



Colonel Samuel Smith Park Study Area

**Terrestrial Biological Inventory
and Assessment**

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1.0 Introduction

In 2013, the Toronto and Region Conservation Authority (TRCA) conducted a fauna and flora inventory of Colonel Samuel Smith Park (CSS). The Park is located on the Lake Ontario shoreline between the mouths of the Etobicoke and Mimico Creeks. The latter opens into Humber Bay where a similar coastal park – Humber Bay Parks East and West – is undergoing considerable management with a view to enhancing natural habitat in the Park. There are a number of similar coastal sites throughout the regional waterfront which provide excellent opportunities for comparison of the status of native flora and fauna communities. With this in mind it is hoped that an extensive inventory of CSS combined with experience gained from the numerous waterfront projects in the region will enable a well-informed management plan to be designed for CSS.

The results of the inventory at CSS will help to *characterize the terrestrial natural heritage features* of the site and *provide site-specific advice on management strategies taken in the future*. Through the completion of this characterization, the site features can be understood within the larger regional context of the Terrestrial Natural Heritage Program of the TRCA. The question that the inventory addresses is “*How does the area surveyed at Colonel Samuel Smith Park Study Area 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. This report presents a detailed compilation of all fauna and flora inventory data collected for the Colonel Samuel Smith Park Study Area, but primarily from the 2013 field season.

1.1 TRCA’s Terrestrial Natural Heritage Program

Rapid urban expansion in the TRCA jurisdiction has led to continuous and incremental loss of natural cover and species. In a landscape that probably supported 95% forest cover prior to European settlement, current mapping shows that only 17% forest and wetland cover remains. Agricultural and natural lands are increasingly being urbanized while species continue to disappear from a landscape that is less able to support them. This represents a substantial loss of ecological integrity and ecosystem function that will be exacerbated in the future according to current urbanization trends. With the loss of natural cover, diminishing proportions of various natural vegetation communities and reduced populations of native species remain. Unforeseen stresses are then exerted on the remaining flora and fauna in the natural heritage system. They become even rarer and may eventually be lost. This trend lowers the ability of the land to support biodiversity and to maintain or enhance human society (e.g. through increased pollution and decreased space for recreation). **The important issue is the cumulative loss of natural cover in the TRCA region that has resulted from innumerable site-specific decisions.**

In the late 1990s the TRCA initiated the Terrestrial Natural Heritage Program to address the loss of terrestrial biodiversity within the jurisdiction’s nine watersheds. This work is based on two landscape-level indicators: the quality distribution of natural cover and the quantity of natural cover.

The aim of the program is to create a conservation strategy that both protects elements of the natural system (vegetation communities, flora and fauna species) *before* they become rare and promotes greater ecological function of the natural system as a whole. This preventive approach is needed because by the time a community or species has become rare, irreversible damage has often already occurred. A healthy natural system capable of supporting regional biodiversity in the long term is the goal of the Terrestrial Natural Heritage Systems Strategy by setting targets – both short- and long-term (100 years) – for the two landscape indicators in order to provide direction in planning at all scales (TRCA 2007a, TRCA 2007b).

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

2.0 Study Area Description

The Colonel Samuel Smith Park Study Area inventoried in 2013 is located along the shoreline of Lake Ontario, approximately 2 km to the east of the mouth of the Etobicoke Creek, and almost 4 km to the west of the mouth of Mimico Creek (Map 1 & 2). The Park, opened to the public in 1996, is located at the southern end of Kipling Avenue in Etobicoke. As with the Humber Bay Parks situated 4 km to the east, a large proportion of the park consists of lake-fill which was deposited through the latter third of the twentieth century on the lakeshore, in front of the former Lakeshore Psychiatric Hospital and the RL Clark Filtration Plant. The remainder of the site comprises the grounds of the former hospital and is largely mowed lawns beneath mature trees, extending 600 m inland to Lakeshore Boulevard.

The site sits on an area of glacial lake deposits, primarily silt and clay, with a small area of bedrock, composed of limey mudrock with silt and sand, at the centre of the site. Both to the east and west much of the shoreline has been developed with lakeshore residential properties. Natural cover within the study area is largely a result of plantings on the lake-fill peninsula, and small areas within the old hospital gardens that have not been persistently mowed and cleared over the years. The site falls within the Carolinian floristic region, this being historically composed mostly of deciduous forest.

3.0 Inventory Methodology

A biological inventory of the Colonel Samuel Smith Park Study Area was conducted at the levels of habitat patch (landscape analysis), vegetation community, and species (flora and fauna) according to the TRCA methodologies for landscape evaluation (TRCA 2007c) and field data collection (TRCA 2007d). Habitat patch mapping was excerpted from the regional 2007/08 mapping of broadly-defined patch categories (forest, wetland, meadow and coastal) and digitized using ArcView GIS software.

A key component of the field data collection is the scoring and ranking of vegetation communities and flora and fauna species to generate local “L” ranks (L1 to L5); this process was initially undertaken in 1996-2000 and ranks are reviewed annually (TRCA 2010). Vegetation community scores and ranks are based on two criteria: *local occurrence* and the number of *geophysical requirements* or factors on which they depend. Flora species are scored using four criteria: *local occurrence*, *population trend*, *habitat dependence*, and *sensitivity to impacts associated with development*. Fauna species are scored based on seven criteria: *local occurrence*, *local population trend*, *continent-wide population trend*, *habitat dependence*, *sensitivity to development*, *area-sensitivity*, and *patch isolation sensitivity*. With the use of this ranking system, communities or species of *regional concern*, ranked L1 to L3, now replace the idea of *rare* communities or species. Rarity (*local occurrence*) is still considered but is now one of many criteria that make up the L-ranks, making it possible to recognize communities or species of regional concern before they have become rare.

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

3.1 Landscape Analysis

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

Base Mapping

The first step in evaluating a natural system or an individual *habitat patch* is to interpret and map land cover using aerial photographs. The basic unit for the evaluation at all scales is the habitat patch in the region, which are then combined and evaluated as a system at any scale. A *habitat patch* is a continuous piece of habitat, as determined from aerial photo interpretation. The TRCA maps habitat according to four broad categories: *forest*, *wetland*, *meadow*, and *coastal* (beach, dune, or bluff). At the regional level, the TRCA jurisdiction is made up of thousands of habitat patches.

This mapping of habitat patches in broad categories is conducted through remote-sensing and is used in the evaluation of quality, distribution and quantity of natural cover. It should not be confused with the more detailed mapping of vegetation communities obtained through field surveys and that is used to ground-truth the evaluation (Section 3.2).

Quality Distribution of Natural Cover

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

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

Table 1. Habitat patch quality, rank and species response

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

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

Quantity

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

3.2 Vegetation Community and 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 for the site was conducted in 2013 during the months of May through September (Table 2). Vegetation community designations were based on the Ecological Land Classification (ELC) and determined to the level of vegetation type (Lee *et al.* 1998). Community boundaries were outlined onto printouts of 2007/08 digital ortho-rectified photographs (ortho-photos) to a scale of 1:2000 and then digitized in ArcView. Flora regional and urban species of concern (species ranked L1 to L4) were mapped as point data with approximate number of individuals seen. A list of all other species observed was documented for the site.

Fauna data were collected by the TRCA in May/June of 2013. Surveys in the summer were concerned primarily with the mapping of breeding bird species of regional concern; earlier visits (April and early May) are conducted in search of calling frogs and toads. As per the TRCA data collection protocol breeding bird surveys are carried out by visiting all parts of a 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 are to be 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 regional species of concern (species ranked L1 to L3) were mapped as point data with each point representing a possible breeding bird. Since the site is situated in the urban landscape, L4 species were also mapped; species ranked as L4 are considered to be of concern with the more urban areas of the region.

Table 2. Schedule of biological surveys at the Colonel Samuel Smith Park Study Area, 2013

Survey Item	Survey Dates	Survey Effort
Patch / Landscape	2007/08 orthographic maps	21 hours
Vegetation Communities and Flora Species	June 4 th , July 3 rd and 29 th , August 13 th , and September 3 rd , 2013	39 hours
Frogs and Nocturnal Spring Birds	May 2 nd , 2013.	0.5 hours
Breeding Songbirds	May 24 th and June 25 th , 2013	5 hours

4.0 Results and Discussion

Information pertaining to Colonel Samuel Smith Park Study Area was collected through both remote-sensing and ground-truthing surveys. This information contains three levels of detail: habitat patch, vegetation community, and species (flora and fauna). This section provides the information collected and its analysis in the context of the TNHS Strategy.

4.1 Regional Context

Based on 2007 orthophotography, 25% of the land area in the TRCA jurisdiction consists of natural cover but this figure includes meadow and old field. Although historically, the region would have consisted of up to 95% forest cover, currently (i.e. 2007) only about 17% is covered by forest and wetland. Of the non-natural cover (i.e. the remaining 75 %), 45% is urban and 24% is rural / agricultural.

The regional level analysis of habitat patches shows that the present average patch quality across the TRCA jurisdiction is “fair” (L3); forest and wetland cover is contained largely in the northern half of the TRCA jurisdiction, especially on the Oak Ridges Moraine; and the quantity is 17% of the surface area of the jurisdiction (Map 3). Thus the existing natural system stands below the quantity target that has been set for the region (30%) and also has an unbalanced distribution. The distribution of fauna species of concern is also largely restricted to the northern part of the jurisdiction; fauna species of regional concern are generally absent from the urban matrix (Map 4). The regional picture, being the result of a long history of land use changes, confirms that all site-based decisions contribute to the condition of a region.

4.2 Habitat Patch Findings for the Colonel Samuel Smith Park Study Area

The following details the study area according to the two natural system indicators used in designing the Terrestrial Natural Heritage System Strategy: the *quality distribution* and *quantity* of natural cover. Analysis was based on 2007/08 ortho-photos.

4.2.1 Quality Distribution of Natural Cover

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

Habitat Patch Size and Shape

The Colonel Samuel Smith Park Study Area consists of an approximately 1km long lake-fill peninsula which curls onto itself to the west, creating a sheltered harbour which serves as a marina. Inland from this shoreline is an area of parkland, extending to Lakeshore Boulevard. Much of the natural habitat is therefore the meadow-type habitat associated with the artificial peninsula and small blocks of meadow and successional habitat at the southern end of the inland park.

Although there is a total of 16.4 ha of meadow-type habitat, which would score as good for overall area, the shape and separation of the various components is such that the shape score is poor. The largest single meadow-type habitat patch surrounds the dry-dock marina (3.9 ha), and the area of successional forest in the south west corner of the old hospital grounds (3.6 ha). It should be noted that the identification of habitat patches is defined by roads, and this protocol has been adhered in calculating patch size at Colonel Samuel Smith Park, however, since the network of roads within the site (particularly those running out onto the peninsula) are not heavily used by motorised traffic, it may be more fairly assumed that the discrete patches actually act as one. Thus the largest meadow-type patch would in fact be close to 13 ha – scoring as fair for patch size (Map 5).

Habitat Patch Matrix Influence

Analysis based on the 2007/08 ortho-photos shows that the overall habitat in the study area is ranked as “good” for matrix influence (i.e. scores 4 out of a possible 5 points, Maps 6 and 7). This score is much higher than would be expected given the urban setting. It is important to understand that the TRCA habitat patch scoring protocol counts Lake Ontario as “natural habitat” and therefore much of the area surrounding the Colonel Samuel Smith Park site is weighted positively for matrix influence, when in reality the proximity of the waters of Lake Ontario is neutral in its effect on the site from a matrix influence perspective – for example, the lake does not present any species recruitment opportunities.

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. Colonel Samuel Smith Park is surrounded on the land-side by dense urbanization, and is visited by large numbers of local and regional visitors, many of whom are accompanied by dogs, both leashed and un-leashed. Such visitor pressure, particularly associated with dogs, constitutes an extremely negative matrix influence which would realistically reduce the habitat patch matrix influence score considerably.

Habitat Patch Total Score

The combination of “good” matrix influence on the site, and the mix of “fair” to “very poor” for habitat patch size and shape, results in an overall “poor” habitat patch quality (Map 8).

