stemmed blue grass	1	ns	ns	ns	1	L+	x		x
<i>Poa pratensis</i> ssp. <i>pratensis</i>	Kentucky blue grass	1	ns	ns	ns	1	L+	x	x	x
<i>Polygonum aviculare</i> ssp. <i>aviculare</i>	prostrate knotweed	2	ns	ns	ns	2	L+	x		
<i>Populus alba</i>	white poplar	2	ns	ns	ns	2	L+	x		x
<i>Populus x canadensis</i>	Carolina poplar	2	ns	ns	ns	2	L+	x		
<i>Populus x canescens</i>	grey poplar hybrid	4	ns	ns	ns	4	L+	x		
<i>Potamogeton crispus</i>	curly pondweed	2	ns	ns	ns	2	L+	x		
<i>Potentilla recta</i>	sulphur cinquefoil	1	ns	ns	ns	1	L+	x		x
<i>Prunella vulgaris</i> ssp. <i>vulgaris</i>	heal-all (European)	2	ns	ns	ns	2	L+	x		
<i>Ranunculus acris</i>	tall buttercup	1	ns	ns	ns	1	L+	x		x
<i>Reynoutria japonica</i> var. <i>japonica</i>	Japanese knotweed	2	ns	ns	ns	2	L+			x
<i>Rhamnus cathartica</i>	common buckthorn	1	ns	ns	ns	1	L+	x	x	x
<i>Ribes rubrum</i>	garden red currant	1	ns	ns	ns	1	L+	x		x
<i>Robinia pseudoacacia</i>	black locust	1	ns	ns	ns	1	L+	xpr	x	x
<i>Rosa multiflora</i>	multiflora rose	1	ns	ns	ns	1	L+	x		
<i>Rudbeckia fulgida</i>	orange coneflower	3	ns	ns	ns	3	L+	x		
<i>Rumex crispus</i>	curly dock	1	ns	ns	ns	1	L+	x		x
<i>Rumex obtusifolius</i>	bitter dock	2	ns	ns	ns	2	L+	x		
<i>Salix alba</i>	white willow	1	ns	ns	ns	1	L+	x		
<i>Salix purpurea</i>	purple-osier willow	2	ns	ns	ns	2	L+	x		x
<i>Salix x fragilis</i>	crack willow	1	ns	ns	ns	1	L+	x	x	x
<i>Scilla siberica</i>	Siberian squill	2	ns	ns	ns	2	L+	x		
<i>Senecio vulgaris</i>	common groundsel	3	ns	ns	ns	3	L+	x		
<i>Setaria pumila</i> ssp. <i>pumila</i>	yellow foxtail	2	ns	ns	ns	2	L+	x		
<i>Setaria viridis</i>	green foxtail	2	ns	ns	ns	2	L+			x
<i>Silene latifolia</i>	evening lychnis	2	ns	ns	ns	2	L+		x	
<i>Silene vulgaris</i>	bladder campion	2	ns	ns	ns	2	L+	x		x
<i>Solanum dulcamara</i>	bittersweet nightshade	1	ns	ns	ns	1	L+	x	x	x
<i>Sonchus arvensis</i> ssp. <i>arvensis</i>	glandular perennial sow-thistle	1	ns	ns	ns	1	L+	x		
<i>Sonchus oleraceus</i>	annual sow-thistle	2	ns	ns	ns	2	L+	x		
<i>Sorbus aucuparia</i>	European mountain-ash	1	ns	ns	ns	1	L+	x		x
<i>Stellaria media</i>	common chickweed	3	ns	ns	ns	3	L+	x		x
<i>Syringa vulgaris</i>	common lilac	1	ns	ns	ns	1	L+	xpr		x
<i>Taraxacum erythrospermum</i>	red-seeded dandelion	5	ns	ns	ns	5	L+			x
<i>Taraxacum officinale</i>	dandelion	1	ns	ns	ns	1	L+	x		x
<i>Taxus cuspidata</i>	Japanese yew	3	ns	ns	ns	3	L+	x		
<i>Tragopogon dubius</i>	lemon-yellow goat's beard	1	ns	ns	ns	1	L+			x
<i>Tragopogon pratensis</i>	meadow goat's beard	1	ns	ns	ns	1	L+	x		

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								2016	2001	1996
<i>Trifolium pratense</i>	red clover	1	ns	ns	ns	1	L+	x	x	x
<i>Trifolium repens</i>	white clover	1	ns	ns	ns	1	L+	x	x	x
