



# Brock Lands

**Terrestrial Biological Inventory  
and Assessment**

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## 1.0 Introduction

In 2010 and 2011 the Toronto and Region Conservation Authority (TRCA) conducted flora and fauna inventories of the recently-acquired Brock Lands in preparation for an upcoming management plan. The northern section was inventoried in 2010; the section to the south of the 5<sup>th</sup> Concession was inventoried in 2011. As shown in Maps 1 and 2, the study area is located in the middle reaches of the Duffins Creek watershed, at the confluence of two of Duffins Creek's tributaries: Brougham and Spring Creeks. East Duffins Creek itself runs along the north-eastern corner of the northern section of the site.

Brock Lands had received no full systematic survey prior to 2010. However, a 10 ha portion (part of the Terrestrial Volunteer Monitoring network) (*partially included in the Brock Lands*), was surveyed by TRCA staff in 2008. In addition, the neighbouring Greenwood Conservation Area was surveyed extensively in 2002 at which time, a partial inventory of the Brock Lands area south of the 5<sup>th</sup> Concession was completed.

The purpose of the work conducted by the TRCA during the 2010 and 2011 field seasons was to *provide site-specific advice on management decisions* in the upcoming plan. In order to provide this advice, detailed field work was undertaken to *characterize the terrestrial natural heritage features* of the Brock Lands. Once characterized, the site features can then be understood within the larger regional context of the Terrestrial Natural Heritage Program of the TRCA. The question that the inventory addresses is "*How does the area surveyed at the Brock Lands 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 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 Brock Lands study area is located in the middle reaches of the Duffins Creek watershed, in the City of Pickering, Durham Region. The study area is bordered on the west by Sideline 16, the north by Highway 7, the east by Greenwood Road, Church Street, and Greenwood Conservation Area, and the south by the east-west Hydro corridor to the north of Taunton Road. The Brock Lands study area covers 460 ha and lies entirely within the Great Lakes – St. Lawrence floristic region, composed of mixed coniferous-deciduous forest. At the coarse physiographic level, the site is situated at the northern edge of the Iroquois sand plain, with the extreme north-west corner lying within the South Slope physiographic zone. Surface geology consists primarily of glacial lake deposits of sand and gravel, interrupted by the river deposits of gravel sand associated with Duffins Creek itself, and an area of glacial till of sandy silt to sand at the north-west edge of the site (i.e. South Slope physiographic zone).

Before being topographically altered by aggregate extraction in the mid 20<sup>th</sup> century, the Brock Lands were a generally sloping plain tilted southeast toward the valley of East Duffins Creek. The slope was associated with the Iroquois shoreline. The ravines of Brougham and Spring Creeks, and a few other smaller watercourses feeding into East Duffins Creek cut across this plain.



Extensive ground water fed into these streams where the ravines intercepted the aquifer associated with the Iroquois sand and gravel deposits. Continuous corridors of natural cover occur along the valley systems up toward the Oak Ridges Moraine and down toward Lake Ontario (Gerber 2003).

Major alterations to the landscape commenced in the 1950s. At that time, continuing up to the 1970s, sand and gravel extraction occurred in large areas of the site. These included much of the southern half of the upper section of the Brock Lands on both sides of the Brougham Creek valley, along with sections of the middle and northwest of the property. Excavation also affected the Brock Lands south of 5<sup>th</sup> Concession. The removal of sand and gravel led to the exposure of the aquifers and extensive areas of seepage. There are several ponds resulting from this activity (Golder 1987).

Subsequent to the closure of the extraction operations, the City of Toronto started to use the southwest corner of the northern section of the Brock Lands for a waste landfill (early 1980s). This was quickly abandoned and any waste removed. However, the landfill operation involved further grading and topographic alteration, including filling and ditching parallel to Sideline 16 (Dixon 2004).

Most recently, clean fill has been dumped in former extraction areas in the northwest part of the southern section of the Brock Lands, starting around 2005. The fill is generally of heavier texture (more silty clay loam) than the original Iroquois sands. Small areas of new fill also occur near Highway 7 at the north end of the site.

The Pickering Museum, located at the northeast corner of the study area in the East Duffins Creek valley at Highway 7, includes a number of heritage buildings, and there is also an old barn in the north-central part of the property just east of Spring Creek. There is a monument to the original Brougham post office roughly to the northwest of the centre of the study area, near where a small tributary stream enters Brougham Creek.

Recreational activity occurs mostly along the eastern area of the Brock Lands, where it adjoins the established Greenwood Conservation Area to the south and the Pickering Museum to the north. A network of trails used by mountain bikers and the occasional hiker and dog-walker occurs in this area. The remainder of the site, even though it has old tracks and roads from the aggregate extraction period, has little recreational traffic other than occasional visits by dirt-bikers and dog-walkers.

### **3.0 Inventory Methodology**

A biological inventory of the Brock Lands was conducted at the levels of habitat patch (landscape analysis), vegetation community, and species (flora and fauna) according to the TRCA methodologies for landscape evaluation (TRCA 2007c) and field data collection (TRCA 2007d).





Habitat patch mapping was excerpted from the regional 2007/08 mapping of broadly-defined patch categories (forest, wetland, meadow and coastal) and digitized using ArcView GIS software. A key component of the field data collection is the scoring and ranking of vegetation communities and flora and fauna species to generate local “L” ranks (L1 to L5); this process was undertaken in 1996-2000 and ranks are reviewed regularly (TRCA 2010). Vegetation community scores and ranks are based on two criteria: *local occurrence* and the number of *geophysical requirements* or factors on which they depend. Flora species are scored using four criteria: *local occurrence*, *population trend*, *habitat dependence*, and *sensitivity to impacts associated with development*. Fauna species are scored based on seven criteria: *local occurrence*, *local population trend*, *continent-wide population trend*, *habitat dependence*, *sensitivity to development*, *area-sensitivity*, and *patch isolation sensitivity*. With the use of this ranking system, communities or species of *regional concern*, ranked L1 to L3, now replace the idea of *rare* communities or species. *Rarity (local occurrence)* is still considered but is now one of many criteria that make up the L-ranks, making it possible to recognize communities or species of regional concern before they have become rare.

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

### **3.1 Landscape Analysis**

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

#### **Base Mapping**

The first step in evaluating a natural system or an individual *habitat patch* is to interpret and map land cover using aerial photographs. The basic unit for the evaluation at all scales is the habitat patch in the region, which are then combined and evaluated as a system at any scale. A *habitat patch* is a continuous piece of habitat, as determined from aerial photo interpretation. The TRCA maps habitat according to four broad categories: *forest*, *wetland*, *meadow*, and *coastal* (beach, dune, or bluff). At the regional level, the TRCA jurisdiction is made up of thousands of habitat patches. This mapping of habitat patches in broad categories is conducted through remote-sensing and is used in the evaluation of quality, distribution and quantity of natural cover. It should not be confused with the more detailed mapping of vegetation communities obtained through field surveys and that is used to ground-truth the evaluation (see Section 3.2).



## Quality Distribution of Natural Cover

The quality of each habitat patch is evaluated according to three criteria: *size* (the number of ha occupied by the patch), *shape* (edge-to-area ratio), and *matrix influence* (measure of the positive and negative impacts from surrounding land use) (TRCA 2007c). A total score for each patch is obtained through a weighted average of the scores for the three criteria. This total score is used as a measure of the ‘quality’ of a habitat patch and is translated into a local rank (L-rank) ranging from L1 to L5 based on the range of possible total scores from 3 to 15 points. Of these L-ranks, L1 represents the highest quality habitat and L5 the poorest.

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

**Table 1: Habitat patch quality, rank and species response**

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

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

## Quantity

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

## 3.2 Vegetation Community and 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 area north of 5<sup>th</sup> Concession was mostly conducted in 2010 with a 10 ha area covered in 2008 (Table 2). The area south of 5<sup>th</sup> Concession was surveyed in 2011 with data from the 2002 inventory being used to provide additional information.

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 2008 digital ortho-rectified photographs (ortho-photos) to a scale of 1:2000 and then digitized in ArcView. Flora regional species of concern (species ranked L1 to L3) were mapped as point data with approximate number of individuals seen. A list of all other species observed was documented for the site.

The most complete fauna survey of the site was conducted by the TRCA in April and June of 2010, and in April to July of 2011. A 10 ha parcel of land within the study area had been surveyed following the same protocol in April and June of 2008. The spring surveys searched primarily for frog species of regional concern but recorded incidentally the presence of any early-spring nocturnal bird species (owls and American woodcocks). Surveys in June and July were concerned primarily with the mapping of breeding bird species of regional concern. As per the TRCA data collection protocol breeding bird surveys were carried out by visiting all parts of the site at least twice during the breeding season (last week of May to mid-July) to determine the breeding status of each mapped point. The methodology for identifying confirmed and possible breeding birds follows Cadman *et al.* (2007). All initial visits were completed by the end of the third week of June. The field-season is to be organized so that by late June only repeat visits are being conducted. It is imperative that any visit made in the first half of June is subsequently validated by a second visit later in the season. Fauna regional species of concern (species ranked L1 to L3) were mapped as point data with each point representing a possible breeding bird.

**Table 2. Schedule of TRCA biological surveys at the Brock Lands Study Area**

Survey Item	Survey Dates	Survey Effort (hours)
Patch / Landscape	2008 ortho-photos	21 hours
Vegetation Communities and Flora Species	(2002): 19 <sup>th</sup> , 24 <sup>th</sup> to 26 <sup>th</sup> , 30 <sup>th</sup> Sep; 4 <sup>th</sup> Nov.	[25 hours]
	(2008): 16 <sup>th</sup> May, 18 <sup>th</sup> June.	14 hours
	(2010): 6 <sup>th</sup> , 18 <sup>th</sup> , 28 <sup>th</sup> May; 2 <sup>nd</sup> , 3 <sup>rd</sup> , 10 <sup>th</sup> , 18 <sup>th</sup> , 25 <sup>th</sup> June; 27 <sup>th</sup> July; 10 <sup>th</sup> , 13 <sup>th</sup> , 17 <sup>th</sup> , 26 <sup>th</sup> Aug; 7 <sup>th</sup> , 10 <sup>th</sup> , 13 <sup>th</sup> , 17 <sup>th</sup> , 21 <sup>st</sup> , 23 <sup>rd</sup> , 24 <sup>th</sup> , 27 <sup>th</sup> , 29 <sup>th</sup> Sep; 4 <sup>th</sup> , 5 <sup>th</sup> , 7 <sup>th</sup> Oct. 29 <sup>th</sup> Nov. [Reconnaissance].	175 hours + 2 hours [Reconnaissance]
	(2011): 25 <sup>th</sup> , 27 <sup>th</sup> May; 27 <sup>th</sup> June; 27 <sup>th</sup> July, 12 <sup>th</sup> Aug.	[35 hours]



Frogs and Nocturnal Spring Birds	7 <sup>th</sup> and 9 <sup>th</sup> April, 2008. 2 <sup>nd</sup> April, 2010. 4 <sup>th</sup> , 6 <sup>th</sup> and 9 <sup>th</sup> April, 2011.	6.75 hours
Breeding Songbirds	6 <sup>th</sup> and 27 <sup>th</sup> June, 2008. 1 <sup>st</sup> to 3 <sup>rd</sup> and 23 <sup>rd</sup> to 25 <sup>th</sup> June, 2010. 1 <sup>st</sup> and 27 <sup>th</sup> June, 2011.	46.5 hours

## 4.0 Results and Discussion

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

### 4.1 Regional Context

Based on 2007/08 orthophotography, 25% of the land area in the TRCA jurisdiction consists of natural cover but this figure includes meadow and old field. Although historically, the region would have consisted of up to 95% forest cover, currently (i.e. 2007/08) only about 17% is covered by forest and wetland. Of the non-natural cover (i.e. the remaining 75%), 48% is urban and 27% is rural / agricultural.

The regional level analysis of habitat patches shows that the present average patch quality across the TRCA jurisdiction is “fair” (L3); forest and wetland cover is contained largely in the northern half of the TRCA jurisdiction, especially on the Oak Ridges Moraine; and the quantity is 16.7% of the surface area of the jurisdiction (Map 3). In addition, meadow cover stands at 8.1% 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.

### 4.2 Habitat Patch Findings for Brock Lands

The following details the study area according to the two natural system indicators used in designing the Terrestrial Natural Heritage System Strategy: the *quality distribution* and *quantity* of natural cover. Analysis was based on 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 Brock Lands study area consists of a complex mosaic of cedar-dominated forest habitat and open meadow habitat interspersed with fen-like wetlands and ponds, a very much modified landscape resulting from a recent history of changing land-uses. The largest forest patch is 107 ha and as such scores “good” for patch size but a large portion of this patch extends into the neighbouring Greenwood Conservation Area. The other forest patches are somewhat smaller achieving scores of “fair” and “poor”. The most extensive meadow habitat patch covers 99 ha, but this is abutted by old agricultural fields that are not included in this calculation since this habitat-type is not considered natural cover. Regardless, the main meadow patch scores as “good” for size (Map 5). The two largest forest and meadow habitat patches within the study area are scored “poor” and “very poor” for shape which is not surprising given the convoluted mosaic of habitats within the site.