4.2.2. Quantity of Natural Cover

The surveyed area makes up 43 ha of which 21.4 ha are natural cover including 10.8 ha of forest, 1.6 ha of successional, 0.7 ha of wetland, 4.1 ha meadow, 0.9 ha of aquatic, and 3.2 ha of beach.

4.3 Vegetation Community Findings for the Colonel Samuel Smith Study Area

4.3.1 Vegetation Community Representation

The study area supports 39 types of vegetation communities, 9 of which are found solely as inclusions and/or complexes (Appendix 1; Map 9). These comprise of 5 dynamic coastal communities (two are strictly anthropogenic), 14 forests (4 natural and 10 plantation), 8 successional, 6 wetlands, 3 aquatic, and 3 meadow communities. The vegetation communities at Colonel Samuel Smith Park are mainly disturbed and anthropogenic in origin with only a small fraction exhibiting any type of natural character.

The coastal communities occupy 14.9 % (3.2 ha) of the natural cover and include 3 types of natural beach and 2 human-made beaches. Natural beaches consist of a small un-vegetated sand and gravel beach classified as Mineral Open Beach (BBO1) at the north end of the site and two narrow stretches of sparsely vegetated beaches toward the south-westerly ends of the site that are classified as Willow Shrub Beach (BBS1-2A) and Mineral Treed Beach (BBT1-A). The 2 artificial shoreline communities at Colonel Samuel Smith Park have been created from lake fill and are classified as Rubble Open Shoreline / Beach (BBO2-A) and Rubble Treed Shoreline (BBT2-A). These engineered features are composed of armoured headlands and somewhat more sheltered bays that accumulate cobble, gravel, and some sand.

Forest cover is largely provided by plantation in various stages of succession. Restoration Mixed Plantation (CUP2-A), Restoration Deciduous Plantation (CUP1-A) and Norway Spruce Coniferous Plantation (CUP3-e) occur most frequently. These communities are dominated by a mix of native and exotic tree species including red pine (*Pinus resinosa*), Norway Spruce (*Picea abies*), Scots Pine (*Pinus sylvestris*), white spruce (*Picea glauca*) and white birch (*Betula papyrifera*).

In addition to plantation, 4 non-plantation forest types exist within the study area. North of the Marina boat yard, 1 naturalized exotic community of Fresh-Moist Norway Maple Lowland Deciduous Forest (FOD7-b) and one small native community of Fresh-Moist White Elm Lowland Deciduous Forest (FOD7-1) are present. Moving east, a small patch of a non-native Fresh-Moist Willow Lowland Deciduous Forest (FOD7-3) is found as an inclusion. Situated on the island in the middle of the aquatic area is a Fresh-Moist Lowland Deciduous Forest (FOD7-c). This community is dominated by black locust (*Robinia pseudo-acacia*) and Manitoba maple (*Acer negundo*). The isolation of this forest suggests that it has regenerated naturally via dispersal mechanisms of wind, animal (i.e. birds) or water (i.e. floating seeds). Collectively, forest contributes 50.5% of the natural cover (10.8 ha).

The lake fill peninsula has been planted with varying combinations of native and exotic tree and shrub species that describe the successional communities at the site. Thicket communities are dominated by shrubs such as grey dogwood (*Cornus racemosa*), silky dogwood (*Cornus amomum*) and fragrant sumac (*Rhus aromatica*) while treed successional communities tend to have canopies dominated by fast growing exotics, namely, black locust, Scotch elm (*Ulmus glabra*) and Siberian elm (*Ulmus pumila*). Depending on the degree of canopy closure these communities received one

of two designations: Exotic successional Savannah (CUS1-b) or Exotic Successional Woodland (CUW1-b). A total of eight successional communities occupying 1.6 ha (7.5%) were found.

Wetlands are limited to the southern half of the site. They are represented by six community types; three are only found as inclusions inland. The areas within the marina are sheltered and the slower moving waters support the establishment of shallow marsh and thicket swamp communities. With the exception of one Common Reed Mineral Shallow Marsh (MAS2-a) inclusion, all marsh communities are classified as Narrow-leaved cattail mineral shallow marsh (MAS2-1b) and consist of two exotic cattail species: hybrid cattail (*Typha x glauca*) and narrow-leaved cattail (*Typha angustifolia*). Various willow species including sandbar willow (*Salix exigua*) and heart-leaved willow (*Salix eriocephala*) were planted along the eastern coastal margin of the marina. The community is naturalizing and is currently classified as a Willow Mineral Thicket Swamp (SWT2-2). Another type of thicket swamp dominated by red-osier dogwood (*Cornus stolonifera*) can be found to the north east, south of Lakeshore Dr. Total cover provided by wetlands is 0.7 ha (3.3%).

Three aquatic communities are found throughout the site with one occurring as an inclusion. The largest is a Stonewort Submerged Shallow Aquatic (SAS1-3); dense mats of Chara (plant-like algae) can be seen growing beneath the waters surface of this community.

4.3.3 Vegetation Communities of Concern

The vegetation communities that occur in the TRCA jurisdiction are scored and given a local rank from L1 to L5. Vegetation communities with a rank of L1 to L3 are considered of regional concern in the jurisdiction while those ranked L4 are of urban concern. The ELC data documented 4 communities of regional concern (3 coastal beaches and 1 thicket as an inclusion) and 8 of urban concern (3 are inclusions and/or complexes).

The coastal communities at Colonel Samuel Smith Park are all of regional concern due to their distributional restriction to Lake Ontario coastal environments within the TRCA jurisdiction and their dependence on dynamic coastal processes (wind and water action). A persistent supply of sand is required to maintain these mineral, shrub and treed beaches. Currently, the park design appears to have maintained the conditions needed for the continuation of the natural small beach habitats. The artificial Rubble Open Shoreline / Beach (BBO2-A) is ranked L5 but it should also be considered “of concern” as its design has enabled this feature to collect, sand, gravel and shoreline vegetation.

4.4 Flora Findings for the Colonel Samuel Smith Park Study Area

4.4.1 Flora Species Representation

A total of 246 confirmed flora species were found at the Colonel Samuel Smith Park Study Area during the 2013 field season (Appendix 2). Of this, 171 were naturally occurring species (i.e. not planted) with natives accounting for 37% (64). The low native species richness is largely the result

of site level disturbance associated with the parks creation. Most naturally occurring native species were found in somewhat protected areas or sections of the site that managed to retain their natural character such as the centrally located wetland pockets or older naturalized forest communities.

Amongst the list of species found was one species of regional concern (L1 to L3) and 13 species of urban concern. With the exception of clasping-leaved hemp dogbane (*Apocynum cannabinum* var. *hypericifolium*), which prefers open to semi-open habitats, all of the species of concern observed in 2013 were clustered around coastal or wetland habitats generally near the marinas shoreline or the shallow aquatic to the north.

Plantings were prevalent throughout the study area with numerous native and horticultural specimens recorded. A total of 73 confirmed species were introduced to the site through restoration plantings; 45 (61.6%) were native and included 13 species of regional concern and 24 species of urban concern. Examples included cardinal flower (*Lobelia cardinalis*), cockspur hawthorn (*Crataegus crus-galli*) and winterberry (*Ilex verticillata*). Some mortality was observed in the restoration plantings along the southern base of the site; with a few young red oak (*Quercus rubra*) and white spruce (*Picea glauca*) trees completely dead or possessing more than 50% crown dieback. Young saplings are highly stressed in the first few seasons after plantings as they try to establish at a new site. Overall plantings appeared to be good condition exhibiting few signs of decline.

4.4.2 Flora Species of Concern

As with vegetation communities, flora species are considered of regional concern in the TRCA jurisdiction if they rank L1 to L3 based on their scores for four criteria: local occurrence; population trend; habitat dependence; and sensitivity to development impacts. Most of the flora species of concern are not rare plants *per se*, since few of them rank as provincially rare (S1-S3); however, they are of conservation concern due to their sensitivity to development and restriction to certain habitats or certain areas within the TRCA region. The flora species of concern are generally associated with specific vegetation communities; consequently, they are highly susceptible to changes in these communities. They score relatively high in *habitat dependence* (Appendix 2). Roughly, they are found in fewer than seven ecosites or habitat types according to the ELC (TRCA, 2010).

Most of the flora species of concern (all of the L1 to L3) at this site would be negatively affected by specific *sensitivity to development* impacts, scoring three or more for this criterion (Appendix 2; Map 11). These impacts are indirect ones emanating from the surrounding land use or *matrix influence*. Areas that have a history of land use disturbance tend to have fewer sensitive species. Colonel Samuel Smith Park is largely human-made and highly disturbed. However, it does support one species of regional concern; Angelica (*Angelica atropurpurea*), ranked L2, which was an unexpected find at the site. This member of the carrot family generally found in meadows or along streams banks was found on western half of the site along a treed beach. Its' curious location and solitary status suggest that it was not planted but rather washed up along shore and regenerated due to viable seed. Coontail (*Ceratophyllum demersum*) and woolly sedge (*Carex pellita*) are two

examples of L4-ranked species found. The first is an aquatic plant typical of quiet ponds, lakes and marshes. The species although sensitive to surface contamination is relatively tolerant of eutrophication. The second prefers open terrestrial areas and does well in sandy or disturbed soils such as those present within the study area

Disturbance caused by development and increased recreational use also facilitates the spread of invasive species. Hybrid cattail, narrow-leaved cattail, reed canary grass (*Phalaris arundinacea*), common reed (*Phragmites australis*) and purple loosestrife (*Lythrum salicaria*) are exotic species prolific throughout the wetlands in the study area. These species are problematic as they are aggressive and are generally found as community dominants. Oriental bittersweet (*Celastrus orbiculatus*), a non-native woody vine occurred in the more open areas. It was seen climbing over shrubs and young trees; through shading mechanisms, the vines fast-growing tendencies have the potential to hinder the success of restoration efforts.

Invading most new meadow areas along the southern edge of the filled parkland was spotted knapweed (*Centaurea maculosa*). Other invasives such as garlic mustard (*Alliaria petiolata*), black locust, Norway maple (*Acer platanoides*) are prominent in the former hospital grounds. The weedy herbaceous species can be expected to spread rapidly with trails and their associated recreational usage (i.e. dog –walking). Increased access and use associated with an urban matrix may also lead to increased trampling and soil compaction in the naturalizing areas. Colonel Samuel Smith Park with its extensive trail network is accessible to a great number of people. Intensive trail systems dissect vegetation communities across the entire site. This fragmentation undermines the quality and resiliency of habitats, making them more vulnerable to invasion by non-natives and trampling.

4.5 Fauna Species Findings for the Colonel Samuel Smith Park Study Area

4.5.1 Fauna Species Representation

The TRCA fauna surveys at the Colonel Samuel Smith Park Study Area in 2013 documented 44 bird species and 4 mammal species for a list of 48 species in total. Several species are notable by their absence (raccoon, *Procyon lotor*; striped skunk, *Mephitis mephitis*; eastern gartersnake, *Thamnophis sirtalis*; turtle species) but the TRCA inventory surveys are essentially rapid assessments and geared primarily to the documentation of breeding bird territories, thus such apparent absences may be simply artefacts of the survey method. The only other records in the TRCA database that refer to this study area are additional reports of red-necked grebe (*Podiceps grisegina*) nesting in the marina on the west side of the Park. A search of birding and naturalist sites on the internet revealed records of nesting Cooper’s hawk in the conifers near the “power plant” (2007 and 2009, S. Favier). The Friends of Samuel Smith Park blog also lists a report of an attempted nesting by the non-native red-eared slider within the park (2013). Refer to Appendix 3 for a list of the fauna species and their corresponding L-ranks.

The absence of any herpetofauna from TRCA's fauna list for the site may simply be a consequence of the timing and protocol of the TRCA survey. The possibility that species such as American toad (*Anaxyrus americanus*), leopard frog (*Lithobates pipiens*), snapping turtle (*Chelydra serpentina*), gartersnake and brownsnake (*Storeria dekayi*) are actually at the site should be properly checked into, since management of the park will need to take such species into consideration. The absence of such species from the lakeshore would be surprising but may be a reflection of the level of disturbance at the Park.