<i>Tussilago farfara</i>	coltsfoot	1	ns	ns	ns	1	L+	x		x
<i>Typha angustifolia</i>	narrow-leaved cattail	1	ns	ns	ns	1	L+	x	x	
<i>Typha x glauca</i>	hybrid cattail	1	ns	ns	ns	1	L+	x		
<i>Ulmus glabra</i>	Scotch elm	2	ns	ns	ns	2	L+	x		
<i>Urtica dioica</i> ssp. <i>dioica</i>	European stinging nettle	2	ns	ns	ns	2	L+	x		
<i>Valeriana officinalis</i>	common valerian	2	ns	ns	ns	2	L+	x		
<i>Verbascum thapsus</i>	common mullein	1	ns	ns	ns	1	L+	x	x	x
<i>Veronica officinalis</i>	common speedwell	1	ns	ns	ns	1	L+	x	x	x
<i>Veronica serpyllifolia</i> ssp. <i>serpyllifolia</i>	thyme-leaved speedwell	1	ns	ns	ns	1	L+	x		
<i>Viburnum opulus</i> ssp. <i>opulus</i>	European highbush cranberry	1	ns	ns	ns	1	L+	x	x	x
<i>Vicia cracca</i>	cow vetch	1	ns	ns	ns	1	L+	x		x
<i>Vicia villosa</i>	hairy vetch	5	ns	ns	ns	5	L+			x
<i>Vinca minor</i>	periwinkle	2	ns	ns	ns	2	L+	x		x
<i>Viola odorata</i>	sweet violet	4	ns	ns	ns	4	L+	x		
<i>Acer negundo</i>	Manitoba maple	1	ns	ns	ns	1	L+?	x	x	x
<i>Agrostis stolonifera</i>	creeping bent grass	1	ns	ns	ns	1	L+?	x		x
<i>Geranium robertianum</i>	herb Robert	1	ns	ns	ns	1	L+?	x	x	x
<i>Persicaria hydropiper</i>	water-pepper	2	ns	ns	ns	2	L+?	x		x
<i>Phalaris arundinacea</i>	reed canary grass	1	ns	ns	ns	1	L+?	x	x	x
<i>Potamogeton crispus</i> x cf. <i>pusillus</i>	hybrid pondweed	5	ns	ns	ns	ns	L+?	x		
<i>Potentilla norvegica</i>	rough cinquefoil	1	ns	ns	ns	1	L+?	x		x
<i>Pinus resinosa</i>	red pine	5	5	5	5	20	pL1	xp	xp	xp
<i>Juniperus virginiana</i>	red cedar	2	2	4	3	11	pL4	xp		
<i>Campsis radicans</i>	trumpet creeper	5	ns	ns	ns	5	pL+	xp		
<i>Celtis occidentalis</i>	hackberry	4	ns	ns	ns	4	pL+	xp		
<i>Gleditsia triacanthos</i>	honey locust	3	ns	ns	ns	3	pL+			xp
<i>Larix decidua</i>	European larch	3	ns	ns	ns	3	pL+	xp	xp	xp
<i>Malus x robusta</i>	crab-apple	4	ns	ns	ns	4	pL+	xp		
<i>Picea pungens</i>	Colorado spruce	5	ns	ns	ns	5	pL+	xp		
<i>Pinus ponderosa</i>	Ponderosa pine	ns	ns	ns	ns	ns	pL+	xp		
<i>Dicentra cucullaria</i>	Dutchman's breeches	2	4	4	5	15	prL3	xpr		
<i>Physocarpus opulifolius</i>	ninebark	3	2	5	4	14	prL3	xpr		
<i>Picea glauca</i>	white spruce	3	5	4	4	16	prL3	xpr	xp	xp
<i>Asarum canadense</i>	wild ginger	1	3	4	3	11	prL4	xpr		
<i>Rudbeckia laciniata</i>	cut-leaved coneflower	3	2	4	2	11	prL4	xpr		
<i>Cornus racemosa</i>	grey dogwood	2	2	3	2	9	prL5	xpr		
<i>Allium schoenoprasum</i> var. <i>schoenoprasum</i>	chives	4	ns	ns	ns	4	prL+	xpr		
<i>Doronicum plantagineum</i>	leopard's bane	5	ns	ns	ns	ns	prL+	xpr		

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								2016	2001	1996
<i>Juglans x bixbyi</i>	buartnut	4	ns	ns	ns	4	prL+	xpr		