##### **Habitat Patch Matrix Influence**

Analysis based on the 2007/08 ortho-photos shows that the entire habitat in the study area is ranked as “good” for matrix influence (i.e. scores four out of a possible five points, see Maps 7 and 8). This score is as expected given the rural setting, with a mix of natural and agricultural land-types in the vicinity.

The TRCA measures matrix influence at the landscape level by assigning set values; positive, neutral and negative, to the type of landscape use occurring within 2 km of the subject site. It is important, however, to also understand and consider the matrix influence that occurs at the site and patch level. Such influences include those transferred to an otherwise remote natural habitat patch from a distant urban or suburban development, for example via a trail system.

##### **Habitat Patch Total Score**

The combination of “good” matrix influence on the site, and the mix of “good” to “very poor” for habitat patch size and shape, results in an overall “fair” to “good” or L2/L3 habitat patch quality (Map 9). Note that the highly degraded forest patch in the south-western corner of the lower portion of the study area scores an L2 for total score primarily because this patch is one of very few habitat patches on the site that exhibits an L2 (“good”) shape. 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. In this particular case, any benefits that might result from such a positive shape attribute are negated by the very poor condition of the vegetation communities present (heavily infested with dog-strangling vine (*Cynanchum rossicum*) and European buckthorn (*Rhamnus cathartica*)).



## 4.2.2. Quantity of Natural Cover

The area of the Duffins Creek watershed is approximately 28,654 ha containing 40.7% natural cover (2007/08), including 8,158 ha as forest (28.4%), 3,000 ha as meadow (10.5%) and 505 ha as wetland (1.8%). The Brock Lands are about 437 ha of which 411.8 ha is natural cover (Appendix 1). The natural cover includes 92.4 ha of forest (35.8 ha of which is plantation), 73.4 ha of successional, 96.8 ha of wetland (including 53.7 ha of treed or shrub swamp), 3.8 ha aquatic and 128.1 ha of meadow. A total of 17.3 ha is classified as “dynamic”: open or semi-open habitats maintained by unique conditions such as riparian or wind erosion (e.g. sand barrens). Less than one ha is manicured. Brock Lands contain 3.5% of the total natural cover in the Duffins Creek watershed.

## 4.3 Vegetation Community Findings for Brock Lands

### 4.3.1 Vegetation Community Representation

The Brock Lands have a very wide range of vegetation communities due to its complex topography and land use history. A total of 98 different ELC vegetation community types were described for the site (listed in Appendix 1). There are 36 forest communities (26 natural forest, 10 plantation), 18 successional communities, 31 wetlands, 3 vegetated aquatic (plus 2 non-vegetated aquatic), 5 dynamic communities (including 4 mineral barren types associated with former extraction pits and one riparian bar), and 3 meadows. Two plantations and two barren communities were recorded solely as complexes and/or inclusions within other communities. Communities range in age and origin from native mature forests (some stumps of cedar and white pine were observed with at least 95 growth rings) down to sand barrens and fen-like wetlands that date from the few decades since aggregate extraction and newly-formed meadows on recent fill dumped after the year 2000. In between these extremes are mid-aged post-agricultural communities such as conifer plantations and semi-grown over successional types.

The site has 92.4 ha of forest (including 35.8 ha of plantation), about one-fifth the whole study area. Mature forest follows the major stream valleys: East Duffins Creek and the lower parts of Brougham and Spring Creeks, with a particularly wide piece on the tableland between Spring and Brougham Creeks above their confluence. This forest is contiguous with a large area of conifer plantation extending across the northeast part of the Brock Lands and down into Greenwood Conservation Area. In contrast to many parts of the TRCA jurisdiction, mixed and coniferous forests dominate over deciduous types. There are 47.5 ha of mixed and coniferous forest and just 9.1 ha of deciduous forest. This unusual configuration can be attributed to the presence of light sandy soils on intact tablelands and cool, sheltered ravines with groundwater. Two forest communities: Fresh-Moist White Cedar Coniferous Forest (FOC4-1), Fresh-Moist Hemlock – Sugar Maple Mixed Forest (FOM6-1), and Fresh-Moist White Cedar – Hardwood Mixed Forest (FOM7-2) account for the majority of the natural forest. The drier upper slopes and ridges have a variety of forest types ranging from Dry-Fresh Sugar Maple – Oak Deciduous Forest (FOD5-3) to Dry-Fresh





White Cedar – Paper Birch Mixed Forest (FOM4-A) and Dry-Fresh White Cedar Coniferous Forest (FOC2-2).

Plantation is largely concentrated to the northeast section of the Brock Lands with smaller patches occurring all through the study area. Most of this is conifer plantation with white spruce (*Picea glauca*) (CUP3-C) or blended conifers (CUP3-H). Deciduous plantation, dominated mainly by black locust (*Robinia pseudoacacia*) (CUP1-c), occupies smaller areas of the site and generally tends to be weedy in character with a heavy component of invasive exotic species in the understory.

Eighteen types of successional semi-woody habitat cover 73.4 ha (~18 % of the natural cover). These are scattered across the site, occupying formerly agricultural lands and areas disturbed by aggregate extraction that are neither wet enough for wetlands nor sandy enough for sand barrens. Native Deciduous Successional Savannah (CUS1-A1) and Native Deciduous Successional Woodland (CUW1-A3) occupy the largest area.

Brock Lands also have a very large area of meadow, totalling 128.1 ha (31% of total natural cover). Big patches of meadow cover recently abandoned agricultural fields in the north and west of the site as well as areas of deposited fill, largely associated with the former Brock North Landfill (south-central part of the site, just north of 5<sup>th</sup> concession). Native Forb Meadow (CUM1-A) with a high proportion of native goldenrod (*Solidago altissima*) and aster (*Aster* spp.) predominates, with lesser coverage of Exotic Cool-season Grass Graminoid Meadow (CUM1-b) and Exotic Forb Meadow (CUM1-c). Much of the meadow in the northwest part of the site was temporarily disturbed by ploughing for archaeological investigation in the summer of 2010. The archaeological investigation was part of a study for the Highway 407 extension.

Wetlands are a very prominent feature here. They occupy 96.8 ha, 23.5% of the natural cover at Brock Lands. The wetlands generally fit four different categories: mature conifer and mixed swamp on undisturbed headwaters and bottomlands; younger deciduous and thicket swamps in richer disturbed areas; calcareous fen-like seepage areas associated with the former extraction pits; and marshes associated with more saturated or inundated parts of the former extraction pits (and beaver ponds along the watercourses). There are also aquatic habitats in several ponds and streams.

There are about 35 ha of coniferous and mixed swamp, largely dominated by cedar, especially White Cedar – Hardwood Mineral Mixed Swamp (SWM1-1) and White Cedar – Hardwood Organic Mixed Swamp (SWM4-1). Mineral soils are somewhat more prevalent than organic in these headwater swamps. An additional 18.3 ha is deciduous or shrub thicket swamp, mostly Willow Mineral Thicket Swamp (SWT2-2), Willow Mineral Deciduous Swamp (SWD4-1), and Paper Birch – Poplar Mineral Deciduous Swamp (SWD4-3).

The fen-like communities are among the most interesting at Brock Lands. They cover more than 22 ha. They have grown up in former extraction areas where ground water has been intercepted and include Willow Shrub Mineral Fen (FES2-A), White Cedar Low Treed Mineral Fen (FET2-A),



White Cedar – Scots Pine Low Treed Mineral Fen (FET2-B), and Mineral Fen Meadow Marsh (MAM5-1). These seeps support a large number of flora species of conservation concern. Unlike a classic fen, the substrate is mineral soil (often residual sand and gravel) instead of peat. Marl deposits are often visible. Given time, the fen communities may develop into conifer swamps.

Marshes (16 types) cover 24 ha and aquatic habitats cover 3.8 ha. The most abundant marsh types are Hybrid Cattail Mineral Shallow Marsh (MAS2-1b) and Common Reed Mineral Shallow Marsh (MAS2-a). Horsetail Mineral Meadow Marsh (MAM2-7) is transitional toward fen communities and may be included with them. There are also communities dominated by invasive species: Reed Canary Grass and Common Reed Mineral Meadow and Shallow Marshes (MAM2-2, MAM2-a, MAS2-a, and MAS2-d) and Purple Loosestrife Mineral Meadow Marsh (MAM2-b).

Large portions of the aquatic habitat are unvegetated, for example, flowing streams. Some ponds have Pondweed Shallow Aquatic (SAS1-1), Stonewort Submerged Shallow Aquatic (SAS1-3), and Coon-tail Submerged Shallow Aquatic (SAS1-A). The deeper pond near the centre of the site that had been used for processing aggregates is still Turbid Open Aquatic (OAO1-T) many years after operations ceased.

Another feature of the old aggregate pits is the communities having harsh dry conditions that maintain an open character. There are 16.9 ha of Sand Barren (SBO1-A, SBO1-B, and SBT1) at Brock Lands, one part of which has a complex of more clayey soils (CBO1). These areas also support some flora species of conservation concern.

Regarding various kinds of disturbance in the various vegetation communities, exotic species are most prominent on richer, finer-textured soils in the successional and meadow areas, with some of the marshes also heavily affected. The fen and barren systems actually are the result of major disturbance but also have more limiting ecological conditions so are mildly to moderately affected by exotic species. The more mature mixed forests and swamps are relatively free of exotics. The plantations and forests on the northeast side of the Brock Lands have a moderate to sometimes heavy traffic of hikers and mountain bikes, with some exotic invasion along the trails in the plantations.

#### **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 regional concern in the jurisdiction while L4 communities are considered of concern in the urban portion of the jurisdiction. The Brock Lands lie within the rural landscape and so L1 to L3 communities are of conservation concern. On the other hand, community ranks do not take into account the intactness or quality of individual examples of communities; thus, a common type of vegetation community may be of conservation concern at a particular site because of its age, intact native ground layer, or other considerations aside from rank. This is clearly the case for the forest communities at Brock Lands, most of which have a rank of L4 but are high-quality examples of their types.





Twenty-two communities at the Brock Lands are ranked L1 to L3 (14 wetland types and 4 barren types plus an unusual Fresh-Moist Cottonwood Successional Woodland CUW1-A4) (communities are listed with ranks in Appendix 1; location and boundaries shown on Map 10). The communities of regional conservation concern (L1 to L3) occupy 60.3 ha, 15% of the total natural cover. An additional 35 communities (15 forest, 6 successional, 10 wetland, 3 aquatic and 1 riparian bar) are ranked L4.

The forest communities are of conservation concern (regardless of L-rank) at Brock Lands because of their extent, mature age, and intact native-dominated ground layer. The ground layer includes a good representation of sedges, ferns, and spring ephemerals. This is especially true of the forests along the Brougham Creek ravine and associated tablelands. The semi-closed Fresh-Moist Cottonwood Successional Woodland (CUW1-A4), which is transitional to forest, occurs on moist sand in one of the former gravel pit storage and windrow areas. This community (ranked L3) is unusual because it resembles the coastal cottonwood communities on Toronto Island, which are mostly unique to Lake Ontario shoreline areas.

The four mineral fen communities: Willow Shrub Mineral Fen (FES2-A), White Cedar Low Treed Mineral Fen (FET2-A), White Cedar – Scots Pine Low Treed Mineral Fen (FET2-B), and Mineral Fen Meadow Marsh (MAM5-1), as well as the similar Horsetail Mineral Meadow Marsh (MAM2-7) are all ranked L2 or L3. In fact, the first three communities are new ELC designations for the TRCA jurisdiction. Five swamps: White Cedar – Conifer Mineral Coniferous Swamp (SWC1-2), White Cedar Organic Coniferous Swamp (SWC3-1), Birch – Conifer Mineral Mixed Swamp (SWM3-1), White Cedar – Hardwood Organic Mixed Swamp (SWM4-1), and Red Maple Mineral Deciduous Swamp (SWD3-1) are ranked L3. Three marshes also are ranked L2 or L3: Horsetail Mineral Shallow Marsh (MAS2-C), Broad-leaved Cattail Organic Shallow Marsh (MAS3-1A), and Forb Organic Shallow Marsh (MAS3-10).

The four barren-type communities are of regional conservation concern: Open Clay Barren (CBO1), Dry Dropseed Sand Barren (SBO1-A), Dry-Fresh Flat-stemmed Bluegrass – Forb Sand Barren (SBO1-B), and Treed Sand Barren (SBT1). The Open Clay Barren occurs as a complex within a larger Treed Sand Barren community in the south-central part of the Brock Lands (the area that had been designated as a landfill site in the 1980s). The largest sand barrens are concentrated to the areas south of 5<sup>th</sup> Concession along the eastern edge of the site boundary.

## **4.4 Flora Findings for Brock Lands**

### **4.4.1 Flora Species Representation**

Floristic surveys conducted throughout Brock Lands in 2002, 2008, 2010 and 2011 identified a total of 579 species of vascular plants (Appendix 2). These included 569 naturally-occurring species and 10 planted species. Of the non-planted species, 354 are native (62%). The high biodiversity of this site (comparable to other sites of similar size in high-quality rural parts of the TRCA jurisdiction) is due to the presence of so many different types of vegetation community, soil



types, and age. In particular, younger, low-nutrient barren and fen communities in old aggregate pits support a different suite of species from those of mature forest and swamp. More fertile yet disturbed post-agricultural habitats have lower species richness (although they have a different composition) and more exotics. The conifer plantations also tend to have lower species richness. However, these plantings can create conditions favourable for certain native species, e.g. through the production of a slow-to-decay duff layer.