4.5.2 Fauna Species of Concern

Fauna species, like vegetation communities and flora species, are considered of regional concern if they rank L1 to L3 based on their scores for the seven criteria mentioned in Section 3.0. Since the subject site is situated within 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. TRCA's 2013 fauna survey at the Colonel Samuel Smith Park Study Area reported 17 bird species of regional and urban concern (L1 to L4), including 2 L3 bird species: red-necked grebe and hooded merganser (*Lophodytes cucullatus*). In addition, there were 2 mammals of urban concern (beaver, *Castor canadensis*; and eastern cottontail, *Sylvilagus floridanus*, ranked L4) bringing the total to 19 fauna species of regional and urban concern. Locations of these breeding fauna are depicted on Map 12. Inclusion of the Cooper's hawk – an L4 species – reported by local naturalists (Toronto Ornithological Club, 2013), would bring the total to 20 species of regional and urban concern.

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 (OMNR) (NHIC 2008). Using local occurrence as a measure of regional rarity, any species that is reported as a probable or confirmed breeder in fewer than 10 of the forty-four 10x10 km UTM grid squares in the TRCA jurisdiction is considered regionally rare (i.e. scores 3 to 5 points for this criterion) (TRCA, 2010).

Three of the fauna species reported from the Study Area are considered regionally rare. Red-necked grebe is a fairly recent addition to the regional breeding avifauna, and records along the Toronto waterfront constitute the most easterly nests of this species in Ontario. It is interesting to note that from 1931 to 1948 Speirs *et al.* (Sandilands, 2005) recorded a total of 48 pairs of this species in the breeding season between Toronto and Hamilton. Sandilands points out that most of the wetlands along that stretch of Lake Ontario have since disappeared. The recent creation of sheltered "harbours" along the region's waterfront and the provision of artificial nest platforms for this species are no doubt helping in the recovery of this significant species. Gadwall (*Anas strepera*) is a species that is actually fairly common along much of the lakeshore but rarely occurs on any inland wetlands in the region. The provision of sheltered nesting locations helps this species, especially if such nesting locations incorporate small islands or other sites inaccessible to dog traffic. Observations of very recently hatched broods of gadwall ducklings at the park in 2013 indicate that such opportunities are in place.

As with the other two regional “rarities” which occur at Colonel Samuel Smith Park, purple martin (*Progne subis*) is very much restricted to sites along the Lake Ontario shoreline, and then only at sites where artificial nest-structures have been specifically provided. In 2013 a purple martin house, donated through Friends of Samuel Smith (FOSS) and Citizens Concerned about the Future of the Etobicoke Waterfront (CCFEW), was installed within the western perimeter of the yacht club; there is another martin-house located on property just to the east of the Park. Together these structures provide ample opportunities for the establishment of a small martin-colony in and around the park.

Sensitivity to development is another criterion used to determine the L-rank of fauna species. A large number of impacts that result from local land use, both urban and agricultural, can affect the local fauna. These impacts – considered separately from the issue of actual habitat loss – can be divided into two distinct categories. The first category involves changes that arise from local urbanization that directly affect the breeding habitat of the species in question. These changes alter the composition and structure of the vegetation communities; for example, the clearing and manicuring of the habitat (e.g. by removal of dead wood and clearance of shrub understorey). The second category of impacts involves changes that directly affect individuals of the species in question. Examples include increased predation from an increase in the local population of predator species that thrive alongside human developments (e.g. blue jays, *Cyanocitta cristata*; American crows, *Corvus brachyrhynchos*; squirrels, raccoons and house cats); parasitism (from facilitating the access of brown-headed cowbirds, *Molothrus ater*, a species which prefers more open, edge-type habitat); competition (for nest-cavities with bird species such as house sparrows, *Passer domesticus*; and European starlings, *Sturnus vulgaris*); flushing (causing disturbance and abandonment of nest) and, sensitivity to pesticides.

Fauna species are considered to have a high sensitivity to development if they score three or more points (out of a possible five) for this criterion. At the Colonel Samuel Smith Park Study Area, 10 of the species that are ranked L1 to L4 receive this score and are therefore considered sensitive to one or more of the impacts associated with development (Map 7). All but one of these species (red-necked grebe, ranked L3) are ranked L4. The provision of artificial floating nest structures specifically for red-necked grebes has no doubt enhanced the breeding opportunities for this sensitive species, however, the birds are still highly susceptible to disturbance from dogs and aggression from local mute swans (*Cygnus olor*). Late in the season at Colonel Samuel Smith Park, it was reported that at least one of the grebe nests had failed, and the carcass of an adult grebe was discovered along the shoreline. Nevertheless, it does appear that the grebes are managing to nest successfully.

The remaining nine species are all ranked L4 and include eastern kingbird (*Tyrannus tyrannus*) and willow flycatcher (*Empidonax traillii*). These two species are considered meadow associates and therefore, given the amount of meadow-type habitat available at the site, it makes sense that they are the best represented species with four and six territories respectively. Both species are somewhat unusual as meadow-associates since neither species nests at ground level, thus their

susceptibility to ground-borne disturbance is diminished compared to more typical meadow species such as savannah sparrow (*Passerculus sandwichensis*).

Two ground-nesting meadow-associated species were conspicuously absent from the 2013 inventory: savannah sparrow and spotted sandpiper (*Actitis macularius*). Both species nest on the ground and as such are highly susceptible both to increased predation from ground-foraging predators that are subsidized by local residences (house cats, raccoons) and to repeated flushing from the nest (by pedestrians, off-trail bikers and dogs) resulting in abandonment and failed breeding attempts. Spotted sandpipers have been reported in previous years at the site by local naturalists and therefore the apparent absence in 2013 may be an anomaly, however it is suspected that even if either of these two species does attempt to nest at the Park, the prevalence of off-leash dog activities in the Park would create an extremely hostile environment for such species and their young (Banks and Byrant, 2007). These same disturbances also likely have considerable impact on non-avian fauna such as leopard frogs (*Lithobates pipiens*), gartersnakes and small mammals.

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).

It is important to understand that negative matrix influences are not solely associated with the proximity of urban and suburban developments; many of the negative influences can be transferred deep within an otherwise intact natural matrix by extensive trail networks used by large numbers of people originating from quite distant urban and suburban centres. Extensive public use of a natural habitat can have substantial negative impact through the cumulative effects of hiking, dog-walking and biking on the site.

The tendency for local urbanization to be accompanied by the clearing and maintenance of woodlands and thickets in the vicinity dramatically disrupts any species that is dependent on such scrub cover for nesting or foraging. Such species appear to be rather scarce at the Park, with only one pair of grey catbirds (*Dumetella carolinensis*, an L4 species) recorded in 2013. This is possibly a reflection of the degree of grooming and manicured maintenance within the Park, grey catbird being a species that prefers a thick shrub layer in the understory or at the woodland edge. Given that willow flycatchers are currently well-represented in the more open habitats on the peninsula suggests that, as the habitat matures, there may be more opportunities for grey catbird and species with similar habitat requirements on the peninsula. It should also be noted that such thick shrub habitat provides excellent foraging and shelter opportunities for migrating songbirds in the both the spring and fall.

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 5 points, while species that either show no minimum habitat requirement, or require <1 ha in total, score 1 point. Species scoring 3 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).

As one might expect for such a relatively small area (with such restricted habitat patches) only four of the fauna species of regional and urban concern that were identified within the study area are considered area sensitive. Furthermore, three of these species are aquatic birds that do not maintain discrete territories other than defence of the female and therefore the area requirement is more concerned with the extent of aquatic habitat available for foraging. Obviously, the Lake Ontario shoreline provides more than adequate foraging opportunities. The remaining area sensitive species is blue-grey gnatcatcher (*Polioptila caerulea*), a forest species that is very much tied to the upper canopy. Blue-grey gnatcatchers' area requirement is for greater than 5 ha of forest habitat. There is very little natural forest habitat identified at the Park, although there is a patch of successional treed habitat measuring 3.6 ha. The "forest" that the Park's two pairs of gnatcatchers are using is in fact the relatively extensive treed canopy created by the large number of mature trees throughout the northern section of the Park. Although this is not forest as such, the mature canopy provides the continuous habitat structure that gnatcatchers favour. This same approximate area is where a pair of Cooper's hawks have been reported as nesting, and again, although the species is area sensitive, the relatively extensive urban canopy provides enough nesting opportunities to support this species which was once considered a denizen of interior forest habitats but in recent decades has adapted to the urban landscape and is now a common raptor throughout the City of Toronto.

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. A variety of habitat needs are more likely satisfied within a larger extent of natural cover, which also provides opportunities for sensitive species to retreat to undisturbed portions of the same block. Cooper's hawk was until recently considered to be a highly area sensitive species due in large part to its need for isolation (and sensitivity at the nest) but recent evidence shows that the species is no longer quite as sensitive.

Patch isolation sensitivity in fauna measures the overall response of fauna species to fragmentation and isolation of habitat patches. One of the two main aspects of this scoring criterion is the physical ability or the predisposition of a species to move about within the landscape and is related to the connectivity of habitat within a landscape. The second main aspect is the potential impact that roads have on fauna species that are known to be mobile. Thus most bird species

score fairly low for this criterion (although they prefer to forage and move along connecting corridors) whereas many herpetofauna score very high (since their life cycle requires them to move between different habitat types which may increase likelihood of roadkill). One example of how this criterion affects species populations is the need for adult birds to forage for food during the nestling and fledgling stage of the breeding season. By maintaining and improving the connectivity of natural cover within the landscape (e.g. by reforestation of intervening lands) we are able to positively influence the populations of such species, improving their foraging and dispersal potential.

Typically, the majority of bird species are not as affected by this criterion as are non-avian species. At Colonel Samuel Smith Park, only two of the fauna species of regional or urban concern recorded from the study area score high for the patch isolation sensitivity: beaver and eastern cottontail. Both species habitually move across the landscape and as such are likely to become roadkill victims. However, beaver is far more likely to travel along the near-shore waters of Lake Ontario, and the reproductive rate of eastern cottontail is high enough to withstand such mortality pressure.

It is highly likely that several other mammal species and herpetofauna that were not reported during the 2013 TRCA inventory are in fact present at the Park, and several of these species will be affected by patch isolation issues. The speculated occurrence of several of these species on the site would be facilitated by the continuity of the shoreline within the park with the Lake Ontario shoreline (e.g. mink, *Mustella vison*). However, much of the shoreline locally is developed right down to the narrow rocky beach, and as such it may be difficult for some of the less aquatic species to maintain a healthy level of dispersal and recruitment.

Fauna species that score greater than three points under the *habitat dependence* criterion are considered habitat specialists (Map 12). These species exhibit a combination of very specific habitat requirements that range from their microhabitat (e.g. decaying logs, aquatic vegetation) and requirements for particular moisture conditions, vegetation structure or spatial landscape structures, to preferences for certain community series and macro-habitat types. Three fauna species that occur in the study area are considered habitat specialists: red-necked grebe, bank swallow (*Riparia riparia*) and northern rough-winged swallow (*Stelgidopteryx serripennis*). The latter two species are both highly dependent on very specific micro-habitat conditions, bank swallow requiring bluffs or cliffs of the appropriate sandy substrate in which to excavate nest-cavities, while northern rough-winged swallow tends to use existing cavities often in man-made structures (e.g. exposed pipes and conduits). Red-necked grebe, as described earlier, is highly aquatic and entirely dependent on the presence of floating aquatic vegetation – or as is the case on the Toronto waterfront, the provision of artificial nest-platforms. Thus, in effect there are actually no truly habitat dependent species at Colonel Samuel Smith Park, which is not surprising given the low quality and artificial nature of much of the habitat patches at the site.

Representation is essentially the presence or absence of a species at a site. However, beyond mere representation of single species is the idea that a natural system can be considered as a healthy functioning system if there is an association of several species thriving within that system.