<i>Narcissus poeticus</i>	narcissus	3	ns	ns	ns	3	prL+	xpr		
<i>Narcissus pseudonarcissus</i>	daffodil	3	ns	ns	ns	3	prL+	xpr		
<i>Paeonia officinalis</i>	peony	4	ns	ns	ns	4	prL+	xpr		
<i>Phlox paniculata</i>	garden phlox	3	ns	ns	ns	3	prL+	xpr		
<i>Picea abies</i>	Norway spruce	3	ns	ns	ns	3	prL+	xpr	xp	xp
<i>Polygonatum multiflorum</i>	European Solomon's seal	3	ns	ns	ns	3	prL+	xpr		
<i>Pulmonaria officinalis</i>	lung-wort	3	ns	ns	ns	3	prL+	xpr		
<i>Tulipa x hybrida</i>	garden tulip	3	ns	ns	ns	3	prL+	xpr		
<i>Mertensia virginica</i>	Virginia bluebells	5	ns	ns	ns	5	prL+?	xpr		
Legend										
L1-L3: species of regional conservation concern		ns: criterion not scored								
L4: species of conservation concern in urban area		e: extirpated from site								
L5: species not of concern at this time		cf: identification not certain								
LX: species is extirpated from TRCA		p: planted only								
L+: introduced species, not native to TRCA		pr: regenerating but of planted origin								
L+?: species is probably introduced		pn: both natural origin and planted								

Appendix 3: Fauna Species at Lake St. George Field Centre

Survey Species: species for which the TRCA protocol effectively surveys.														
Birds														
Common Name	Scientific Name	Code	2014	LO	PTn	PTt	AS	PIS	StD	HD	+	TS	L-Rank	Additional notes
broad-winged hawk	<i>Buteo platypterus</i>	BWHA	1	3	2	2	5	1	3	4	1	21	L2	circled then flew SW
ovenbird	<i>Seiurus aurocapillus</i>	OVEN	1	1	1	3	4	2	5	4	1	21	L2	
alder flycatcher	<i>Empidonax alnorum</i>	ALFL	2	2	4	2	1	1	4	2	0	16	L3	
American woodcock	<i>Scolopax minor</i>	AMWO	1 (5)	0	2	2	3	2	4	2	0	15	L3	
golden-crowned kinglet	<i>Regulus satrapa</i>	GCKI	2	3	4	2	3	1	3	3	0	19	L3	
long-eared owl	<i>Asio otus</i>	LEOW	1	4	2	2	2	2	3	3	0	18	L3	
Nashville warbler	<i>Oreothlypis ruficapilla</i>	NAWA	1	2	1	2	2	1	5	2	1	16	L3	
northern waterthrush	<i>Parkesia noveboracensis</i>	NOWA	2 (2)	1	1	2	3	1	5	4	1	18	L3	
osprey	<i>Pandion haliaetus</i>	OSPR	1 (1)	3	1	2	3	1	5	2	1	18	L3	
ruffed grouse	<i>Bonasa umbellus</i>	RUGR	1	1	2	2	3	3	5	2	1	19	L3	2016 flora survey
winter wren	<i>Troglodytes troglodytes</i>	WIWR	1	1	1	2	3	2	5	3	1	18	L3	
wood thrush	<i>Hylocichla mustelina</i>	WOTH	1 (1)	0	4	2	3	2	4	2	0	17	L3	
yellow-billed cuckoo	<i>Coccyzus americanus</i>	YBCU	1	0	4	2	3	1	3	3	0	16	L3	
belted kingfisher	<i>Ceryle alcyon</i>	BEKI	1	0	3	2	2	1	2	2	0	12	L4	
common yellowthroat	<i>Geothlypis trichas</i>	COYE	14	0	3	2	1	2	4	1	0	13	L4	
Cooper's hawk	<i>Accipiter cooperii</i>	COHA	1	0	2	2	4	1	2	3	0	13	L4	
eastern kingbird	<i>Tyrannus tyrannus</i>	EAKI	8	0	4	2	2	1	3	1	0	13	L4	
eastern wood-pewee	<i>Contopus virens</i>	EAWP	4 (1)	0	4	2	2	1	3	1	0	13	L4	incl one 2016 record