#### 4.4.2 Flora Species of Concern

There are 109 vascular plant species of regional conservation concern (rank L1 to L3) at Brock Lands. 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 2010). In most cases, the species are not currently rare but are at risk of long-term decline due to the other criteria.

Twenty-one 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). Many of them rank as provincially-uncommon (provincial rank S4). Some examples of regionally-rare plants at Brock Lands include cuckoo-flower (*Cardamine pratensis* var. *palustris*), larger yellow lady's slipper (*Cypripedium parviflorum* var. *pubescens* [syn. *C. calceolus* var. *pubescens*]), rock polypody (*Polypodium virginianum*), small beggar's-ticks (*Bidens discoideus*), smooth sweet-cicely (*Osmorhiza longistylis*), twig-rush (*Cladium mariscoides*), white beak-rush (*Rhynchospora alba*) and Alpine cotton-grass (*Trichophorum alpinum*). Cuckoo-flower is known in the TRCA jurisdiction only from the nearby Greenwood Conservation Area and Lake St. George on the Oak Ridges Moraine. The TRCA's only other records of small beggar's-ticks are at Frenchman's Bay, Oak Ridges Moraine Corridor Park, and Caledon Tract Wetland. The discovery of Alpine cotton-grass at the Brock Lands marks the first record for the TRCA jurisdiction. This species is a native obligate wetland species often associated with sandy/peaty clearings and fen-type habitats.

All of the flora species of concern (with the possible exception of an unusual hybrid horsetail, *Equisetum x mackaii*) 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 (those associated with fens, seepage swamps or cool mixed to coniferous forests on north-facing slopes) are vulnerable to hydrological changes. A few examples include tamarack (*Larix laricina*), Richardson's rush (*Juncus alpinoarticulatus*), oak fern (*Gymnocarpium dryopteris*), mitrewort (*Mitella diphylla*), and golden ragwort (*Packera aurea* [syn. *Senecio aureus*]). Nutrient inputs from agriculture or fill dumping also can affect the fens and marshes; invasive species such as common reed (*Phragmites australis*) are taking hold in some of the wetlands, especially those with deeper water; common reed is displacing some of the smaller and more sensitive wetland species. This is an ongoing risk given that further dumping of fill with its attendant silt-laden runoff is likely to occur.

Species of successional and barren areas such as pearly everlasting (*Anaphalis margaritacea*) or foxglove beard-tongue (*Penstemon digitalis*) and of open fenlike transitional areas such as slender



gerardia (*Agalinis tenuifolia*) inhabit places that could readily be overtaken by more competitive invasive species, especially if there are no factors active to maintain an open character to the habitat. Forest ground layer species could also be vulnerable to invasive species such as dog-strangling vine (*Cynanchum rossicum*) and garlic mustard (*Alliaria petiolata*) if these can disperse along disturbance corridors such as trails.

Increased human traffic into a natural area results in disturbance caused by trampling and the incursion of invasive species that compete with the existing native flora. The heaviest trampling (due to pedestrian and bike trails) is along the north-eastern part of the Brock Lands which are contiguous with the more highly-used Greenwood Conservation Area. The mature forest along the ravines of Spring and Brougham Creeks and associated tableland have sensitive forest floor species such as oak fern (*Gymnocarpium dryopteris*), broad-leaved spring beauty (*Claytonia caroliniana*), and wood anemone (*Anemone quinquefolia*).

Some species may be deliberately removed if they are seen: the lady's slippers (*Cypripedium* spp.) and to some extent Michigan lily (*Lilium michiganense*) and several of the fern species are prized for gardens. Wild collection is certainly a serious conservation problem for showy native orchids. There was evidence of wild-collection of cedar (*Thuja occidentalis*) saplings, presumably for cedar hedges, but it is not clear whether the removal rate exceeds the regeneration rate at Brock Lands. Cedar is an L4 species with a high regeneration capacity on open, moist, disturbed calcareous soils. Nonetheless, harvest of cedar may handicap its regeneration in favour of the mildly invasive Scots pine (*Pinus sylvestris*).

Habitat fragmentation can lead to increased populations of herbivores such as white-tailed deer (*Odocoileus virginianus*); deer have had significant impacts in the nearby Rouge Park. Evidence of deer browse was observed during field work at the Brock Lands, but seems not yet to have attained severe levels.

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 2010). They will not readily recover when these habitats are lost or altered. Brock Lands have habitat specialists corresponding to all of its main habitat types. Some examples of forest species of the drier sandier communities include Back's sedge (*Carex backii*) and black-fruited mountain-rice (*Oryzopsis racemosa*), while the moister, richer forests have ferns such as maidenhair fern (*Adiantum pedatum*); as well as sedges such as white bear sedge (*Carex albursina*) and plantain-leaved sedge (*Carex plantaginea*). Bearded shorthusk (*Brachyelytrum erectum*) is one of several woodland grasses. Several spring ephemerals occur in parts of the forested areas, including broad-leaved spring beauty and squirrel-corn (*Dicentra canadensis*). There are also the two myco-heterotrophs pinesap (*Monotropa hypopithys*) and Indian pipe (*M. uniflora*). (The term means that they 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).



Mature swamp areas support cuckoo-flower, thicket horsetail (*Equisetum pratense*), golden saxifrage (*Chrysosplenium americanum*), wood reed (*Cinna latifolia*), and fen star sedge (*Carex interior*) which, as the name implies, can also occur in the open fen seeps.

The fen habitats in the former aggregate pits have a very distinctive set of species that overlap with those of Great Lakes coastal fens. These include variegated scouring-rush (*Equisetum variegatum*), Richardson's rush, slender gerardia (*Agalinis tenuifolia*), nodding ladies' tresses (*Spiranthes cernua*), yellow and greenish sedges (*Carex flava* and *C. viridula*), Alpin cotton-grass (*Trichophorum alpinum*), white beak-rush (*Rhynchospora alba*), twig-rush (*Cladium mariscoides*) and Lindheimer's panic grass (*Panicum acuminatum* var. *lindheimeri*). There is also regeneration of tamarack (*Larix laricina*). Bottle gentian (*Gentiana andrewsii*) grows in areas transitional between fen and meadow.

Marshes and aquatic habitats include two-parted umbrella-sedge (*Cyperus bipartitus*), star duckweed (*Lemna trisulca*), and bushy naiad (*Najas flexilis*).

The sand barrens also have a suite of species associated with them, for example: sand dropseed (*Sporobolus cryptandrus*), narrow-leaved panic grass (*Panicum linearifolium*), red-seeded sedge (*Carex tonsa* var. *rugosperma*), and hoary vervain (*Verbena stricta*).

Finally, such plants as the hawthorns (*Crataegus* spp.) and foxglove beard-tongue are most characteristic of meadow and successional habitats.

## **Invasive Species**

With a few exceptions, invasive species have not taken over large areas of the Brock Lands. The greatest threat to upland habitats would be dog-strangling vine. This occurs in successional areas in the northwest, central and southern parts of Brock Lands; as well as in patches in the plantations on the east side. This plant is a formidable threat (TRCA 2008). If it follows the trajectory it has taken in Rouge Park and the Seaton Trail / Whitevale Corridor along West Duffins Creek, it will likely become the dominant ground layer species in most upland habitats except for mature forests. Biological control is the best long-term hope for dealing with it.

Another strangling type of vine present at Brock Lands is Asiatic bittersweet (*Celastrus orbiculatus*). There is a large colony of this woody vine, originally planted and currently localized, at the Pickering Museum. Asiatic bittersweet shares many similarities with its native counterpart, American bittersweet (*Celastrus scandens*) which is also present at Brock Lands. The potential for genetic-diversity loss is high as the Asiatic bittersweet can easily out-compete the American bittersweet for resources.

Garlic mustard at Brock Lands appears to be occurring in those communities that are successional and/or disturbed in nature. There is also a small localized patch within a swamp in the northwest section of the site where the water table has been lowered. It is often found in association with exotic community types (i.e. Black Locust Deciduous and Mixed Plantations,



CUP1-c and CUP2-b). It is likely to spread along trail systems. At present, infiltration of this species into the healthier sections of the site is minimal.

Scots pine is vigorously regenerating in the better-drained fen and adjacent aggregate pit habitats throughout the site. The main threat from this tree is that it could shade out sun-loving fen specialists negatively altering the community structure.

Common reed is probably the main threat to the fen and marsh habitats. There are a number of areas now dominated by monotypic stands of common reed, especially along the watercourse and ponds in the south-central part of Brock Lands, and in a few openings along Brougham Creek. Hybrid cattail (*Typha x glauca*) is even more dominant along the disturbed watercourse in the south-centre part of Brock Lands.

## **4.5 Fauna Species Findings for Brock Lands**

### **4.5.1 Fauna Species Representation**

The TRCA fauna surveys at the Brock Lands in 2010 and 2011, documented a total of 83 bird species, 13 mammals, and 10 herpetofauna species, bringing the total number of possible breeding vertebrate fauna species identified by the TRCA to 106. Two additional bird species (scarlet tanager, *Piranga olivacea*, and eastern screech-owl, *Megascops asio*), can be added from the less extensive survey conducted in 2008, giving an overall total of 108 species. This total is similar to if not higher than several other of the larger rural sites within the TRCA jurisdiction, for example, the 2002 survey of the neighbouring Greenwood Conservation Area reported a total of 89 terrestrial 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 concern if they rank L1 to L3 based on their scores for the seven criteria mentioned in Section 3.2. Since the subject site is situated within the rural zone this report does not consider in detail those species ranked as L4, i.e. those species that are of concern in urban landscapes. As with flora, this is a proactive, preventive approach, identifying where conservation efforts need to be made before a species becomes rare.

Fauna surveys at the Brock Lands reported 29 bird species of regional concern (L1 to L3), including 5 L2 bird species: ruffed grouse (*Bonasa umbellus*), broad-winged hawk (*Buteo platypterus*), black-and-white warbler (*Mniotilta varia*), blue-winged warbler (*Vermivora pinus*) and grasshopper sparrow (*Ammodramus savannarum*). In addition, there was one mammal species of regional concern (meadow jumping mouse, *Zapus hudsonius*), and 7 herpetofauna of regional concern including the L2 ranked wood frog (*Rana sylvatica*), spring peeper (*Pseudacris crucifer*), grey treefrog (*Hyla versicolor*), and common snapping turtle (*Chelydra serpentina*), bringing the





total to 37 fauna species of regional concern. Locations of these breeding fauna are depicted on Map 13. Two of the species of concern documented at Brock Lands are listed on the provincial Species at Risk list. Common snapping turtle is listed as special concern by the province, while bobolink (*Dolichonyx oryzivorus*) is listed as threatened and is therefore afforded protection under Ontario's Endangered Species Act (2007).

**Local occurrence** is one of seven scoring criteria for fauna species and is based on TRCA data and information from the Natural Heritage Information Centre (NHIC) of the Ontario Ministry of Natural Resources (OMNR) (NHIC 2008). Using local occurrence as a measure of regional rarity, any species that is reported as a probable or confirmed breeder in fewer than 10 of the forty-four 10x10 km UTM grid squares in the TRCA jurisdiction is considered regionally rare (i.e. scores three to five points for this criterion) (TRCA, 2010).

At the Brock Lands there are nine species that are considered regionally rare; three of these rarities are birds that nest near to or on the ground in meadow and shrubby habitat (blue-winged warbler, grasshopper sparrow and clay-coloured sparrow, *Spizella pallida*). Of the other six species, common raven (*Corvus corax*) is a recent and ongoing colonist having re-appeared in the region over the past decade; it is possible this is a result of the species' continental population rebounding from the effects of pesticides banned in the 1970s. Hooded merganser (*Lophodytes cucullatus*) is a species whose numbers appear to be on the rise regionally, in response to the provision of nest boxes in suitable wetland locations. Yellow-rumped warbler (*Dendroica coronata*) is a species which appears to be responding well to the maturing of conifer plantations; and broad-winged hawk was observed hunting over the southern section of the site but may in fact be associated with the more extensive forest in the neighbouring Greenwood Conservation Area. Finally, both meadow jumping mouse and red-bellied snake (*Storeria occipitomaculata*) are likely somewhat under-reported across the region, but nevertheless the latter can certainly be said to have disappeared from the more urbanized portion of the region unlike the similar Dekay's brownsnake (*Storeria dekayi*) which is maintaining small populations within the urban landscape.

**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 Brock Lands all but one of the 37 species that are ranked L1 to L3 receive this score and are therefore considered sensitive to one or more of the impacts associated with development (Map 8). Nine of these species (five birds and four herp species) are ranked L2 and their presence is certainly significant, especially since two of the species, black-and-white warbler and blue-winged warbler, held nine and eight territories respectively suggesting that these species are very well-established.