Each habitat type supports particular species associations. As the quality of the habitat patch improves so will the representation of flora and fauna species within that habitat. In this way representation biodiversity is an excellent measure of the health of a natural system. The effective absence of any habitat dependent species indicates that the habitats at the Colonel Samuel Smith Park Study Area are not functioning at a particularly high level from the fauna perspective. However, the relatively thriving population of two open-habitat species – eastern kingbird and willow flycatcher – indicates that the mosaic of shrubby, meadow-type open habitat on the peninsula portion of the Park is providing ample nesting and foraging opportunities for these species, and it can be hoped that in due course other shrub-nesting species will be recruited into this existing habitat. Although not given the same amount of attention as forest, wetland and meadow habitats, such successional type habitat supports a particular suite of bird species as well as providing excellent foraging and shelter opportunities for migrating songbirds.

4.5.3. Migrating Birds on the Lakeshore

Given the paucity of breeding habitat and the level of human disturbance associated with this site it is generally unlikely that any but somewhat more resilient fauna species will find suitable breeding opportunities on the site. However, Colonel Samuel Smith Park Study Area, as a relatively undeveloped lakeshore property, is of high significance for any migrating or dispersing fauna species, particularly those species that do not spend any time foraging at ground level. Maintenance of a healthy canopy of mature trees and shrubs will facilitate the movements of any species that utilize the tree canopy to move through an area. This is particularly important on the lakeshore where thousands of first-time migrants gather in the fall, searching for easy passage to the south. Many of these migrants coast along the lakeshore, feeding as they go, in search of a narrow lake crossing, or replenishing fat deposits that will sustain them in a flight across the Great Lakes. The same is true of migrating insects such as the monarch butterfly and even migrant bats that no doubt pass along this shoreline.

5.0 Recommendations

The recommendations for the Colonel Samuel Smith Park Study Area are given in relation to the regional targets for natural heritage in the TRCA jurisdiction. To reach the regional targets for quality distribution and quantity of natural cover, every site will require its own individualized plan of action. Following is a short summary of the site within the regional context, followed by specific recommendations.

5.1 Site Highlights

- A total of 39 vegetation types (includes 9 found as inclusions or complexes only) observed, which reflects the natural and anthropogenic communities at the site.
- In 2013 there were 256 flora species observed within the study area; naturally occurring native flora are largely concentrated in coastal and wetland communities.

- Restoration plantings appear to be relatively healthy showing few signs of serious decline.
- Total of 48 breeding vertebrate fauna species observed during the 2013 inventory which is on par with several other similar coastal sites (e.g. Port Union with 56 species).
- Areas of natural habitat on the shoreline of Lake Ontario are important staging areas for migrating songbirds.
- Despite fairly extensive meadow-type habitat within the park, there are no ground-nesting meadow-associated species (specifically savannah sparrow). It is speculated that this is entirely due to the heavy disturbance caused by off-leash dogs.
- The survey in 2013 did not reveal any frog or toad species at the site although there are several suitable wetlands. If such species are in fact absent, this will likely be in large part due to disturbance of both the wetland breeding habitat and meadow foraging habitat caused by off-leash dogs.
- The provision of artificial nest platforms has been extremely successful in persuading the regionally rare red-necked grebe to nest at the Park. Local stewardship and interest in these engaging birds has been especially keen.
- The installation of martin-houses both within and just outside the park appear to have been successful in establishing a small population of purple martins in the area and it is hoped that further efforts will be spent to enhance and maintain this population.

5.2 Site Recommendations

Minimize Negative Matrix Influence

Although landscape metrics indicate that the matrix influence at the site is largely positive, this does not take into account the high level of disturbance that occurs throughout the summer months due to the large number of visitors to the site for recreational activities. This visitor pressure is unlikely to improve in the future. Any future plantings with a view to improving the natural heritage at the site needs to consider the locations of most intense visitor pressure and to direct restoration efforts to areas within the study area that are not generally accessed by the public.

- Visitors need to be directed away from sensitive species. Signage educating the public about the sensitivities of dynamic coastal communities and the many flora species that they harbour. Trampling is a concern to the re-colonization of sensitive flora species.
- Invasive species populations such as garlic mustard, field thistle and spotted knapweed should be controlled in order to support the native biodiversity and to ensure the continued success of restoration plantings within the area.
- Controlling sources of disturbance such as erosion (in forest environments), nutrient input, and trampling as well as screening plantings may be a factor in containing exotic invasions.
- Targeted monitoring should be conducted to more specifically assess the presence of herpetofauna species at the site.

- Limit the number of non-native plantings that are incorporated in the sites' landscape design. Some species such as black locust have a propensity to become invasive limiting the potential for native species richness.
- The ongoing problem of off-leash dogs throughout the Park needs to be addressed, especially throughout the spring, summer and fall seasons. If the area is to be managed as a leash-free area then management of the habitat within the park will need to be reconfigured accordingly, e.g. there should be no expectation that any ground-nesting species (e.g. spotted sandpiper and savannah sparrow) will establish a population at the site.
- Dogs entering the water in proximity to the red-necked grebe nest platforms will likely cause considerable distress to the birds, potentially resulting in abandonment and nest failure. Steps should be taken to ensure that such incidents do not occur.

It is important that an agreement be reached between the various park user-groups and management regarding the permitted activities within the Park. Off-leash dogs outside of the leash-free compound are a serious threat to many of the fauna species using the Park. One possible compromise may be to allow leash-free access to the park in the summer and winter months, but then to restrict such activity to the leash-free compound throughout the peak songbird migration periods. Such a compromise allows that the opportunities for low-nesting songbird species to breed within the Park are less ecologically significant than the opportunities for foraging migrant song-birds. Given that this compromise is to the benefit of the two conflicting user-groups it can be expected that the user-groups may be willing to self-police the agreement.

Improve Connectivity to Nearby Habitat

Continuity of natural habitat along the Lake Ontario lakeshore is of considerable importance to migrating and dispersing fauna species within the region. The imposition of even small areas of hostile environment within an otherwise continuous corridor of natural habitat can undermine the positive opportunities provided by a high level of connectivity, particularly for non-avian fauna. It is therefore recommended that the amount of natural cover be increased and enhanced wherever possible within the site.

Improve Habitat Quality

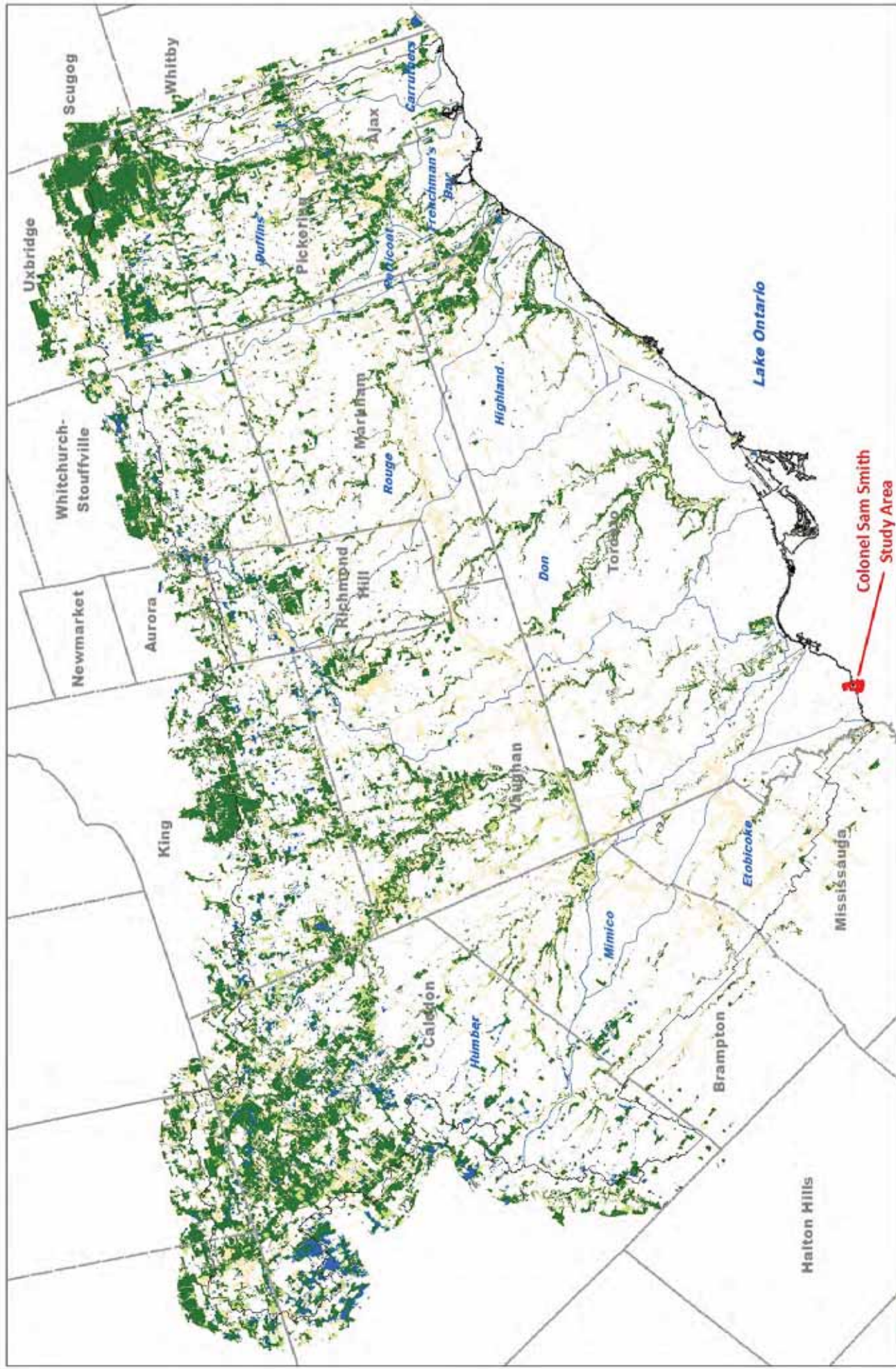
Habitat degradation from factors such as the introduction of invasive species leads to the decline and disappearance of various flora species. Minimizing impacts such as this is imperative to improving habitat quality and preventing further biodiversity loss. Aggressive invasives such as spotted knapweed and Oriental bittersweet should be targeted in invasive species management strategies to maintain native biodiversity establishing at the site.

Habitat quality can be artificially enhanced by the judicious installation of artificial nesting structures. The careful monitoring and maintenance of any artificial nest-structures installed on the site is paramount. It is the responsibility of anyone who installs such structures to ensure that such structures are safe and installed in the optimal locations. Fortunately, Colonel Samuel Smith Park is blessed with an extremely active and enthused stewardship group. This group should be encouraged and helped by management as much as possible, enabling effective and long-term stewardship of the site.