great-crested flycatcher	<i>Myiarchus crinitus</i>	GCFL	3	0	2	2	3	1	2	2	0	12	L4	
green heron	<i>Butorides virescens</i>	GRHE	1 (1)	0	3	2	2	1	4	2	0	14	L4	flyover
grey catbird	<i>Dumetella carolinensis</i>	GRCA	4	0	3	2	1	1	3	1	0	11	L4	
hairy woodpecker	<i>Picoides villosus</i>	HAWO	2	0	2	2	3	1	2	2	0	12	L4	
indigo bunting	<i>Passerina cyanea</i>	INBU	3	0	3	2	1	1	4	2	0	13	L4	
northern flicker	<i>Colaptes auratus</i>	NOFL	3	0	4	2	1	1	3	2	0	13	L4	
pine warbler	<i>Setophaga pinus</i>	PIWA	3	0	1	2	4	1	3	3	0	14	L4	
red-breasted nuthatch	<i>Sitta canadensis</i>	RBNU	2	0	1	2	3	1	2	1	0	10	L4	
red-eyed vireo	<i>Vireo olivaceus</i>	REVI	17	0	1	2	2	1	3	1	0	10	L4	
rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>	RBGR	3	0	3	2	3	1	3	2	0	14	L4	
savannah sparrow	<i>Passerculus sandwichensis</i>	SAVS	1	0	4	2	1	1	4	1	0	13	L4	
swamp sparrow	<i>Melospiza georgiana</i>	SWSP	8	0	1	2	1	2	5	1	1	13	L4	
tree swallow	<i>Tachycineta bicolor</i>	TRES	2	0	4	2	1	1	2	2	0	12	L4	nest boxes
turkey vulture	<i>Cathartes aura</i>	TUVU	1	2	1	1	1	1	1	2	0	9	L4	circling
white-breasted nuthatch	<i>Sitta carolinensis</i>	WBNU	3	0	2	2	3	1	2	2	0	12	L4	
willow flycatcher	<i>Empidonax traillii</i>	WIFL	1	0	4	2	1	1	3	1	0	12	L4	

Appendix 3: Fauna Species at Lake St. George Field Centre

Common Name	Scientific Name	Code	2014	LO	PTn	PTt	AS	PIS	StD	HD	+	TS	L-Rank	Additional notes
American Crow	<i>Corvus brachyrhynchos</i>	AMCR	x	0	1	2	1	1	0	0	0	5	L5	
American goldfinch	<i>Carduelis tristis</i>	AMGO	x	0	3	2	1	1	1	0	0	8	L5	
American robin	<i>Turdus migratorius</i>	AMRO	x	0	1	2	1	1	1	0	0	6	L5	
Baltimore oriole	<i>Icterus galbula</i>	BAOR	x	0	4	2	1	1	1	0	0	9	L5	
black-capped chickadee	<i>Parus atricapillus</i>	BCCH	x	0	1	2	1	1	1	0	0	6	L5	
blue jay	<i>Cyanocitta cristata</i>	BLJA	x	0	3	2	1	1	1	0	0	8	L5	
brown-headed cowbird	<i>Molothrus ater</i>	BHCO	x	0	3	2	1	1	1	0	0	8	L5	
Canada goose	<i>Branta canadensis</i>	CANG	x	0	0	2	1	2	0	1	0	6	L5	
cedar waxwing	<i>Bombycilla cedrorum</i>	CEDW	x	0	1	2	1	1	1	0	0	6	L5	
chipping sparrow	<i>Spizella passerina</i>	CHSP	x	0	3	2	1	1	2	0	0	9	L5	
common grackle	<i>Quiscalus quiscula</i>	COGR	x	0	4	2	1	1	1	0	0	9	L5	
downy woodpecker	<i>Picoides pubescens</i>	DOWO	x	0	1	2	1	1	1	1	0	7	L5	
eastern phoebe	<i>Sayornis phoebe</i>	EAPH	x	0	1	2	1	1	1	2	0	8	L5	
house wren	<i>Troglodytes aedon</i>	HOWR	x	0	1	2	1	2	1	1	0	8	L5	
mallard	<i>Anas platyrhynchos</i>	MALL	x	0	1	2	1	2	1	0	0	7	L5	
mourning dove	<i>Zenaidra macroura</i>	MODO	x	0	3	2	1	1	0	0	0	7	L5	
northern cardinal	<i>Cardinalis cardinalis</i>	NOCA	x	0	1	2	1	1	2	1	0	8	L5	
red-tailed hawk	<i>Buteo jamaicensis</i>	RTHA	x	0	2	2	2	1	1	1	0	9	L5	