Both black-and-white warbler and blue-winged warbler are ground-nesting birds and as such are highly susceptible to ground-borne disturbance, e.g. off-leash dog-walking. For black-and-white warbler the high total number of territories documented in 2010 (this species was only reported on the site north of 5<sup>th</sup> Concession) corresponds well with the number of territories documented in 2002 on the neighbouring Greenwood Conservation Area, and this same correspondence is maintained with other ground-nesting species such as veery (*Catharus fuscescens*), Nashville warbler (*Vermivora ruficapilla*) and ovenbird (*Seiurus aurocapillus*). For blue-winged warbler, six of the eight territories were located in the south-west corner of the southern section of the site, at the edge of an otherwise very degraded patch of forest; this species is generally associated with drier early successional habitats whereas black-and-white warbler is associated with more moist mature forest habitats.

Ground-nesting birds are highly susceptible both to increased predation from ground-foraging predators that are subsidized by local residences (house cats, raccoons) and to repeated flushing from the nest (by pedestrians, off-trail bikers and dogs) resulting in abandonment and failed breeding attempts. These same disturbances also have considerable impact on wood frogs and spring peeper in their upland summer-foraging and over-wintering habitat.

Currently, disturbance at both the northern and southern sections of the Brock Lands seems to be somewhat intermittent, and although people are trespassing with dogs and dirt-bikes, the level of disturbance is restricted to a small number of individuals which perhaps explains why, at least for the section north of 5<sup>th</sup> Concession, such a high number of ground-nesting birds are able to maintain territories on the site. If such disturbance increases as the site becomes more accessible to the general public then it is highly likely that the numbers of sensitive ground-nesting fauna will decrease.

Higher ranked species are persisting at this site because the landscape is still largely rural. However, 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. It will be of considerable interest over the next few years to monitor the status of highly sensitive ground-nesting birds (both in the forest and in the more open habitats) and terrestrial fauna such as wood frog and common snapping turtle. This could be done by adding the Brock Lands to a network of fixed monitoring plots to assess the



impacts of the planned Seaton urban area. The documentation of such high numbers of these species especially on the northern section of the Brock Lands attests to the site's quality and the current relatively low level of disturbance.

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, and certainly several of the sensitive bird species at the Brock Lands have such specific requirements (e.g. eastern towhee, *Pipilo erythrophthalmus*; winter wren, *Troglodytes troglodytes*; and white-throated sparrow, *Zonotrichia albicollis*; – species that are dependent on thick, tangled forest understorey). Similarly, clearing of forest understorey to accommodate trails will displace such sensitive species.

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

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

Twenty-four of the fauna species of regional concern that were identified at the Brock Lands are considered area sensitive, including nine species that require at least 20 ha of habitat. Many of these species are forest species and as such are well-accommodated by the largest patch of forest on the site which extends into the neighbouring Greenwood Conservation Area (a total patch size of 107 ha). Likewise, the two area sensitive meadow-species – bobolink and northern harrier (*Circus cyaneus*) – are provided with plenty of open-habitat to satisfy their requirements.

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. Many of the ground-nesting bird species which are so well-represented on the northern section of the Brock Lands benefit considerably from the extent of their potential nesting habitats on the site, ensuring that despite





some degree of disturbance from the small number of visitors and dogs there are currently likely enough successful nestings that populations of these species are maintained on site.

One area sensitive species in particular, ruffed grouse, was reported from the site as an incidental record by TRCA staff in 2000 and was confirmed as breeding on the section to the south of the 5<sup>th</sup> Concession in 2002 (three family groups). The species was not encountered during the nesting season in 2008 or 2010, but three birds (apparently young of the year) were flushed from the south-east corner of the study area in 2011. Much of the forest habitat where the species was reported in 2002 (the south-west corner of the southern section of the site) is now heavily infested with dog-strangling vine and European buckthorn. It is possible that dense infestations of dog-strangling vine may have some impact on such ground-nesting species. Any urbanizing site that currently accommodates ruffed grouse is of particular interest since this species, together with other ground-nesting species, have shown a steady decline within the urbanized portion of the region.

Two non-avian species which certainly benefit from the extensive areas of natural cover at the site are spring peeper and wood frog. These species are considered area sensitive primarily due to their requirement for two distinct habitat elements in order to complete their life-cycles. Both species overwinter in upland forested habitat and then migrate to nearby wetlands in the early spring to breed, returning to forest habitats to forage throughout the summer and fall months. The complex mosaic of wetland and forest habitat, particularly in the northern section of the site, presents excellent opportunities for these two species of regional concern.

**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.

Nine of the species of regional concern that occur at the Brock Lands score high for patch isolation sensitivity, and as is fairly typical, all but two of these species are herpetofauna: four frog species, two turtle species and a snake species. The non-herpetofauna species are wild turkey (*Meleagris gallopavo*) and meadow jumping-mouse. The former is highly mobile and susceptible to road-kill, however this species (the subject of a very successful re-introduction program in southern Ontario) appears to be faring very well across the region. The jumping-mouse is also very mobile and therefore a likely road-kill victim, but the species does not undergo the same



seasonal migrations as the herpetofauna species and therefore is not exposed to the same extreme pressures in the spring and fall. All seven of the herpetofaunal species are highly mobile, moving considerable distances across the local landscape to and from breeding and wintering habitats. It is possible that the life-cycle requirements of these species are currently satisfied by habitats available within the site boundaries and as yet there have been no road-kill hotspots identified. However, it is likely, given the mobility of these species, that there is already some dispersal across at least the road that bisects the site – 5<sup>th</sup> Concession – as animals move between wetlands in the northern and southern halves of the site or to neighbouring Greenwood Conservation Area. As traffic volume on this road increases there may be an increase in the number of road-kill incidents for all seven of these 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. Fourteen fauna species that occur in the study area are considered habitat specialists with the majority being forest specialists.

Richness is essentially the presence or absence of species at a site. Beyond mere presence of single species is the idea that a natural system can be considered as a healthy functioning system if there is an association of several species thriving within that system. Each habitat type supports particular species associations. As the quality of the habitat patch improves so will the representation of flora and fauna species within that habitat. In this way representation biodiversity is an excellent measure of the health of a natural system. The presence of a relatively high number of habitat dependent species, in particular, species that are dependent on forest, indicates that the forest habitat in the northern section of the study area is functioning at a particularly high level. The same cannot, however, be said of the southern section, where forest associated species are under-represented despite the presence of fairly extensive forest patches along the southern edge.

Although only two of the fourteen habitat dependent species are identified as meadow specialists (grasshopper sparrow and northern harrier), several other species found throughout the site including species such as bobolink and clay-coloured sparrow are in fact dependent on a wide variety of open-habitats. Another habitat type that is often overlooked in appraisals of the natural cover on a site is successional habitat. Characterized by sparse to dense shrubby vegetation cover, this habitat presents nesting and foraging opportunities to a large number of fauna species, several of which have recently been identified as undergoing long-term provincial and continental declines. As should be expected given the human history of the Brock Lands site, the mosaic of habitats includes a large total area of such transitional habitat. Consequently, the site holds very good populations of species such as brown thrasher (*Toxostoma rufum*) and Nashville warbler, blue-winged warbler and eastern towhee. These latter two species are particularly well-represented in the southern section of the site.



## 5.0 Recommendations

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

### 5.1 Site Highlights

- Located on sandy deposits from Lake Iroquois, with diverse topography and abundant aquifers; several streams including East Duffins, Brougham and Spring Creeks and some minor watercourses cross the Brock Lands
- Extensive modification of landscape due to aggregate extraction from 1950s to 1970s, followed by brief use of southwest portion as a landfill site
- 98 vegetation types observed, ranging from mature undisturbed forest in ravines to mineral fens and sand barrens in old gravel pits
- 22 vegetation communities of conservation concern including treed sand barren (L1) and mineral fen meadow-marsh (L2)
- 36 forest, 18 successional, 31 wetland, 5 aquatic, 5 dynamic, and 3 meadow vegetation types
- 22.6 ha of mineral fen and 16.9 ha of sand barren habitats
- 579 flora species observed of which 109 are species of conservation concern (L1 to L3); flora species of concern were associated especially with fen, wetland, sand barren and forest habitats.
- 21 of the 94 L1 to L3 plant species are also regionally-rare
- Cuckoo-flower (one of three known TRCA populations) and small beggar's ticks observed (one of four known TRCA populations)
- A high total of 108 vertebrate fauna species observed including 37 species of conservation concern
- An especially high density of sensitive ground-nesting avifauna across all habitat types
- Two Species at Risk were observed on the site: common snapping turtle and bobolink

### 5.2 Site Recommendations

#### ***Protect and Maximize Contribution of Brock Lands to Wider Natural System***

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

#### *Optimize Patch Size and Shape, and Patch Interior*

The more that natural cover is retained at the study area and vicinity, the better it can support a healthy level of biodiversity. The Brock Lands site is already well-endowed with natural cover, and recreation or other activities at the site should be directed away from such natural cover as much



as possible. Increasing natural cover through strategic plantings and restoration will improve the patch size and shape, and facilitate in reducing negative matrix influences. The larger a habitat block, the more resilient the associated fauna and flora communities are to developments within the landscape or to increased user pressure.

Of particular significance at Brock Lands are the extensive fen vegetation communities which accommodate several flora species of conservation concern and regional significance. It is important that restoration on the Brock Lands strives to protect the extent of these areas of open fen if such communities are to persist in the TRCA jurisdiction (together with the unique flora and invertebrate species associated with such communities).

- The development of management zones and restoration plans should emphasize protection of existing natural heritage features including the presence and location of vegetation communities, plant or animal species of high conservation rank.

#### *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 disturbance that occurs along the eastern edge of the northern half of the Brock Lands throughout the summer months due to the large number of visitors to the neighbouring Greenwood Conservation Area for recreational activities. This visitor pressure is unlikely to improve in the future and is actually more than likely to increase considerably as local residential developments introduce much larger numbers of visitors both to Greenwood and to the Brock Lands itself.

- Any future trail planning needs to consider the locations of flora and fauna species of concern and to direct visitor pressure away from these areas. Likewise, restoration activities should target non-sensitive areas.
- Installation of board-walks as opposed to typical ground-borne trails should be considered as a means of protecting the sensitive flora and fauna species that occur throughout the various habitat patches on the site.
- The northern section in particular supports high numbers of ground-nesting birds that have shown considerable declines in more urbanized portions of the region. It is important to ensure that any increase in visitor use of the site does not occur at the expense of these sensitive species.
- Dogs should be either excluded from the site or, at the very least; the leash-by-law should be properly enforced.
- The localized population of Asiatic bittersweet at Pickering Museum should be removed. It is also possible that the garlic mustard in the northwest of the Brock Lands may be localized enough for effective control or at least containment. There is also some promise



of biological control through an agent already present in southern Ontario (Yates and Murphy 2008).

- Scots pine should be cut where it is invading and shading fen and barren habitats.
- More abundant invasive species such as dog-strangling vine and common reed should be addressed through controlling sources of disturbance such as erosion (in forest environments), nutrient input, and trampling. Competitive and screening plantings may play a role in containing exotic invasions, and biological control may act in the longer term.
- Long-term monitoring of biodiversity at Brock Lands should be implemented through the establishment of monitoring plots on site (at minimum, a forest vegetation plot, a forest bird plot, and a meadow bird plot); this will help document the effect of the development of the Seaton urban area. The plots would be part of a network of monitoring plots across the Seaton terrestrial natural heritage system.

#### *Improve Connectivity to Nearby Habitat*

The existing corridor of natural cover along East Duffins Creek from the Oak Ridges Moraine to Lake Ontario is impressive. However, roads such as Highway 7 along the north side of Brock Lands and to some extent 5<sup>th</sup> Concession and Sideline 16 are barriers to connectivity. The severity of these barriers will increase as vehicular traffic increases.

- Monitoring for amphibian and reptile crossings over the 5<sup>th</sup> Concession where it bisects the Brock Lands site needs to be conducted so as to fully understand the potential for road-kill hotspots.
- Ensure effective and adequate passage (e.g. tunnels) for amphibians and mammals across or under roads that cross East Duffins, Brougham, and Spring Creeks where appropriate whenever road widening or other construction are planned.
- Further opportunities for improving habitat connectivity along the entire East Duffins corridor should be pursued, including but not limited to ecological restoration and the provision of wildlife connections as mentioned above.

#### *Improve Habitat Quality*

Efforts should be made to at least retain and ideally improve the high quality of existing habitat at Brock Lands, and to ensure that restoration work matches site conditions.

- Where there are existing communities or species of conservation concern, ecological restoration should focus on maintaining conditions that allow these species to thrive and expand. For example, for some of the open habitat, a conservative approach that involves



weeding invasive exotics and occasional prescribed fire would be preferable to activities that involve grading or large-scale tree planting.

- Retain and maintain the areas of mineral fen and sand barren. The mineral fen meadow-marsh, although originating anthropogenically, is an extremely significant habitat, supporting several regionally rare plant species.
- The rich avifauna - with particularly good numbers of ground-nesting species - is in part a result of the large areas of the three main habitat components on the site: forest, meadow and transitional habitats. Maintaining the area's avian diversity will depend largely on the maintenance of all three of these very different habitats. The challenge lies in the latter of these three, a habitat which is constantly succeeding to forest habitat. An investigation should be conducted (e.g. literature search) into how best to manage for such a dynamic habitat type. It is possible that the infertile sites exposed by aggregate operations will become forest cover only very slowly. If this is the case then little management other than the control of invasive plant species will be required.
- Disturbed wetlands that are invaded by common reed and hybrid cattail may be suitable for intensive restoration activities (e.g. preserving cold-water groundwater inputs, excavation and grading, habitat structures) dependant on the presence of sensitive fauna species (e.g. turtles and frogs).
- Areas of recently-deposited fill, especially where the fill is of heavy texture, are also suitable for intensive restoration activities such as large-scale tree plantings and the provision of vernal pools (on impermeable substrates). For example, the northwest corner of the southern half of the site is a location that has and is receiving heavy fill.
- Pine plantations in the northeast part of the Brock Lands should have trail management, invasive control, and careful inter-planting to encourage the growth of a diverse native forest.