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Date: March, 2014
 * Landscape analysis based on 2007/2008 Orthophotography

Map 1: Colonel Sam Smith in the Context of Regional Natural Cover

Natural Cover*		Legend	
	Forest		Colonel Sam Smith Study Area Boundary
	Successional		TRCA Jurisdiction
	Meadow		Watershed
	Wetland		Municipal Boundary
	Beach/Bluff		



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0 25 50 100 150 200
 Meters

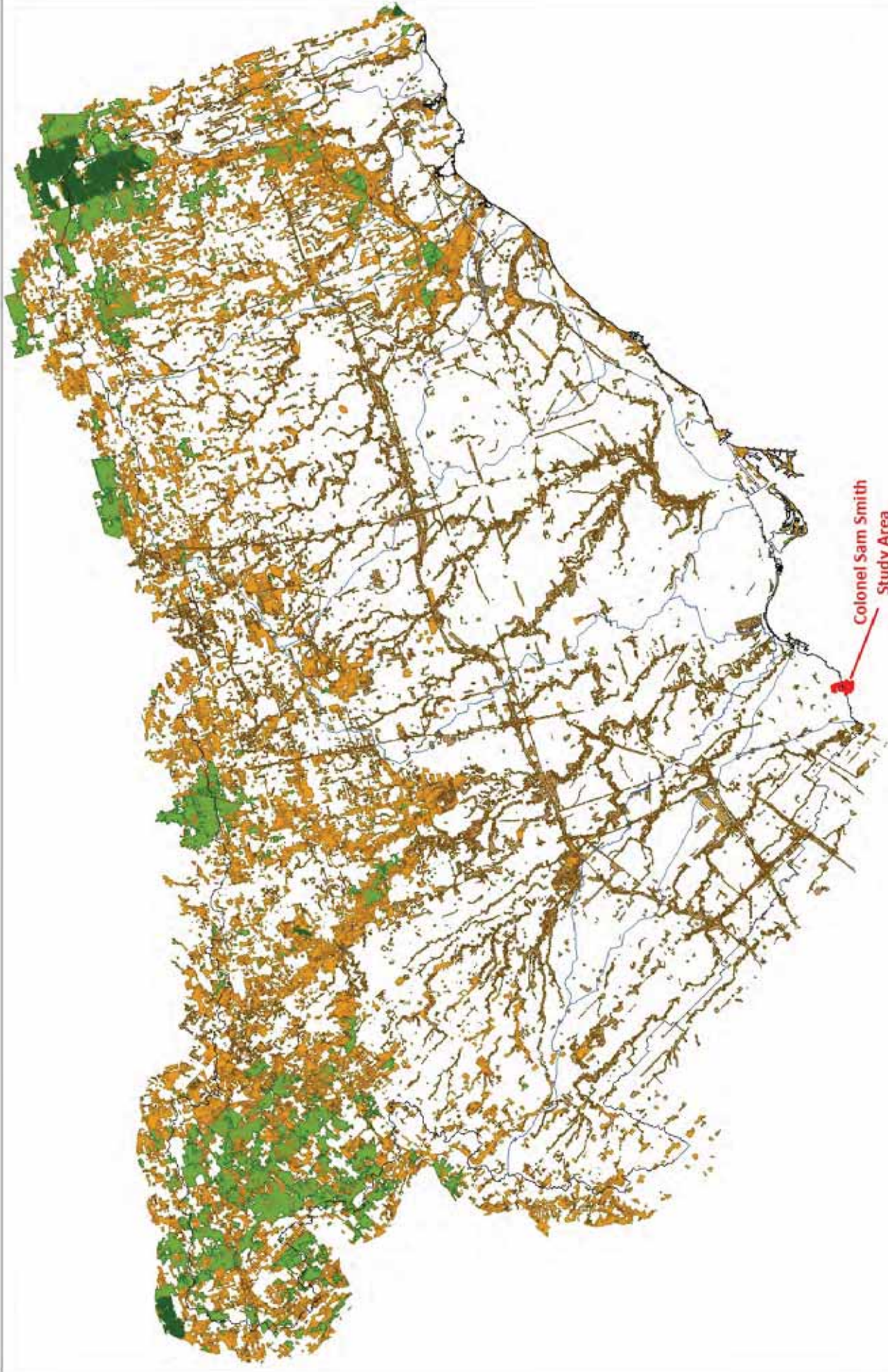
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Map 2:
Colonel Sam Smith
Study Area

Legend



Colonel Sam Smith
 Study Area
 Boundary











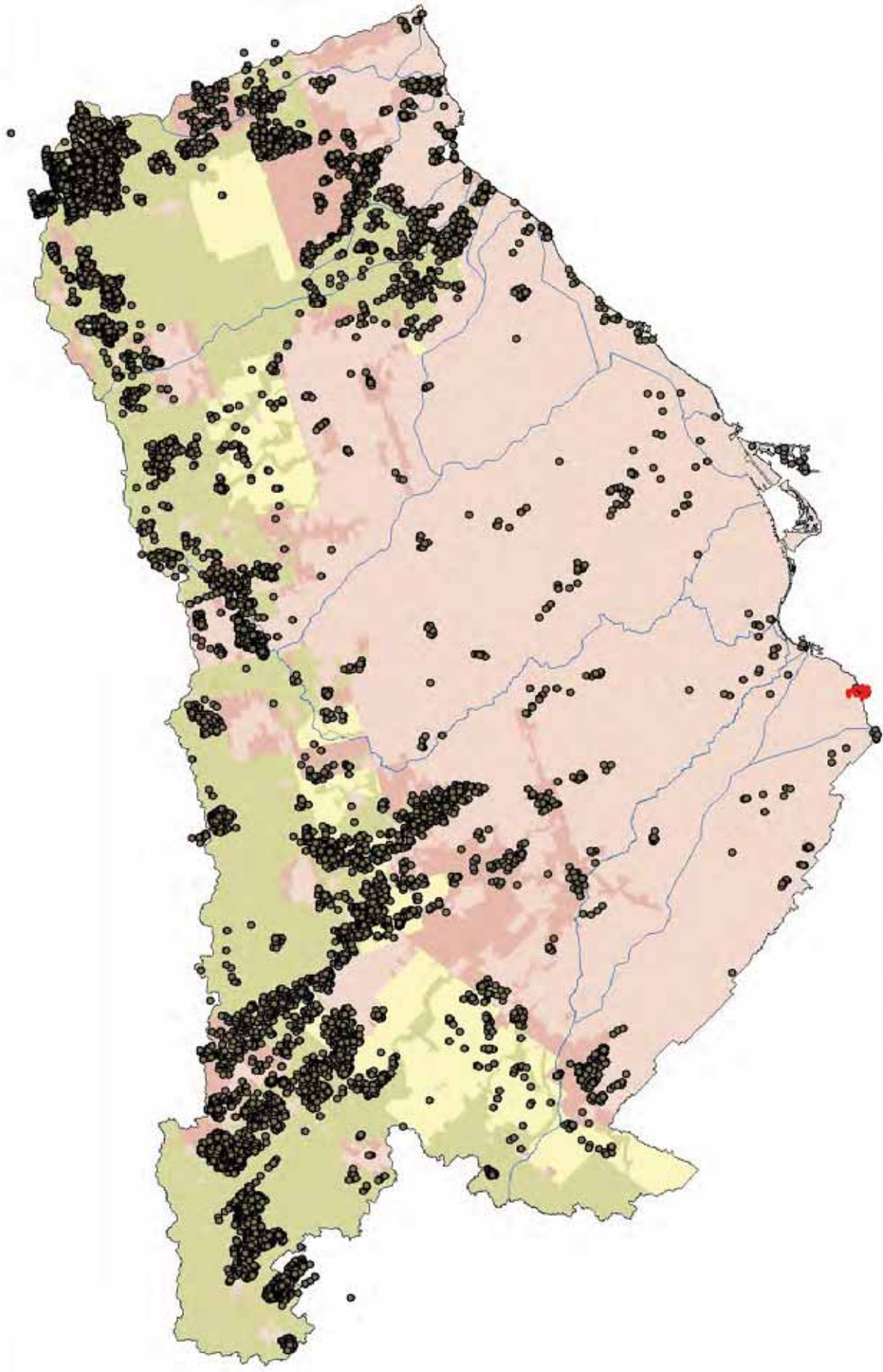

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Date: March, 2014
 * Landscape analysis based on 2007/2008 Orthophotography

Map 3: Regional Natural System Habitat Patch Quality

Legend

 L1 - Excellent	 Colonel Sam Smith Study Area Boundary
 L2 - Good	 TRCA Jurisdiction
 L3 - Fair	 Watershed
 L4 - Poor	
 L5 - Very Poor	



Map 4:
Distribution of Fauna
Regional Species of Concern



Date: March, 2014



Fauna Area Sensitivity Scores

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

- △ Fauna Species
- Frog Species

Habitat Patch Size Scores *

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



0 50 100 200 Meters

Date: March, 2014

Orthophoto: Spring 2011, First Base Solutions Inc.

* Landscape analysis based on 2007/2008 Orthophotography

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

Legend

- Colonel Sam Smith Study Area Boundary

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



Flora Sensitivity to Development Scores

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

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

- Flora Species
- ⊕ Planted Flora Species



0 25 50 100 150 200 Meters

Date: March, 2014

Orthophoto: Spring 2011, First Base Solutions Inc.

* Landscape analysis based on 2007/2008 Orthophotography

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

Legend

Habitat Matrix Influence Scores *

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

□ Colonial Sam Smith Study Area Boundary



Fauna Sensitivity to Development Scores

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

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

- △ Fauna Species
- Frog Species



0 50 100 200 Meters

Date: March, 2014

Orthophoto: Spring 2011, First Base Solutions Inc.
* Landscape analysis based on 2007-2008 Orthophotography

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

Legend

Habitat Matrix Influence Scores *

- 5 - Excellent
- 4 - Good
- 3 - Fair
- 2 - Poor
- 1 - Very Poor
- Colonel Sam Smith Study Area Boundary



0 25 50 100 150 200
Meters

Date: March, 2014

Orthophoto: Spring 2011, First Base Solutions Inc.
* Landscape analysis based on 2007/2008
Orthophotography

Map 8: Habitat Patch Quality

Legend

Habitat Patch Quality *

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

Colonel Sam Smith
Study Area Boundary



0 25 50 100 150 200
Meters

Date: March, 2014
Orthophoto: Spring 2011, First Base
Solutions Inc.

Map 9: Vegetation Communities with their Associated Local Ranks


Legend Vegetation Community Ranks

	L1		L4
	L2		L5
	L3		L+


Colonel Sam Smith
Study Area Boundary

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





 Toronto and Region
Conservation
 for The Living City




0 25 50 100 150 200
 Meters

Date: March, 2014
 Orthophoto: Spring 2011, First Base
 Solutions Inc.

Map 10:
Location of Flora
Species of Concern

Legend

<p>Flora Species of Concern (L1-L4)</p> <ul style="list-style-type: none"> ● L1 ○ L2 	<p>Planted Flora Species of Concern (L1-L4)</p> <ul style="list-style-type: none"> ● L3 ○ L4
--	--

 Colonel Sam Smith Study Area Boundary



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
- ⊕ Planted Flora Species

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



0 25 50 100 150 200
Meters

Date: March, 2014

Orthophoto: Spring 2011, First Base Solutions Inc.

**Map 11:
Flora Species Habitat
Dependence Scores**

Legend

- Colonel Sam Smith Study Area Boundary



0 50 100 200
 Meters

Date: March, 2014
 Orthophoto: Spring 2011, First Base
 Solutions Inc.

Map 12: Locations of Fauna Species of Concern

Legend

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

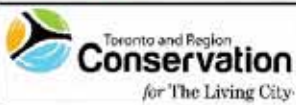
Colonel Sam Smith
 Study Area Boundary



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

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



0 50 100 200 Meters

Date: March, 2014
 Orthophoto: Spring 2011, First Base Solutions Inc.

**Map 13:
 Fauna Species
 Habitat Dependence
 Scores**

Legend

- Colonel Sam Smith Study Area Boundary
- △ Fauna Species
- Frog Species

Appendix 1: List of TRCA Vegetation Communities at Colonel Sam Smith (2013)

ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank Score (2012-08)
			Local Occur.	Geophy. Requir.	Total Score	
Forest						
FOD7-1	Fresh-Moist White Elm Lowland Deciduous Forest	0.3	2.0	1.0	3.0	L4
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest*	-	2.0	0.0	2.0	L5
FOD7-b	Fresh-Moist Norway Maple Deciduous Forest	0.4	3.5	0.0	3.5	L+
FOD7-c	Fresh-Moist Exotic Lowland Deciduous Forest	0.0	2.5	0.0	2.5	L+
CUP1-1	Sugar Maple Deciduous Plantation*	-	4.0	0.0	4.0	L5
CUP1-4	Hybrid Poplar Deciduous Plantation	0.2	3.0	0.0	3.0	L5
CUP1-8	Red Oak Deciduous Plantation	0.3	3.5	0.0	3.5	L5
CUP1-A	Restoration Deciduous Plantation	0.5	2.0	0.0	2.0	L5
CUP1-c	Black Locust Deciduous Plantation	0.2	2.0	0.0	2.0	L+
CUP1-d	Horticultural Deciduous Plantation	1.4	3.5	0.0	3.5	L+
CUP2-A	Restoration Mixed Plantation	6.4	2.5	0.0	2.5	L5
CUP3-A	Restoration Coniferous Plantation	0.2	2.5	0.0	2.5	L5
CUP3-e	Norway Spruce Coniferous Plantation	0.9	2.0	0.0	2.0	L+
CUP3-H	Mixed Conifer Coniferous Plantation	0.1	1.5	0.0	1.5	L5
Successional						
CUT1-1	Sumac Deciduous Thicket	0.3	2.0	0.0	2.0	L5
CUT1-4	Grey Dogwood Deciduous Thicket*	-	4.0	0.0	4.0	L4
CUT1-A1	Native Deciduous Sapling Regeneration Thicket	0.3	2.0	0.0	2.0	L5
CUT1-c	Exotic Deciduous Thicket	0.0	2.0	0.0	2.0	L+
CUT1-F	Silky Dogwood Deciduous Thicket*	-	5.0	0.0	5.0	L3
CUT1-G	Willow Deciduous Thicket*	-	4.0	0.0	4.0	L4
CUS1-b	Exotic Successional Savannah	0.6	2.0	0.0	2.0	L+
CUW1-b	Exotic Successional Woodland	0.4	1.5	0.0	1.5	L+
Wetland						
SWT2-2	Willow Mineral Thicket Swamp	0.1	2.0	2.0	4.0	L4
SWT2-5	Red-osier Mineral Thicket Swamp	0.2	2.0	2.0	4.0	L4
SWT2-a	Exotic Mineral Thicket Swamp*	-	3.5	1.0	4.5	L+
MAM2-a	Common Reed Mineral Meadow Marsh*	-	3.0	0.0	3.0	L+
MAS2-1b	Narrow-Leaved Cattail Mineral Shallow Marsh	0.5	2.0	0.0	2.0	L+
MAS2-a	Common Reed Mineral Shallow Marsh*	-	3.0	0.0	3.0	L+