red-winged blackbird	<i>Agelaius phoeniceus</i>	RWBL	x	0	3	2	1	1	2	0	0	9	L5	
song sparrow	<i>Melospiza melodia</i>	SOSP	x	0	3	2	1	1	2	0	0	9	L5	
warbling vireo	<i>Vireo gilvus</i>	WAVI	x	0	1	2	1	1	2	1	0	8	L5	
yellow warbler	<i>Setophaga petechia</i>	YWAR	x	0	3	2	1	1	2	0	0	9	L5	
European starling	<i>Sturnus vulgaris</i>	EUST	x		4								L+	
Herpetofauna														
grey treefrog	<i>Hyla versicolor</i>	TGTF	1 (1)	1	3	2	3	4	5	2	1	21	L2	
spring peeper	<i>Pseudacris crucifer crucifer</i>	SPPE	4 (3)	1	2	2	3	4	5	3	1	21	L2	
wood frog	<i>Lithobates sylvatica</i>	WOFR	3 (3)	0	2	2	3	4	5	3	1	20	L2	
northern leopard frog	<i>Lithobates pipiens</i>	LEFR	1	0	3	2	1	4	5	2	1	18	L3	2016 flora survey
American toad	<i>Anaxyrus americanus</i>	AMTO	1	0	3	2	1	4	4	0	0	14	L4	
green frog	<i>Lithobates clamitans</i>	GRFR	6	0	2	2	1	3	4	1	0	13	L4	

Appendix 3: Fauna Species at Lake St. George Field Centre

Common Name	Scientific Name	Code	2014	LO	PTn	PTt	AS	PIS	StD	HD	+	TS	L-Rank	Additional notes
Incidental Species: species that are reported on as incidental to the TRCA protocol.														
Mammals														
big brown bat	<i>Eptesicus fuscus</i>	BBBA		4	2	2	1	1	2	1	0	13	L4	2015 & 2016 (MNRF)
coyote	<i>Canis latrans</i>	COYO	1	1	2	2	1	3	1	0	0	10	L4	
eastern chipmunk	<i>Tamias striatus</i>	EACH	1	0	2	2	2	3	3	1	0	13	L4	
little brown bat	<i>Myotis lucifugus</i>	LBBA		4	2	2	1	1	2	2	0	14	L4	2015 & 2016 (MNRF)
muskrat	<i>Ondatra zibethicus</i>	MUSK	1	0	2	2	1	3	3	1	0	12	L4	2016 flora survey
red squirrel	<i>Tamiasciurus hudsonicus</i>	RESQ	2	0	2	2	1	3	2	1	0	11	L4	
white-tailed deer	<i>Odocoileus virginianus</i>	WTDE	1	0	2	1	3	2	1	2	0	11	L4	
grey squirrel	<i>Sciurus carolinensis</i>	GRSQ	x	0	2	2	1	3	0	0	0	8	L5	
raccoon	<i>Procyon lotor</i>	RACC	x	0	2	2	1	3	0	1	0	9	L5	
Herpetofauna														
eastern gartersnake	<i>Thamnophis sirtalis sirtalis</i>	EAGA	1	0	2	2	1	3	3	0	0	11	L4	
Legend														
LO = local occurrence	PIS = Patch Isolation Sensitivity													
PTn = Continental population trend	STD = sensitivity to development													
PTt = TRCA population trend	+ = additional points													
HD = habitat dependence	TS = total score													
AS = area sensitivity	L-rank = TRCA Rank, February, 2016 - based on data up to 2015 inclusive													
L1 - L3: species of regional conservation concern														
L4: species of conservation concern in urban areas														
L5: species is not of concern at this time														
L+: introduced species, not native to the Toronto region														
LX: extirpated species; species not recorded in the region in the past 10 years														