## 6.0 References

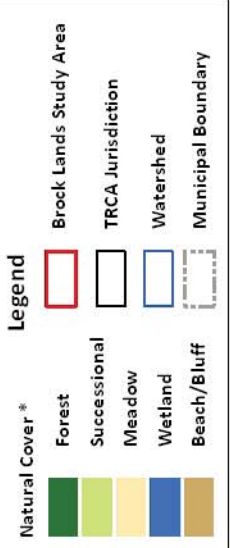
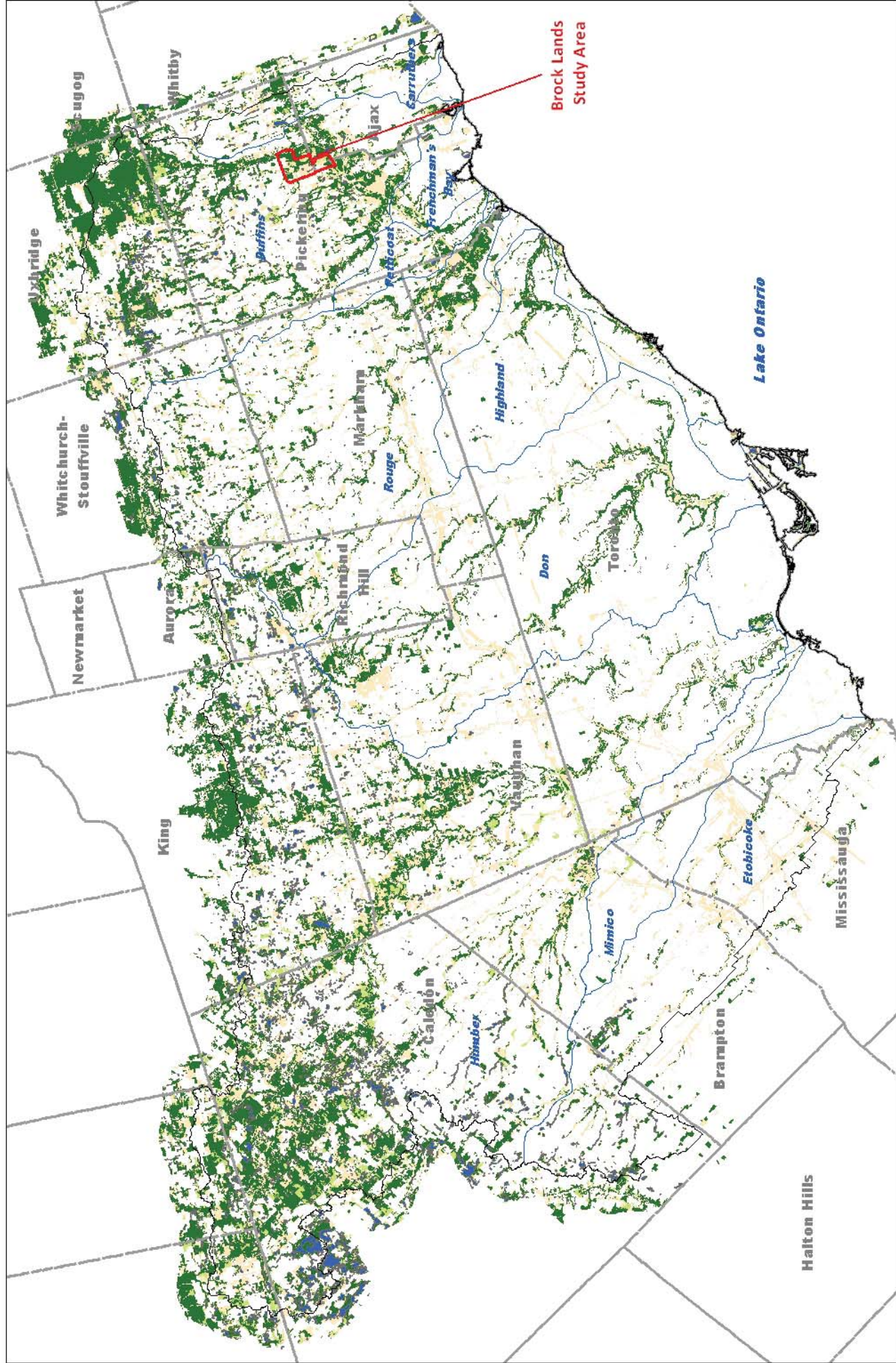
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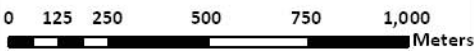
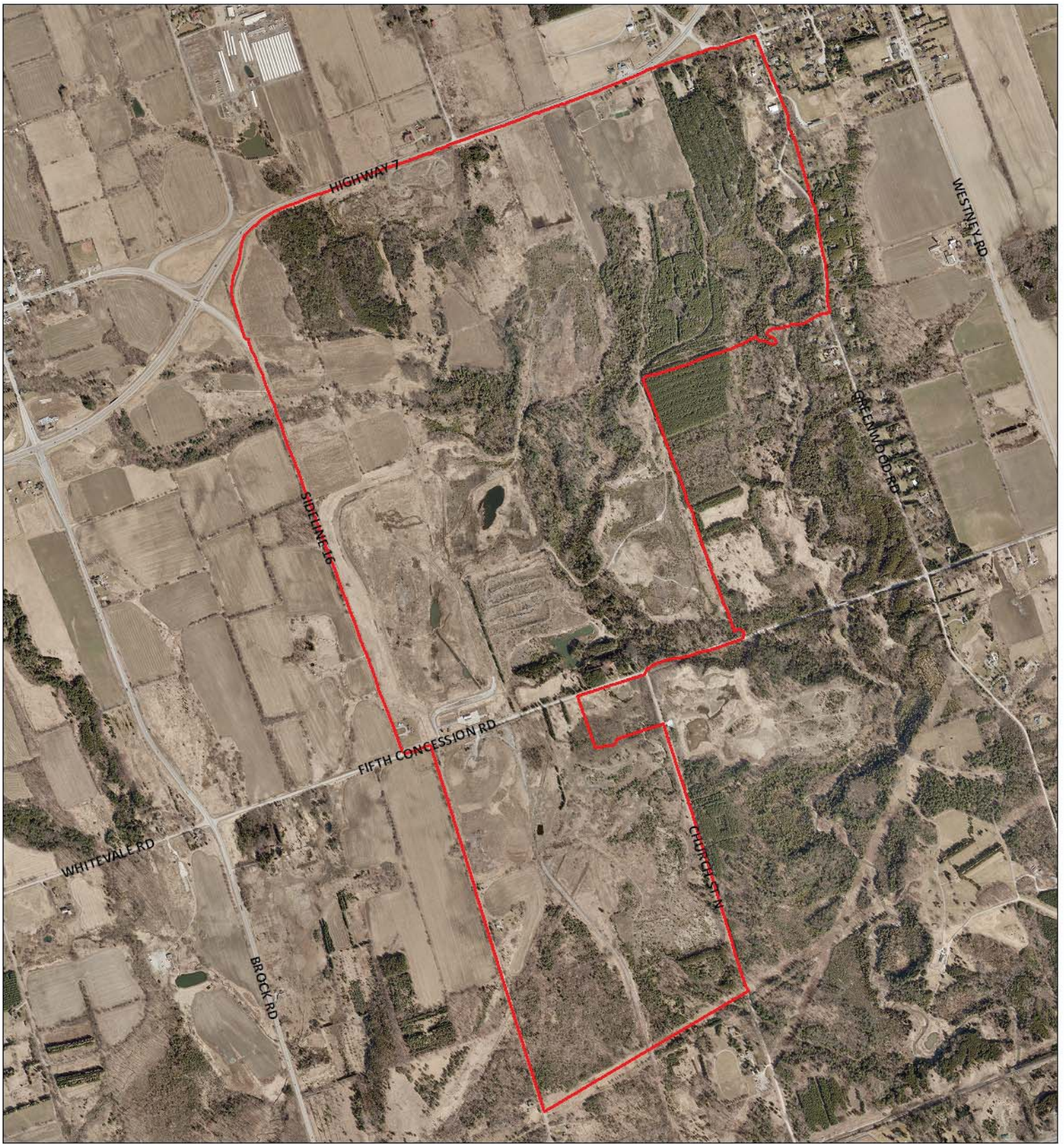


**Map 1:**  
**Brock Lands Study Area**  
**in the Context of Regional Natural Cover**



Date: November 2011  
 \* Landscape analysis based on 2007/2008 Orthophotography





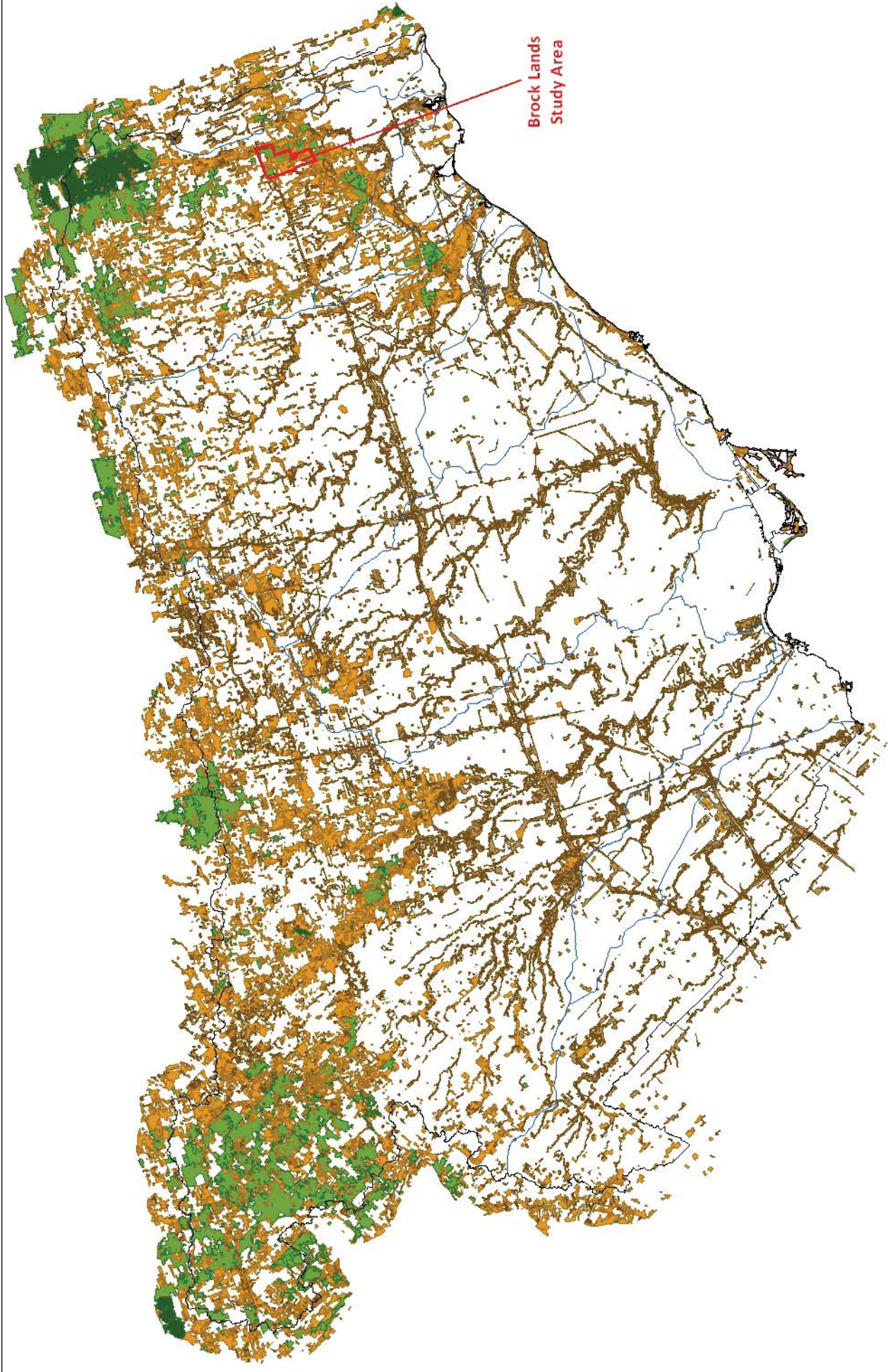
Date: November 2011  
 Orthophoto: Spring 2010, First Base  
 Solutions Inc.