Appendix 1: List of TRCA Vegetation Communities at Colonel Sam Smith (2013)

ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank Score (2012-08)
			Local Occur.	Geophy. Requir.	Total Score	
	Aquatic					
SAS1-3	Stonewort Submerged Shallow Aquatic	0.8	2.5	1.0	3.5	L4
SAS1-4	Water Milfoil Submerged Shallow Aquatic	0.1	3.0	1.0	4.0	L4
SAF1-3	Duckweed Floating-leaved Shallow Aquatic*	-	2.5	1.0	3.5	L4
	Dynamic (Beach, Bluff, Barren, Prairie, Savannah)					
BBO1	Mineral Open Beach	0.4	3.5	2.0	5.5	L3
BBO2-A	Rubble Open Shoreline	1.6	3.5	0.0	3.5	L5
BBS1-2A	Willow Shrub Beach	0.9	4.5	3.0	7.5	L2
BBT1-A	Mineral Treed Beach	0.1	4.5	2.0	6.5	L2
BBT2-A	Rubble Treed Shoreline	0.2	5.0	0.0	5.0	L5
	Meadow					
CUM1-A	Native Forb Meadow	0.5	1.5	0.0	1.5	L5
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	2.9	1.0	0.0	1.0	L+
CUM1-c	Exotic Forb Meadow	0.7	1.5	0.0	1.5	L+

Appendix 2: TRCA Flora Species found at Colonel Sam Smith Park (2013)		Local	Popn.	Hab.	Sens.	Total	Rank		
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Score	Plant
		1-5	1-5	0-5	0-5	2-20	(08/2012)	Date	Type
<i>Angelica atropurpurea</i>	angelica	3	3	4	4	14	L3	21-Jun-2012	FO
<i>Hypericum cf punctatum</i>	spotted St. John's-wort	3	4	4	5	16	L3	21-Jun-2012	FO
<i>Apocynum cannabinum</i> var. <i>hypericifolium</i>	clasping-leaved hemp dogbane	4	2	3	2	11	L4	21-Jun-2012	FO
<i>Bidens tripartita</i>	three-parted beggar's-ticks	3	2	4	2	11	L4	21-Jun-2012	FO
<i>Carex pellita</i>	woolly sedge	2	3	4	3	12	L4	21-Jun-2012	SE
<i>Ceratophyllum demersum</i>	coontail	2	3	5	3	13	L4	21-Jun-2012	FO
<i>Cicuta bulbifera</i>	bulblet-bearing water-hemlock	2	3	4	3	12	L4	27-Feb-2012	FO
<i>Elodea canadensis</i>	common water-weed	2	3	5	3	13	L4	21-Jun-2012	FO
<i>Epilobium coloratum</i>	purple-leaved willow-herb	2	3	4	2	11	L4	21-Jun-2012	FO
<i>Juncus articulatus</i>	jointed rush	3	2	4	2	11	L4	21-Jun-2012	RU
<i>Juncus nodosus</i>	knotted rush	2	2	5	3	12	L4	03-Feb-2012	RU
<i>Myosotis laxa</i>	smaller forget-me-not	2	4	3	4	13	L4	21-Jun-2012	FO
<i>Potamogeton foliosus</i>	leafy pondweed	1	3	5	4	13	L4	21-Jun-2012	FO
<i>Spirodela polyrrhiza</i>	greater duckweed	1	4	5	3	13	L4	21-Jun-2012	FO
<i>Wolffia columbiana</i>	Columbia water-meal	2	4	5	2	13	L4	03-Feb-2012	FO
<i>Alisma plantago-aquatica</i>	water-plantain	2	2	4	2	10	L5	21-Jun-2012	FO
<i>Ambrosia artemisiifolia</i>	common ragweed	2	1	3	0	6	L5	21-Jun-2012	FO
<i>Anemone canadensis</i>	Canada anemone	2	2	2	2	8	L5	21-Jun-2012	FO
<i>Anemone virginiana</i>	common thimbleweed	3	3	0	3	9	L5	21-Jun-2012	FO
<i>Asclepias syriaca</i>	common milkweed	2	2	0	2	6	L5	21-Jun-2012	FO
<i>Bidens frondosa</i>	common beggar's-ticks	2	1	4	0	7	L5	21-Jun-2012	FO
<i>Carex cf bebbii</i>	Bebb's sedge	2	2	3	3	10	L5	21-Jun-2012	SE
<i>Carex blanda</i>	common wood sedge	2	2	1	2	7	L5	21-Jun-2012	SE
<i>Carex cristatella</i>	crested sedge	2	2	4	1	9	L5	21-Jun-2012	FO
<i>Carex granularis</i>	meadow sedge	3	2	1	3	9	L5	21-Jun-2012	SE
<i>Carex stipata</i>	awl-fruited sedge	2	3	2	3	10	L5	21-Jun-2012	SE
<i>Carex vulpinoidea</i>	fox sedge	2	2	4	1	9	L5	21-Jun-2012	SE
<i>Cornus alternifolia</i>	alternate-leaved dogwood	2	2	1	2	7	L5	21-Jun-2012	SH
<i>Eleocharis erythropoda</i>	creeping spike-rush	2	2	4	1	9	L5	21-Jun-2012	SE
<i>Equisetum arvense</i>	field horsetail	2	2	1	1	6	L5	21-Jun-2012	FE
<i>Erigeron philadelphicus</i> var. <i>philadelphicus</i>	Philadelphia fleabane	3	2	0	1	6	L5	21-Jun-2012	FO
<i>Euthamia graminifolia</i>	grass-leaved goldenrod	2	1	4	1	8	L5	21-Jun-2012	FO
<i>Fragaria virginiana</i>	wild strawberry (sensu lato)	2	2	0	2	6	L5	21-Jun-2012	FO
<i>Galium aparine</i>	cleavers	3	1	3	2	9	L5	21-Jun-2012	FO
<i>Geum canadense</i>	white avens	2	2	1	2	7	L5	21-Jun-2012	FO
<i>Impatiens capensis</i>	orange touch-me-not	2	2	0	2	6	L5	21-Jun-2012	FO
<i>Juglans nigra</i>	black walnut	2	1	2	1	6	L5	21-Jun-2012	TR
<i>Juncus dudleyi</i>	Dudley's rush	2	2	3	1	8	L5	03-Feb-2012	RU
<i>Juncus tenuis</i>	path rush	3	2	1	1	7	L5	21-Jun-2012	RU
<i>Lemna minor</i>	common duckweed	2	2	4	2	10	L5	21-Jun-2012	FO
<i>Mentha arvensis</i> ssp. <i>borealis</i>	wild mint	2	2	3	2	9	L5	21-Jun-2012	FO
<i>Monarda fistulosa</i>	wild bergamot	2	3	2	3	10	L5	21-Jun-2012	FO
<i>Oenothera biennis</i>	common evening-primrose	2	1	1	1	5	L5	21-Jun-2012	FO
<i>Oxalis stricta</i>	common yellow wood-sorrel	5	1	1	1	8	L5	21-Jun-2012	FO
<i>Panicum capillare</i>	panic grass	3	1	4	1	9	L5	21-Jun-2012	GR
<i>Parthenocissus inserta</i>	thicket creeper	2	2	0	1	5	L5	21-Jun-2012	VW
<i>Plantago rugelii</i>	red-stemmed plantain	3	2	0	1	6	L5	21-Jun-2012	FO
<i>Populus deltoides</i>	cottonwood	2	1	4	1	8	L5	21-Jun-2012	TR
<i>Potentilla anserina</i> ssp. <i>anserina</i>	silverweed	3	2	3	2	10	L5	21-Jun-2012	FO
<i>Prunus virginiana</i> var. <i>virginiana</i>	choke cherry	2	2	0	1	5	L5	21-Jun-2012	SH
<i>Rhus typhina</i>	staghorn sumach	2	1	2	2	7	L5	21-Jun-2012	SH
<i>Rubus idaeus</i> ssp. <i>strigosus</i>	wild red raspberry	1	1	0	1	3	L5	21-Jun-2012	SH
<i>Rubus odoratus</i>	purple-flowering raspberry	2	2	2	2	8	L5	21-Jun-2012	SH
<i>Salix eriocephala</i>	narrow heart-leaved willow	2	1	3	1	7	L5	21-Jun-2012	SH
<i>Salix interior</i>	sandbar willow	2	1	5	2	10	L5	21-Jun-2012	SH
<i>Sambucus canadensis</i>	common elderberry	2	3	2	2	9	L5	21-Jun-2012	SH
<i>Solidago altissima</i>	tall goldenrod	2	2	0	0	4	L5	21-Jun-2012	FO
<i>Solidago canadensis</i> var. <i>canadensis</i>	Canada goldenrod	2	2	0	1	5	L5	21-Jun-2012	FO
<i>Symphotrichum ericoides</i> var. <i>ericoides</i>	heath aster	2	1	2	1	6	L5	21-Jun-2012	FO
<i>Symphotrichum lanceolatum</i> var. <i>lanceolatum</i>	panicled aster	2	2	3	1	8	L5	21-Jun-2012	FO
<i>Symphotrichum novae-angliae</i>	New England aster	2	2	2	1	7	L5	21-Jun-2012	FO
<i>Ulmus americana</i>	white elm	2	4	0	2	8	L5	21-Jun-2012	TR
<i>Viburnum lentago</i>	nannyberry	2	3	1	2	8	L5	21-Jun-2012	SH
<i>Viola sororia</i> var. <i>sororia</i>	common blue violet	2	2	0	2	6	L5	21-Jun-2012	FO
<i>Vitis riparia</i>	riverbank grape	2	1	0	0	3	L5	03-Feb-2012	VW
<i>Xanthium strumarium</i>	clotbur	3	1	4	0	8	L5	21-Jun-2012	FO
<i>Acer negundo</i>	Manitoba maple	4	0	0	2	6	L+?	21-Jun-2012	TR
<i>Phalaris arundinacea</i>	reed canary grass	3				3	L+?	21-Jun-2012	GR
<i>Potentilla norvegica</i>	rough cinquefoil	3				3	L+?	03-Feb-2012	FO
<i>Acer platanoides</i>	Norway maple	4				4	L+	21-Jun-2012	TR
<i>Aesculus glabra</i>	Ohio buckeye	5				5	L+	02-Jun-2008	TR
<i>Agrostis gigantea</i>	redtop	4				4	L+	21-Jun-2012	GR
<i>Alliaria petiolata</i>	garlic mustard	4				4	L+	21-Jun-2012	FO
<i>Alnus glutinosa</i>	European alder	5				5	L+	21-Jun-2012	TR

Appendix 2: TRCA Flora Species found at Colonel Sam Smith Park (2013)		Local	Popn.	Hab.	Sens.	Total	Rank		
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Score	Plant
		1-5	1-5	0-5	0-5	2-20	(08/2012)	Date	Type
<i>Anagallis arvensis</i>	scarlet pimpernel	4				4	L+	03-Feb-2012	FO
<i>Arctium lappa</i>	great burdock	4				4	L+	21-Jun-2012	FO
<i>Arctium minus</i>	common burdock	5				5	L+	21-Jun-2012	FO
<i>Barbarea vulgaris</i>	winter cress	4				4	L+	21-Jun-2012	FO
<i>Bromus inermis</i>	smooth brome grass	4				4	L+	21-Jun-2012	GR
<i>Bromus cf japonicus</i>	Japanese chess	5				5	L+	03-Feb-2012	GR
<i>Campanula rapunculoides</i>	creeping bellflower	4				4	L+	21-Jun-2012	FO
<i>Carduus acanthoides</i>	plumeless thistle	5				5	L+	03-Feb-2012	FO
<i>Carex spicata</i>	spiked sedge	5				5	L+	21-Jun-2012	SE
<i>Celastrus orbiculatus</i>	oriental bittersweet	3				3	L+	03-Feb-2012	VW
<i>Centaurea stoebe ssp. micranthos</i>	spotted knapweed	5				5	L+	21-Jun-2012	FO
<i>Cerastium arvense ssp. arvense</i>	field chickweed	5				5	L+	03-Feb-2012	FO
<i>Chenopodium album</i>	lamb's quarters	5				5	L+	21-Jun-2012	FO
<i>Cichorium intybus</i>	chicory	5				5	L+	21-Jun-2012	FO
<i>Cirsium arvense</i>	creeping thistle	4				4	L+	21-Jun-2012	FO
<i>Cirsium vulgare</i>	bull thistle	4				4	L+	21-Jun-2012	FO
<i>Convolvulus arvensis</i>	field bindweed	3				3	L+	03-Feb-2012	VI
<i>Crataegus monogyna</i>	English hawthorn	4	1	4	0	9	L+	21-Jun-2012	TR
<i>Dactylis glomerata</i>	orchard grass	4				4	L+	21-Jun-2012	GR
<i>Daucus carota</i>	Queen Anne's lace	4				4	L+	21-Jun-2012	FO
<i>Dipsacus fullonum</i>	teasel	5				5	L+	21-Jun-2012	FO
<i>Echinochloa crus-galli</i>	barnyard grass	5				5	L+	21-Jun-2012	GR
<i>Echium vulgare</i>	viper's bugloss	3				3	L+	03-Feb-2012	FO
<i>Elaeagnus angustifolia</i>	Russian olive	4				4	L+	21-Jun-2012	SH
<i>Elymus repens</i>	quack grass	5				5	L+	21-Jun-2012	GR
<i>Epipactis helleborine</i>	helleborine	5				5	L+	21-Jun-2012	FO
<i>Euphorbia esula</i>	leafy spurge	5				5	L+	11-Apr-2003	FO
<i>Fallopia japonica var. japonica</i>	Japanese knotweed	4				4	L+	21-Jun-2012	FO
<i>Festuca rubra ssp. rubra</i>	red fescue	5				5	L+	21-Jun-2012	GR
<i>Forsythia viridissima</i>	forsythia	4				4	L+	03-Feb-2012	SH
<i>Galeopsis tetrahit</i>	hemp-nettle	5				5	L+	21-Jun-2012	FO
<i>Galium verum</i>	yellow bedstraw	5				5	L+	21-Jun-2012	FO
<i>Geum urbanum</i>	urban avens	4				4	L+	21-Jun-2012	FO
<i>Glechoma hederacea</i>	creeping Charlie	4				4	L+	21-Jun-2012	FO
<i>Glyceria maxima</i>	giant manna grass	5				5	L+	21-Jun-2012	GR
<i>Hemerocallis fulva</i>	orange day-lily	5				5	L+	21-Jun-2012	FO
<i>Hesperis matronalis</i>	dame's rocket	4				4	L+	21-Jun-2012	FO
<i>Hydrocharis morsus-ranae</i>	European frog-bit	5				5	L+	03-Feb-2012	FO
<i>Hypericum perforatum</i>	common St. John's-wort	4				4	L+	21-Jun-2012	FO
<i>Juncus compressus</i>	round-fruited rush	4				4	L+	03-Feb-2012	RU
<i>Lactuca serriola</i>	prickly lettuce	3				3	L+	03-Feb-2012	FO
<i>Leonurus cardiaca ssp. cardiaca</i>	motherwort	4				4	L+	21-Jun-2012	FO
<i>Lepidium campestre</i>	field pepper-grass	5				5	L+	21-Jun-2012	FO
<i>Leucanthemum vulgare</i>	ox-eye daisy	2				2	L+	03-Feb-2012	FO
<i>Linaria vulgaris</i>	butter-and-eggs	5				5	L+	21-Jun-2012	FO
<i>Lonicera morrowii</i>	Morrow's honeysuckle	5				5	L+	21-Jun-2012	SH
<i>Lonicera tatarica</i>	Tartarian honeysuckle	5				5	L+	21-Jun-2012	SH
<i>Lonicera x bella</i>	shrub honeysuckle	4				4	L+	21-Jun-2012	SH
<i>Lotus corniculatus</i>	bird's foot trefoil	4				4	L+	21-Jun-2012	FO
<i>Lycopus europaeus</i>	European water-horehound	5				5	L+	21-Jun-2012	FO
<i>Lythrum salicaria</i>	purple loosestrife	4				4	L+	21-Jun-2012	FO
<i>Matricaria discoidea</i>	pineappleweed	4				4	L+	03-Feb-2012	FO
<i>Medicago lupulina</i>	black medick	5				5	L+	21-Jun-2012	FO
<i>Medicago sativa ssp. sativa</i>	alfalfa	5				5	L+	21-Jun-2012	FO
<i>Melilotus albus</i>	white sweet clover	4				4	L+	21-Jun-2012	FO
<i>Melilotus officinalis</i>	yellow sweet clover	5				5	L+	21-Jun-2012	FO
<i>Myosotis scorpioides</i>	true forget-me-not	4				4	L+	21-Jun-2012	FO
<i>Myriophyllum spicatum</i>	Eurasian water-milfoil	5				5	L+	21-Jun-2012	FO
<i>Nepeta cataria</i>	catnip	5				5	L+	21-Jun-2012	FO
<i>Persicaria maculosa</i>	lady's thumb	5				5	L+	21-Jun-2012	FO
<i>Phleum pratense</i>	Timothy grass	4				4	L+	21-Jun-2012	GR
<i>Phragmites australis ssp. australis</i>	common reed	4				4	L+	21-Jun-2012	GR
<i>Plantago lanceolata</i>	English plantain	5				5	L+	21-Jun-2012	FO
<i>Plantago major</i>	common plantain	2				2	L+	03-Feb-2012	FO
<i>Poa compressa</i>	flat-stemmed blue grass	4				4	L+	21-Jun-2012	GR
<i>Poa nemoralis</i>	woodland spear grass	3				3	L+	03-Feb-2012	GR
<i>Poa pratensis ssp. pratensis</i>	Kentucky blue grass	4				4	L+	21-Jun-2012	GR
<i>Potentilla argentea</i>	silvery cinquefoil	5				5	L+	03-Feb-2012	FO
<i>Potentilla recta</i>	sulphur cinquefoil	5				5	L+	21-Jun-2012	FO
<i>Ranunculus acris</i>	tall buttercup	4				4	L+	21-Jun-2012	FO
<i>Rhamnus cathartica</i>	common buckthorn	4				4	L+	21-Jun-2012	SH
<i>Robinia pseudoacacia</i>	black locust	3				3	L+	21-Jun-2012	TR
<i>Rumex crispus</i>	curly dock	5				5	L+	21-Jun-2012	FO
<i>Salix alba</i>	white willow	5				5	L+	21-Jun-2012	TR