**Map 2:**  
**Brock Lands Study Area**

**Legend**

 Brock Lands Boundary

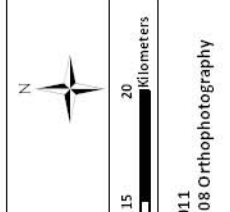




Brock Lands Study Area

**TORONTO AND REGION Conservation for The Living City**

Date: November 2011  
 \* Landscape analysis based on 2007/2008 Orthophotography

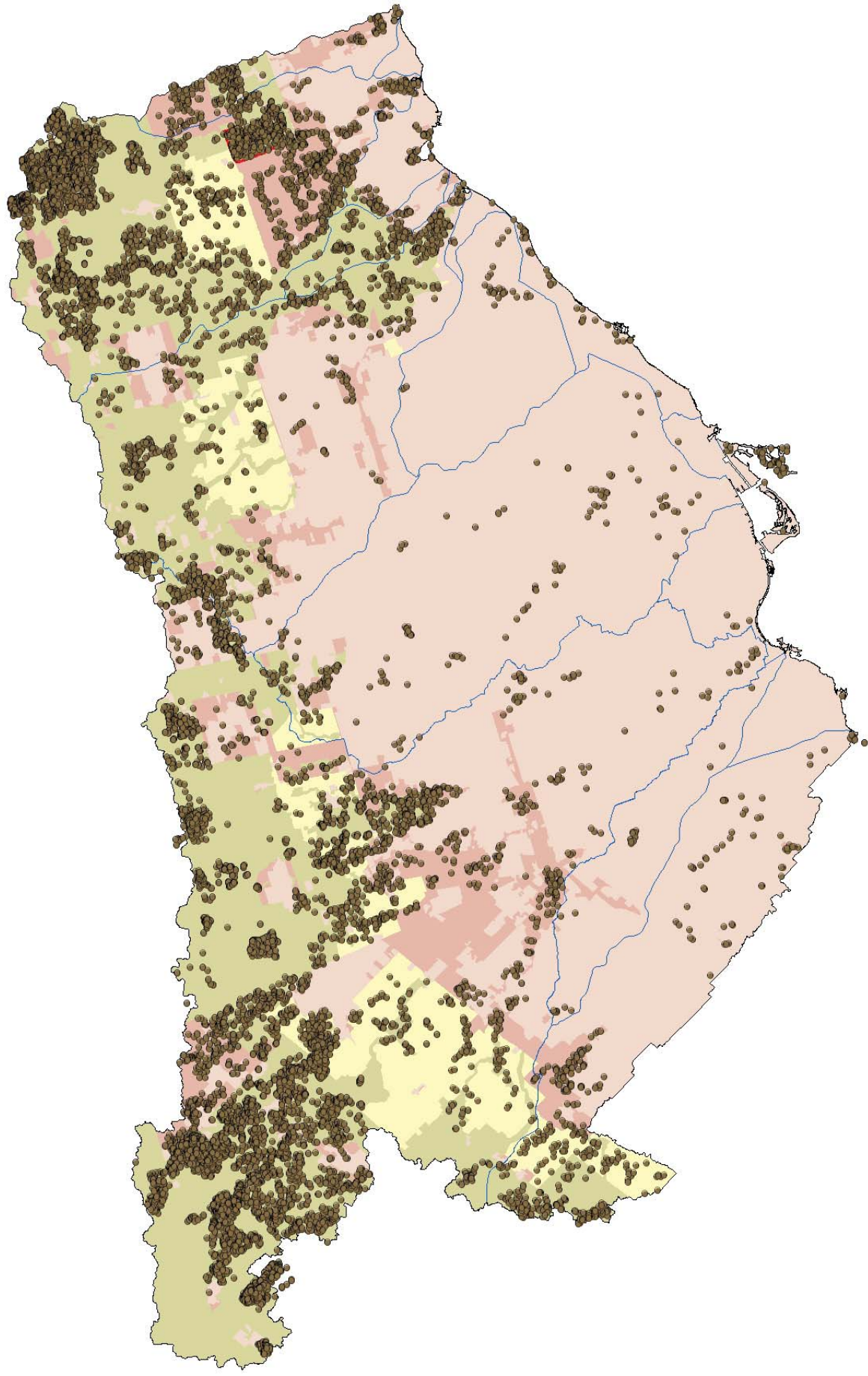



### Map 3: Regional Natural System Habitat Patch Quality



**Legend**

L1 - Excellent	Brock Lands Study Area
L2 - Good	TRCA Jurisdiction
L3 - Fair	Watershed
L4 - Poor	
L5 - Very Poor	






  
 TORONTO AND REGION  
**Conservation**  
 for The Living City


  

  
 Kilometers

Date: November 2011

**Map 4:**  
**Distribution of Fauna**  
**Regional Species of Concern**

**Legend**

● Fauna Species of Concern (L1 - L3)	■ Agricultural & Rural Area
□ Brock Lands Study Area	■ Built-up Area
□ TRCA Jurisdiction	■ Designated Greenfield Area
□ Watershed	■ Greenbelt Area





**Fauna Area Sensitivity Scores**

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

- △ Fauna Species
- Frog Species

**Habitat Patch Size Scores \***

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



0 100 200 400 600 800 Meters

Date: November 2011  
 Orthophoto: Spring 2010, First Base Solutions Inc.  
 \* Landscape analysis based on 20072008 Orthophotography

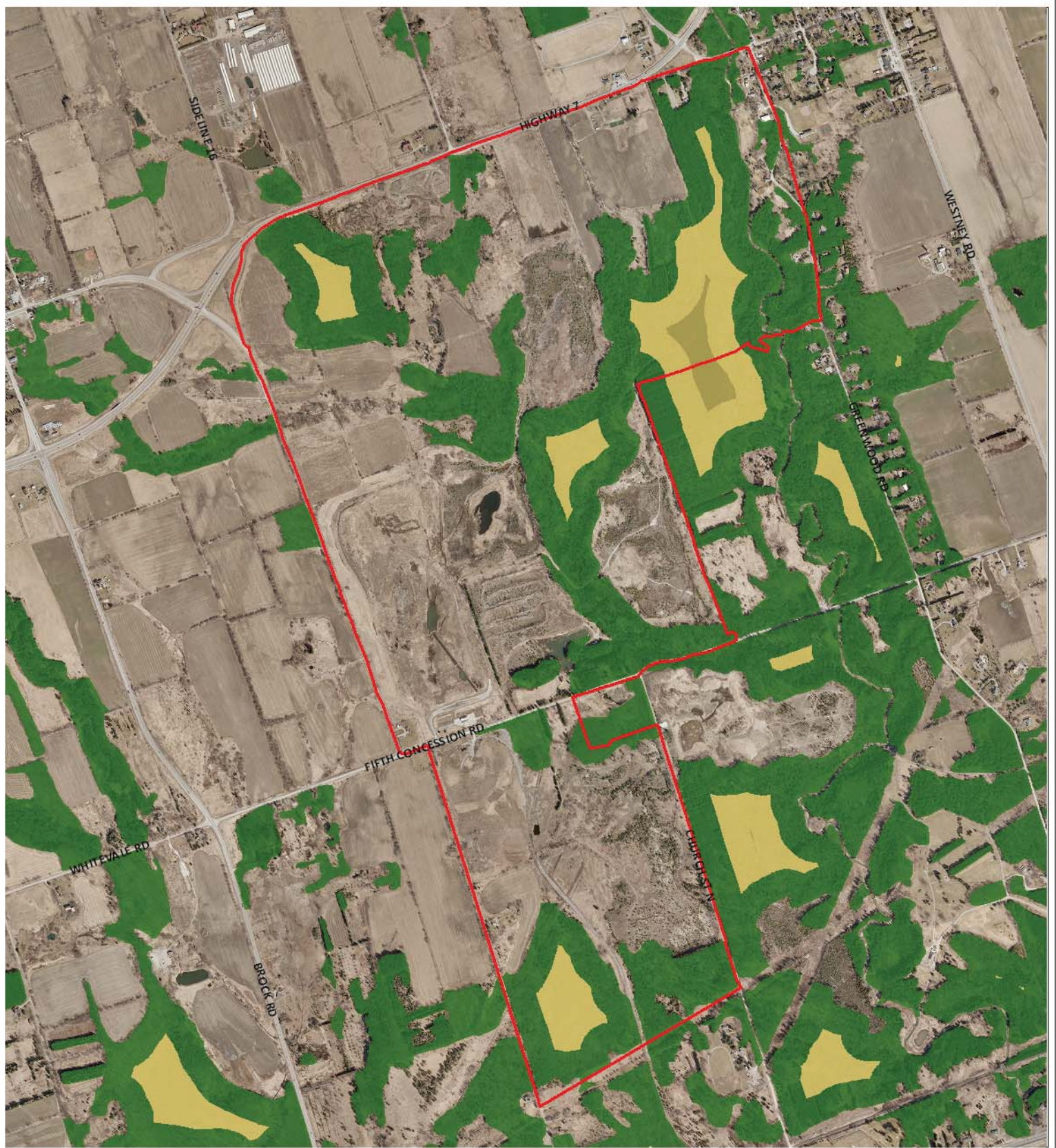
**Map 5:  
 Habitat Patch Size  
 Scores with Fauna Area  
 Sensitivity Scores**

**Legend**

- Brock Lands Study Area

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





0 100 200 400 600 800  
 Meters

Date: October 2011  
 Orthophoto: Spring 2010, First Base Solutions Inc.  
 \* Landscape analysis based on 2007/2008  
 Orthophotography

### Map 6: Interior Forest at Brock Lands

#### Legend

- Brock Lands Study Area
  - Forest
- Forest Interior
- |  |   |
|--|---|
| <span style="display: inline-block; width: 20px; height: 10px; background-color: yellow; margin-right: 5px;"></span> 100m-200m     | <span style="display: inline-block; width: 20px; height: 10px; background-color: lightyellow; margin-right: 5px;"></span> 400m-500m |
| <span style="display: inline-block; width: 20px; height: 10px; background-color: orange; margin-right: 5px;"></span> 200m-300m     | <span style="display: inline-block; width: 20px; height: 10px; background-color: lightgreen; margin-right: 5px;"></span> 500m-600m  |
| <span style="display: inline-block; width: 20px; height: 10px; background-color: lightgreen; margin-right: 5px;"></span> 300m-400m | <span style="display: inline-block; width: 20px; height: 10px; background-color: brown; margin-right: 5px;"></span> 600m-700m       |





**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

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0 100 200 400 600 800  
Meters

Date: November 2011

Orthophoto: Spring 2010, First Base Solutions Inc.

\* Landscape analysis based on 2007/2008 Orthophotography

**Map 7:  
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

□ Brock Lands Study Area





**Fauna Sensitivity to Development Scores**

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

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

- △ Fauna Species
- Frog Species



**Map 8:  
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

□ Brock Lands Study Area





0 100 200 400 600 800  
 Meters

Date: November 2011  
 Orthophoto: Spring 2010, First Base Solutions Inc.  
 \* Landscape analysis based on 2007/2008  
 Orthophotography

### Map 9: Habitat Patch Quality

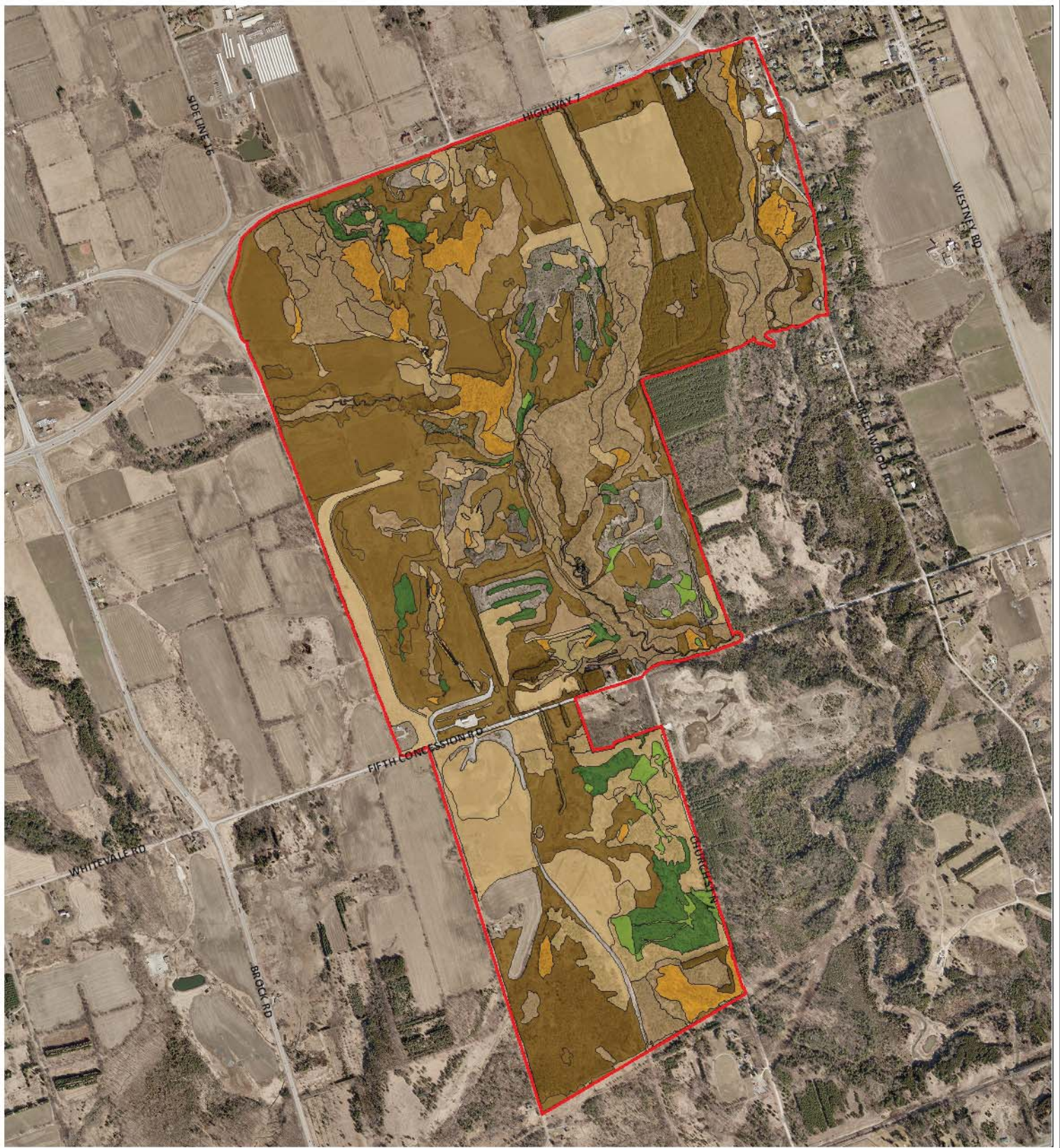
**Legend**

**Habitat Patch Quality \***

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

Brock Lands Study Area





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0 100 200 400 600 800  
 Meters