Appendix 2: TRCA Flora Species found at Colonel Sam Smith Park (2013)		Local	Popn.	Hab.	Sens.	Total	Rank		
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA	Score	Plant
		1-5	1-5	0-5	0-5	2-20	(08/2012)	Date	Type
<i>Salix x fragilis</i>	crack willow	3				3	L+	21-Jun-2012	TR
<i>Salix x sepulcralis</i>	weeping willow	5				5	L+	21-Jun-2012	TR
<i>Schedonorus pratensis</i>	meadow fescue	4				4	L+	21-Jun-2012	GR
<i>Securigera varia</i>	crown vetch	5				5	L+	21-Jun-2012	FO
<i>Silene latifolia</i>	evening lychnis	4				4	L+	03-Feb-2012	FO
<i>Sisymbrium altissimum</i>	tumble mustard	5				5	L+	07-Mar-2008	FO
<i>Solanum dulcamara</i>	bittersweet nightshade	4				4	L+	21-Jun-2012	VW
<i>Sonchus arvensis</i> ssp. <i>arvensis</i>	glandular perennial sow-thistle	5				5	L+	21-Jun-2012	FO
<i>Sonchus oleraceus</i>	annual sow-thistle	5				5	L+	21-Jun-2012	FO
<i>Sorbus aucuparia</i>	European mountain-ash	5				5	L+	21-Jun-2012	TR
<i>Tanacetum vulgare</i>	tansy	5				5	L+	21-Jun-2012	FO
<i>Taraxacum officinale</i>	dandelion	4				4	L+	21-Jun-2012	FO
<i>Thlaspi arvense</i>	penny-cress	5				5	L+	21-Jun-2012	FO
<i>Torilis japonica</i>	hedge-parsley	5				5	L+	21-Jun-2012	FO
<i>Tragopogon dubius</i>	lemon-yellow goat's beard	3				3	L+	03-Feb-2012	FO
<i>Tragopogon pratensis</i>	meadow goat's beard	3				3	L+	03-Feb-2012	FO
<i>Trifolium pratense</i>	red clover	5				5	L+	21-Jun-2012	FO
<i>Trifolium repens</i>	white clover	5				5	L+	21-Jun-2012	FO
<i>Tussilago farfara</i>	coltsfoot	4				4	L+	21-Jun-2012	FO
<i>Typha angustifolia</i>	narrow-leaved cattail	3				3	L+	21-Jun-2012	FO
<i>Typha x glauca</i>	hybrid cattail	3				3	L+	21-Jun-2012	FO
<i>Ulmus glabra</i>	Scotch elm	5				5	L+	21-Jun-2012	TR
<i>Ulmus pumila</i>	Siberian elm	4				4	L+	21-Jun-2012	TR
<i>Viburnum opulus</i> ssp. <i>opulus</i>	European highbush cranberry	4				4	L+	21-Jun-2012	SH
<i>Vicia cracca</i>	cow vetch	4				4	L+	21-Jun-2012	VI
<i>Juniperus</i> sp.	juniper sp.								SH
<i>Crataegus crus-galli</i>	cockspur hawthorn	5	4	5	4	18	L2	03-Feb-2012	TR
<i>Liatris spicata</i>	spike blazing-star	5	3	5	5	18	L2	29-Feb-2012	FO
<i>Lobelia cardinalis</i>	cardinal flower	4	5	4	5	18	L2	03-Feb-2012	FO
<i>Pinus resinosa</i>	red pine	2	5	5	5	17	L2	03-Feb-2012	TR
<i>Bolboschoenus fluviatilis</i>	river bulrush	3	2	5	4	14	L3	21-Jun-2012	SE
<i>Cornus amomum</i> ssp. <i>obliqua</i>	silky dogwood	3	3	5	3	14	L3	21-Jun-2012	SH
<i>Hamamelis virginiana</i>	witch-hazel	2	4	4	4	14	L3	07-Mar-2008	SH
<i>Ilex verticillata</i>	winterberry	2	4	4	5	15	L3	21-Jun-2012	SH
<i>Larix cf laricina</i>	tamarack	2	4	4	4	14	L3	21-Jun-2012	TR
<i>Lobelia siphilitica</i>	great blue lobelia	2	3	4	5	14	L3	21-Jun-2012	FO
<i>Panicum virgatum</i>	switch grass	3	2	5	5	15	L3	07-Mar-2008	GR
<i>Physocarpus opulifolius</i>	ninebark	3	2	5	4	14	L3	03-Feb-2012	SH
<i>Picea glauca</i>	white spruce	1	5	4	4	14	L3	21-Jun-2012	TR
<i>Salix lucida</i>	shining willow	2	4	5	3	14	L3	21-Jun-2012	SH
<i>Schoenoplectus acutus</i> var. <i>acutus</i>	hard-stemmed bulrush	3	3	5	4	15	L3	03-Feb-2012	SE
<i>Sparanium eurycarpum</i>	great bur-reed	2	4	5	4	15	L3	21-Jun-2012	FO
<i>Viburnum opulus</i> cf. ssp. <i>trilobum</i>	American highbush cranberry	3	5	4	4	16	L3	21-Jun-2012	SH
<i>Acer rubrum</i>	red maple	2	4	1	5	12	L4	21-Jun-2012	TR
<i>Acer saccharinum</i>	silver maple	1	2	5	3	11	L4	21-Jun-2012	TR
<i>Acer saccharum</i> ssp. <i>nigrum</i>	black maple	2	3	4	2	11	L4	21-Jun-2012	TR
<i>Acer x freemanii</i>	hybrid swamp maple	3	3	5	2	13	L4	21-Jun-2012	TR
<i>Amelanchier laevis</i>	smooth serviceberry	2	2	4	3	11	L4	03-Feb-2012	SH
<i>Asclepias incarnata</i> ssp. <i>incarnata</i>	swamp milkweed	2	3	4	4	13	L4	21-Jun-2012	FO
<i>Betula papyrifera</i>	paper birch	1	4	2	4	11	L4	21-Jun-2012	TR
<i>Carpinus caroliniana</i> ssp. <i>virginiana</i>	blue beech	1	3	4	3	11	L4	21-Jun-2012	SH
<i>Desmodium canadense</i>	showy tick-trefoil	3	2	3	3	11	L4	21-Jun-2012	FO
<i>Elymus canadensis</i>	Canada wild rye	3	2	5	3	13	L4	21-Jun-2012	GR
<i>Eupatorium perfoliatum</i>	boneset	1	3	4	3	11	L4	21-Jun-2012	FO
<i>Fagus cf grandifolia</i>	American beech	1	4	3	4	12	L4	21-Jun-2012	TR
<i>Fraxinus nigra</i>	black ash	1	4	4	3	12	L4	21-Jun-2012	TR
<i>Pinus strobus</i>	white pine	1	4	3	4	12	L4	21-Jun-2012	TR
<i>Quercus macrocarpa</i>	bur oak	2	4	3	3	12	L4	21-Jun-2012	TR
<i>Quercus rubra</i>	red oak	1	4	2	4	11	L4	21-Jun-2012	TR
<i>Rudbeckia hirta</i>	black-eyed Susan	1	4	4	3	12	L4	07-Mar-2008	FO
<i>Sagittaria latifolia</i>	common arrowhead	2	2	5	4	13	L4	21-Jun-2012	FO
<i>Salix amygdaloides</i>	peach-leaved willow	1	2	5	3	11	L4	21-Jun-2012	TR
<i>Salix bebbiana</i>	Bebb's willow	2	3	3	4	12	L4	21-Jun-2012	SH
<i>Salix discolor</i>	pussy willow	2	3	4	3	12	L4	21-Jun-2012	SH
<i>Schoenoplectus pungens</i> var. <i>pungens</i>	three-square	3	2	5	3	13	L4	07-Mar-2008	SE
<i>Schoenoplectus tabernaemontani</i>	soft-stemmed bulrush	1	2	5	3	11	L4	21-Jun-2012	SE
<i>Spiraea alba</i>	wild spiraea	2	4	4	3	13	L4	03-Feb-2012	SH
<i>Thuja occidentalis</i>	white cedar	1	4	1	5	11	L4	21-Jun-2012	TR
<i>Typha latifolia</i>	broad-leaved cattail	1	4	4	4	13	L4	21-Jun-2012	FO
<i>Acer saccharum</i> ssp. <i>saccharum</i>	sugar maple	2	3	0	2	7	L5	21-Jun-2012	TR
<i>Cornus foemina</i> ssp. <i>racemosa</i>	grey dogwood	3	2	3	2	10	L5	21-Jun-2012	SH
<i>Cornus stolonifera</i>	red osier dogwood	2	2	0	3	7	L5	03-Feb-2012	SH
<i>Fraxinus pennsylvanica</i>	red ash	1	2	0	3	6	L5	21-Jun-2012	TR
<i>Hackelia virginiana</i>	Virginia stickseed	2	2	0	2	6	L5	03-Feb-2012	FO

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		1-5	1-5	0-5	0-5	2-20	(08/2012)	Date	Type
<i>Populus tremuloides</i>	trembling aspen	2	3	1	3	9	L5	21-Jun-2012	TR
<i>Silphium perfoliatum</i>	cup-plant	4	1	3	2	10	L5	03-Feb-2012	FO
<i>Tilia americana</i>	basswood	2	3	2	3	10	L5	21-Jun-2012	TR
<i>Prunus pumila</i> var. <i>pumila</i>	sand cherry	5		5		10	L+?	02-Jun-2008	SH
<i>Rosa virginiana</i>	Virginia rose	5				5	L+?	29-Apr-2008	SH
<i>Acer pseudoplatanus</i>	sycamore maple	5	0	5	2	12	L+	10-Mar-2008	TR
<i>Alnus incana</i> ssp. <i>incana</i>	grey alder	5				5	L+	21-Jun-2012	TR
<i>Catalpa speciosa</i>	northern catalpa	4				4	L+	03-Feb-2012	TR
<i>Cercis canadensis</i>	redbud						L+		SH
<i>Coreopsis lanceolata</i>	lance-leaved coreopsis	5				5	L+	07-Mar-2008	FO
<i>Corylus colurna</i>	Turkish hazel						L+		TR
<i>Crataegus phaenopyrum</i>	Washington hawthorn						L+		TR
cf <i>Gymnocladus dioicus</i>	Kentucky coffee-tree	5				5	L+	05-Mar-2012	TR
<i>Morus alba</i>	white mulberry	5				5	L+	21-Jun-2012	TR
<i>Picea abies</i>	Norway spruce	5				5	L+	21-Jun-2012	TR
<i>Picea pungens</i>	Colorado spruce	5				5	L+	11-Apr-2003	TR
<i>Pinus banksiana</i>	Jack pine	5				5	L+	07-Mar-2008	TR
<i>Pinus sylvestris</i>	Scots pine	4				4	L+	21-Jun-2012	TR
<i>Populus alba</i>	white poplar	5				5	L+	21-Jun-2012	TR
<i>Prunus avium</i>	mazzard cherry	4				4	L+	03-Feb-2012	TR
<i>Rhus aromatica</i>	fragrant sumach	5				5	L+	03-Feb-2012	SH
<i>Salix cf. viminalis</i>	basket willow	5				5	L+	03-Feb-2012	SH
<i>Sorbus intermedia</i>	Swedish whitebeam						L+		TR
<i>Spiraea x vanhouttei</i>	bridalwreath spiraea	5				5	L+	03-Feb-2012	SH
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	western snowberry	5				5	L+	03-Feb-2012	SH
<i>Tilia cordata</i>	little-leaf linden	5				5	L+	21-Jun-2012	TR
<i>Viburnum recognitum</i>	southern arrow-wood	5				5	L+	03-Feb-2012	SH
<i>Acer pensylvanicum</i>	striped maple						L+		TR
<i>Potentilla fructosa</i>	shrubby cinquefoil						L+		SH
<i>Quercus palustris</i>	pin oak						L+		SH
<i>Hydrangea cf. arborescens</i>	smooth hydrangea						L+		FO
<i>Cannabis sativa</i>	marijuana						L+		TR
<i>Quercus bicolor</i>	swamp white oak						L+		TR
<i>Taxus cf. chinensis</i>	Chinese yew						L+		SH

Common Name	Code	Scientific Name	count	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
Survey Species: species for which the TRCA protocol effectively surveys.													
Birds													
hooded merganser	HOME	<i>Lophodytes cucullatus</i>	1	2	2	2	4	2	2	2	0	16	L3
red-necked grebe	RNGR	<i>Podiceps grisegena</i>	5	5	2	1	3	1	3	4	0	19	L3
bank swallow	BANS	<i>Riparia riparia</i>	1	1	3	2	1	1	3	3	0	14	L4
barn swallow	BARS	<i>Hirundo rustica</i>	2	0	2	3	1	1	2	1	0	10	L4
belted kingfisher	BEKI	<i>Ceryle alcyon</i>	1	0	3	2	2	1	2	2	0	12	L4
blue-grey gnatcatcher	BGGN	<i>Poliophtila caerulea</i>	2	0	1	1	3	1	1	3	0	10	L4
chimney swift	CHSW	<i>Chaetura pelagica</i>	1	1	3	3	1	1	1	1	0	11	L4
cliff swallow	CLSW	<i>Petrochelidon pyrrhonota</i>	18	1	2	2	1	1	2	1	0	10	L4
eastern kingbird	EAKI	<i>Tyrannus tyrannus</i>	4	0	4	2	2	1	1	3	0	13	L4
gadwall	GADW	<i>Anas strepera</i>	1	4	1	2	1	2	1	3	0	14	L4
grey catbird	GRCA	<i>Dumetella carolinensis</i>	1	0	2	2	1	1	1	3	0	10	L4
northern flicker	NOFL	<i>Colaptes auratus</i>	1	0	3	2	1	1	2	3	0	12	L4
northern rough-winged swallow	NRWS	<i>Stelgidopteryx x serripennis</i>	2	0	1	2	1	1	3	2	0	10	L4
purple martin	PUMA	<i>Progne subis</i>	1	4	2	3	1	1	2	1	0	14	L4
tree swallow	TRES	<i>Tachycineta bicolor</i>	2	0	2	2	1	1	2	2	0	10	L4
willow flycatcher	WIFL	<i>Empidonax traillii</i>	6	0	4	2	1	1	1	3	0	12	L4
wood duck	WODU	<i>Aix sponsa</i>	1	0	2	1	3	2	2	4	0	14	L4
American goldfinch	AMGO	<i>Carduelis tristis</i>	x	0	2	2	1	1	0	1	0	7	L5
American robin	AMRO	<i>Turdus migratorius</i>	x	0	1	2	1	1	0	1	0	6	L5
Baltimore oriole	BAOR	<i>Icterus galbula</i>	x	0	2	2	1	1	0	1	0	7	L5
black-capped chickadee	BCCH	<i>Parus atricapillus</i>	x	0	1	2	1	1	0	1	0	6	L5
blue jay	BLJA	<i>Cyanocitta cristata</i>	x	0	4	2	1	1	0	1	0	9	L5
brown-headed cowbird	BHCO	<i>Molothrus ater</i>	x	0	2	2	1	1	0	1	0	7	L5
Canada goose	CANG	<i>Branta canadensis</i>	x	0	1	1	1	2	1	0	0	6	L5
cedar waxwing	CEDW	<i>Bombycilla cedrorum</i>	x	0	1	2	1	1	0	1	0	6	L5
chipping sparrow	CHSP	<i>Spizella passerina</i>	x	0	2	2	1	1	0	2	0	8	L5
common grackle	COGR	<i>Quiscalus quiscula</i>	x	0	3	2	1	1	0	1	0	8	L5
eastern phoebe	EAPH	<i>Sayornis phoebe</i>	x	0	2	2	1	1	2	1	0	9	L5
house wren	HOWR	<i>Troglodytes aedon</i>	x	0	2	2	1	2	1	1	0	9	L5
killdeer	KILL	<i>Charadrius vociferus</i>	x	0	2	2	1	2	0	2	0	9	L5
mallard	MALL	<i>Anas platyrhynchos</i>	x	0	2	2	1	2	0	1	0	8	L5
mourning dove	MODO	<i>Zenaida macroura</i>	x	0	2	2	1	1	0	0	0	6	L5
northern cardinal	NOCA	<i>Cardinalis cardinalis</i>	x	0	2	2	1	1	1	2	0	9	L5