Date: November 2011  
 Orthophoto: Spring 2010, First Base  
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**Map 10:**  
**Vegetation Communities**  
**with their Associated**  
**Local Ranks**

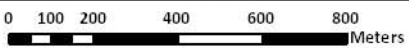
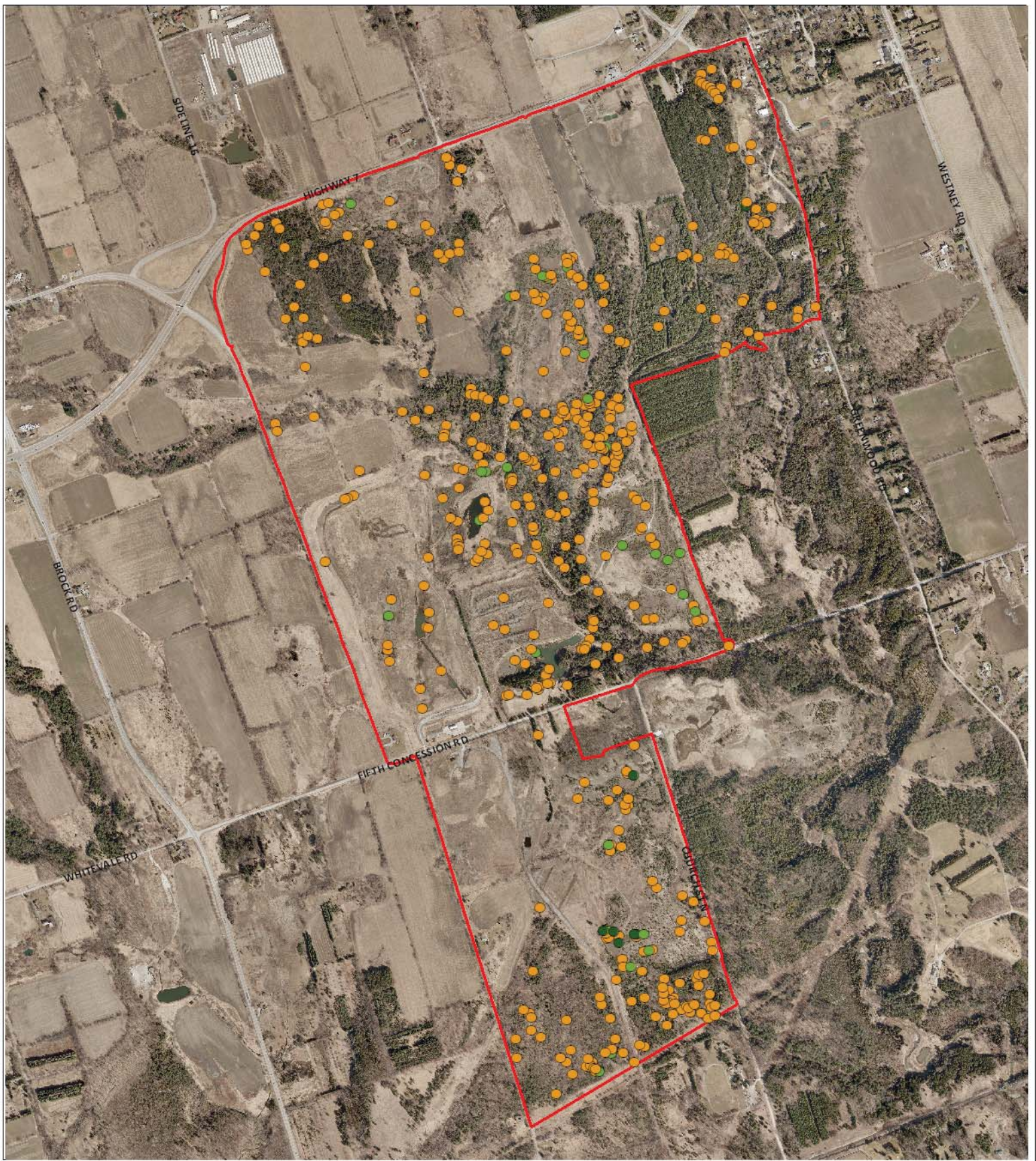
**Legend**

**Vegetation Community Ranks**

	L1		L4
	L2		L5
	L3		L+

 Brock Lands Study Area





Date: November 2011  
 Orthophoto: Spring 2010, First Base  
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### Map 11: Location of Flora Species of Concern

**Legend**

Flora Species of  
 Concern (L1-L4)

- L1 ● L3
- L2

Brock Lands Study Area





**Flora Habitat Dependence Scores**

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

○ Flora Species

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



0 100 200 400 600 800 Meters

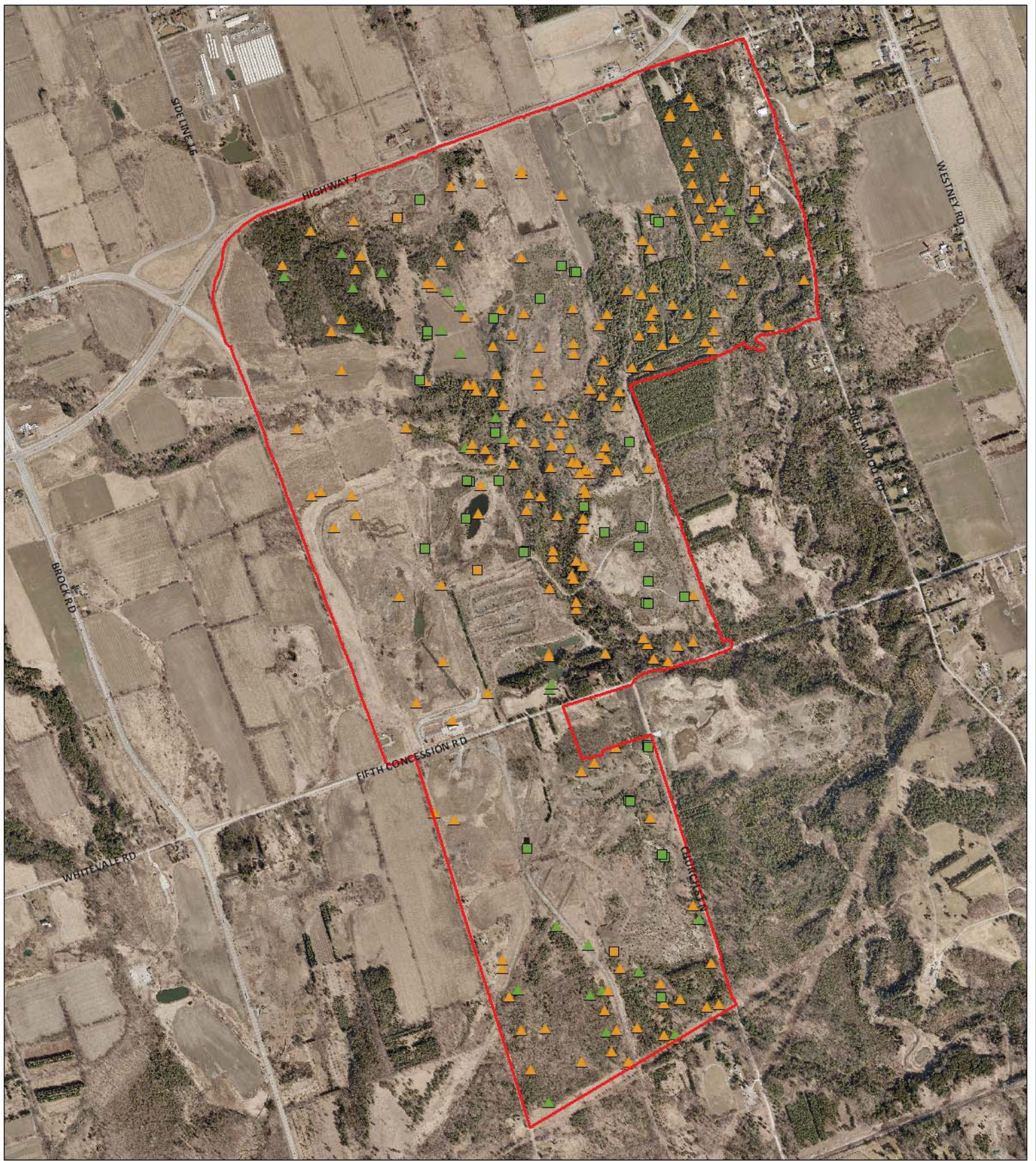
**Map 12:  
Flora Habitat  
Dependence Scores**



Legend

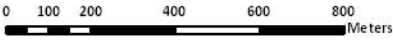
Brock Lands Study Area

Date: November 2011  
Orthophoto: Spring 2010, First Base Solutions Inc.








Date: November 2011  
 Orthophoto: Spring 2010, First Base Solutions Inc.

**Map 13:**  
**Location of Fauna**  
**Species of Concern**

**Legend**

<b>Fauna Species of Concern</b>		<b>Frog Species of Concern</b>	
▲ L1	▲ L3	■ L1	■ L3
▲ L2		■ L2	

 **Brock Lands Study Area**





**Fauna Habitat Dependence Scores**

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

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



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

**Legend**

- Brock Lands Study Area
- △ Fauna Species
- Frog Species



Appendix 1: List of TRCA Vegetation Communities at Brock Lands						
ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2010-04)
			Local Occur.	Geophy. Requir.	Total Score	
<b>Forest</b>						
FOC2-2	Dry-Fresh White Cedar Coniferous Forest	0.5	2.5	2.0	4.5	L4
FOC4-1	Fresh-Moist White Cedar Coniferous Forest	11.3	2.0	2.0	4.0	L4
FOC4-2	Fresh-Moist White Cedar - Hemlock Coniferous Forest	1.0	2.5	2.0	4.5	L4
FOC4-A	Fresh-Moist White Cedar - White Pine Coniferous Forest	0.6	3.0	2.0	5.0	L3
FOM2-1	Dry-Fresh White Pine - Oak Mixed Forest	0.6	3.0	4.0	7.0	L2
FOM2-2	Dry-Fresh White Pine - Sugar Maple Mixed Forest	1.0	2.5	1.0	3.5	L4
FOM2-A	Dry-Fresh White Pine - Hardwood Mixed Forest	2.0	2.5	1.0	3.5	L4
FOM3-2	Dry-Fresh Hemlock - Sugar Maple Mixed Forest	3.0	2.5	2.0	4.5	L4
FOM4-1	Dry-Fresh White Cedar - Paper Birch Mixed Forest	0.9	3.5	1.0	4.5	L4
FOM4-2	Dry-Fresh White Cedar - Poplar Mixed Forest	0.5	3.0	1.0	4.0	L4
FOM4-A	Dry-Fresh White Cedar - Hardwood Mixed Forest	1.9	2.5	1.0	3.5	L4
FOM6-1	Fresh-Moist Sugar Maple - Hemlock Mixed Forest	11.5	1.5	2.0	3.5	L4
FOM7-1	Fresh-Moist White Cedar - Sugar Maple Mixed Forest	3.0	2.5	2.0	4.5	L4
FOM7-2	Fresh-Moist White Cedar - Hardwood Mixed Forest	6.6	1.5	2.0	3.5	L4
FOMA-A	Fresh-Moist White Pine - Sugar Maple Mixed Forest	3.0	3.5	2.0	5.5	L3
FOD3-1	Dry-Fresh Poplar Deciduous Forest	0.2	2.0	2.0	4.0	L4
FOD5-3	Dry-Fresh Sugar Maple - Oak Deciduous Forest	0.6	1.5	2.0	3.5	L4
FOD5-4	Dry-Fresh Sugar Maple - Ironwood Deciduous Forest	0.1	2.5	0.0	2.5	L5
FOD5-7	Dry-Fresh Sugar Maple - Black Cherry Deciduous Forest	0.7	2.5	0.0	2.5	L5
FOD5-8	Dry-Fresh Sugar Maple - White Ash Deciduous Forest	0.2	1.5	0.0	1.5	L5
FOD5-10	Dry-Fresh Sugar Maple - Paper Birch - Poplar Deciduous Forest	1.1	2.5	1.0	3.5	L4
FOD6-1	Fresh-Moist Sugar Maple - Ash Deciduous Forest	0.7	2.0	0.0	2.0	L5
FOD7-2	Fresh-Moist Ash Deciduous Forest	0.9	1.5	1.0	2.5	L5
FOD7-3	Fresh-Moist Willow Lowland Deciduous Forest	1.1	2.0	0.0	2.0	L5
FOD7-a	Fresh-Moist Manitoba Maple Lowland Deciduous Forest	0.4	1.5	0.0	1.5	L5
FOD8-1	Fresh-Moist Poplar Deciduous Forest	3.1	1.0	0.0	1.0	L5
CUP1-5	Silver Maple Deciduous Plantation	0.2	3.0	0.0	3.0	L5
CUP1-c	Black Locust Deciduous Plantation	4.9	2.5	0.0	2.5	L+
CUP2-b	Black Locust - Conifer Mixed Plantation	0.8	3.5	0.0	3.5	L+
CUP3-1	Red Pine Coniferous Plantation	2.3	1.5	0.0	1.5	L5
CUP3-2	White Pine Coniferous Plantation	0.9	1.5	0.0	1.5	L5

<b>Appendix 1: List of TRCA Vegetation Communities at Brock Lands</b>						
ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2010-04)
			Local Occur.	Geophy. Requir.	Total Score	
CUP3-3	Scotch Pine Coniferous Plantation	4.2	2.0	0.0	2.0	L+
CUP3-b	Austrian Pine Coniferous Plantation		3.5	0.0	3.5	L+
CUP3-C	White Spruce Coniferous Plantation	11.1	2.0	0.0	2.0	L5
CUP3-e	Norway Spruce Coniferous Plantation		2.5	0.0	2.5	L+
CUP3-H	Mixed Conifer Coniferous Plantation	11.5	1.5	0.0	1.5	L5
<b>Successional</b>						
CUT1-1	Sumac Deciduous Thicket	2.0	2.0	0.0	2.0	L5
CUT1-A1	Native Deciduous Sapling Regeneration Thicket	0.2	2.0	0.0	2.0	L5
CUT1-A2	Native Mixed Sapling Regeneration Thicket	1.8	2.5	0.0	2.5	L5
CUT1-A3	Coniferous Sapling Regeneration Thicket	1.8	2.5	1.0	3.5	L4
CUT1-b	Buckthorn Deciduous Thicket	0.4	2.5	0.0	2.5	L+
CUT1-c	Exotic Deciduous Thicket	0.3	2.0	0.0	2.0	L+
CUT1-G	Willow Deciduous Thicket	0.5	4.5	0.0	4.5	L4
CUH1-A	Treed Hedgerow	1.1	1.5	0.0	1.5	L5
CUH1-c	Buckthorn Hedgerow	0.2	2.5	0.0	2.5	L+
CUS1-2A	White Cedar Successional Savannah	3.2	2.5	1.0	3.5	L4
CUS1-A1	Native Deciduous Successional Savannah	23.6	1.5	0.0	1.5	L5
CUS1-A2	White Pine Successional Savannah	1.0	2.5	1.0	3.5	L4
CUS1-b	Exotic Successional Savannah	4.1	1.5	0.0	1.5	L+
CUW1-A1	White Cedar Successional Woodland	0.5	2.5	1.0	3.5	L4
CUW1-A2	White Pine Successional Woodland	1.5	2.5	1.0	3.5	L4
CUW1-A3	Native Deciduous Successional Woodland	20.4	1.5	0.0	1.5	L5
CUW1-A3i	Fresh-Moist Cottonwood Tall Treed Woodland	2.0				L3
CUW1-b	Exotic Successional Woodland	8.9	1.5	0.0	1.5	L+
<b>Wetland</b>						
SWC1-1	White Cedar Mineral Coniferous Swamp	3.8	2.5	2.0	4.5	L4
SWC1-2	White Cedar - Conifer Mineral Coniferous Swamp	0.1	3.5	2.0	5.5	L3
SWC3-1	White Cedar Organic Coniferous Swamp	2.5	2.5	3.0	5.5	L3
SWM1-1	White Cedar - Hardwood Mineral Mixed Swamp	18.0	2.0	2.0	4.0	L4
SWM3-1	Birch - Conifer Mineral Mixed Swamp	1.0	3.5	2.0	5.5	L3
SWM4-1	White Cedar - Hardwood Organic Mixed Swamp	9.9	2.0	3.0	5.0	L3

<b>Appendix 1: List of TRCA Vegetation Communities at Brock Lands</b>						
ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2010-04)
			Local Occur.	Geophy. Requir.	Total Score	
SWD3-1	Red Maple Mineral Deciduous Swamp	0.3	3.5	2.0	5.5	L3
SWD4-1	Willow Mineral Deciduous Swamp	4.5	2.0	1.0	3.0	L4
SWD4-2	White Elm Mineral Deciduous Swamp	0.2	2.5	2.0	4.5	L4
SWD4-3	Paper Birch - Poplar Mineral Deciduous Swamp	3.5	2.0	2.0	4.0	L4
SWT2-2	Willow Mineral Thicket Swamp	9.6	2.0	2.0	4.0	L4
SWT2-5	Red-osier Mineral Thicket Swamp	0.1	2.0	2.0	4.0	L4
FES2-A	Willow Shrub Mineral Fen	1.0				L2
FET2-A	White Cedar Low Treed Mineral Fen	10.0				L2
FET2-B	White Cedar - Scots Pine Low Treed Mineral Fen	8.1				L2
MAM5-1	Mineral Fen Meadow Marsh	2.6	3.5	3.0	6.5	L2
MAM2-2	Reed Canary Grass Mineral Meadow Marsh	7.4	1.0	1.0	2.0	L+
MAM2-3	Red-top Mineral Meadow Marsh	0.2	3.0	0.0	3.0	L4
MAM2-6	Broad-leaved Sedge Mineral Meadow Marsh	0.1	3.0	1.0	4.0	L4
MAM2-7	Horsetail Mineral Meadow Marsh	0.8	3.0	2.0	5.0	L3
MAM2-10	Forb Mineral Meadow Marsh	5.3	1.5	1.0	2.5	L5
MAM2-a	Common Reed Mineral Meadow Marsh	0.9	3.0	0.0	3.0	L+
MAM2-b	Purple Loosestrife Mineral Meadow Marsh	0.5	3.0	0.0	3.0	L+
MAM2-C	Rush Mineral Meadow Marsh	0.2	3.5	2.0	5.5	L3
MAS2-1b	Narrow-Leaved Cattail Mineral Shallow Marsh	2.7	2.0	0.0	2.0	L+
MAS2-9	Forb Mineral Shallow Marsh	0.4	3.0	1.0	4.0	L4
MAS2-a	Common Reed Mineral Shallow Marsh	1.7	3.0	0.0	3.0	L+
MAS2-C	Horsetail Mineral Shallow Marsh	0.1	4.0	1.0	5.0	L3
MAS2-d	Reed Canary Grass Mineral Shallow Marsh	0.7	3.0	1.0	4.0	L+
MAS3-1A	Broad-leaved Cattail Organic Shallow Marsh	0.5	2.5	3.0	5.5	L3
MAS3-10	Forb Organic Shallow Marsh	0.1	4.0	3.0	7.0	L2
<b>Aquatic</b>						
SAS1-1	Pondweed Submerged Shallow Aquatic	0.1	2.0	2.0	4.0	L4
SAS1-3	Stonewort Submerged Shallow Aquatic	0.4	2.5	1.0	3.5	L4
SAS1-A	Coon-tail Submerged Shallow Aquatic	0.7	3.5	1.0	4.5	L4
OAO1	Open Aquatic (deep or riverine unvegetated)	1.9	1.5	0.0	1.5	L5
OAO1-T	Turbid Open Aquatic (disturbed unvegetated)	0.7	2.0	0.0	2.0	L+

**Appendix 1: List of TRCA Vegetation Communities at Brock Lands**

ELC Code	Vegetation Type (* indicates present as inclusion and/or complex only)	Tot. area # ha	Scores			Local Rank (2010-04)
			Local Occur.	Geophy. Requir.	Total Score	
<b>Dynamic (Beach, Bluff, Barren, Prairie, Savannah)</b>						
BBT1-B	Mineral Treed Riparian Bar	0.5	5.0	3.0	8.0	L4
CBO1	Open Clay Barren		4.0	4.0	8.0	L2
SBO1-A	Dry Dropseed Sand Barren	1.3	3.5	4.0	7.5	L2
SBO1-B	Dry-Fresh Flat-stemmed Bluegrass - Forb Sand Barren		3.5	3.0	6.5	L2
SBT1	Treed Sand Barren	15.5	3.5	5.0	8.5	L1
<b>Meadow</b>						
CUM1-A	Native Forb Meadow	87.5	1.5	0.0	1.5	L5
CUM1-b	Exotic Cool-season Grass Graminoid Meadow	38.6	1.0	0.0	1.0	L+
CUM1-c	Exotic Forb Meadow	2.0	1.5	0.0	1.5	L+

<b><i>Brock Lands Vegetation Cover Summary</i></b>	<b><i>#ha</i></b>	<b><i>#types</i></b>	<b><i>%</i></b>
Total Natural Cover	411.8	98	94%
Total Forest Cover	92.4	36	22%
... total natural forest	56.5	26	14%
... total coniferous and mixed forest	47.5	15	12%
... total deciduous forest	9.1	11	2%
... total plantation	35.8	10	9%
Total Successional Cover	73.4	18	18%
Total Wetland Cover	96.8	31	24%
total fen-like	22.6	5	5%
... total swamp	53.7	12	13%
... total marsh	20.5	14	5%
Total Aquatic Cover	3.8	5	1%
Total Dynamic Habitat Cover	17.3	5	4%
Total Meadow Cover	128.1	3	31%
Total L1-L3 Communities	60.3	22	15%
Total L+ Communities	78.9	19	19%

Appendix 2: List of Flora Species at Brock Lands		Local	Popn.	Hab.	Sens.	Total	Rank
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Cardamine pratensis</i> ssp. <i>angustifolia</i>	cuckoo-flower	5	5	5	4	19	L1
<i>Cladium mariscoides</i>	twig-rush	5	5	5	5	20	L1
<i>Rhynchospora alba</i>	white beak-rush	5	5	5	5	20	L1
<i>Trichophorum alpinum</i>	Alpine cotton-grass						L1
<i>Cypripedium calceolus</i> var. <i>pubescens</i>	larger yellow lady's slipper	4	4	5	4	17	L2
<i>Cypripedium reginae</i>	showy lady's slipper	3	4	5	5	17	L2
<i>Eragrostis spectabilis</i>	purple love grass	5	3	5	4	17	L2
<i>Hypericum canadense</i>	Canadian St. Johnswort						L2
<i>Najas flexilis</i>	bushy naiad	3	4	5	5	17	L2
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	2	5	5	5	17	L2
<i>Panicum acuminatum</i> var. <i>lindheimeri</i>	Lindheimer's panic grass	5	3	5	5	18	L2
<i>Panicum linearifolium</i>	narrow-leaved panic grass	4	3	5	5	17	L2
<i>Platanthera hyperborea</i>	northern green orchis	3	4	5	5	17	L2
<i>Polypodium virginianum</i>	rock polypody	4	4	5	5	18	L2
<i>Pyrola asarifolia</i>	pink pyrola	3	4	5	5	17	L2
<i>Senecio aureus</i>	golden ragwort	5	5	4	4	18	L2
<i>Adiantum pedatum</i>	northern maidenhair fern	2	3	5	5	15	L3
<i>Agalinis tenuifolia</i>	slender gerardia	3	4	5	4	16	L3
<i>Anaphalis margaritacea</i>	pearly everlasting	3	4	4	3	14	L3
<i>Anemone acutiloba</i>	sharp-lobed hepatica	2	4	4	5	15	L3
<i>Anemone cylindrica</i>	long-fruited thimbleweed	3	4	3	4	14	L3
<i>Anemone quinquefolia</i> var. <i>quinquefolia</i>	wood-anemone	2	4	3	5	14	L3
<i>Aquilegia canadensis</i>	wild columbine	2	4	3	5	14	L3
<i>Arabis glabra</i>	tower mustard	4	4	4	4	16	L3
<i>Aralia racemosa</i> ssp. <i>racemosa</i>	spikenard	2	4	4	4	14	L3
<i>Aster umbellatus</i> var. <i>umbellatus</i>	flat-topped aster	3	4	3	4	14	L3
<i>Aster urophyllus</i>	arrow-leaved aster	3	3	4	4	14	L3
<i>Bidens discoides</i>	small beggar's-ticks	5	2	4	4	15	L3
<i>Brachyelytrum erectum</i>	bearded short-husk	3	5	3	4	15	L3
<i>Carex albursina</i>	white bear sedge	2	3	5	4	14	L3
<i>Carex backii</i>	Back's sedge	4	3	4	4	15	L3
<i>Carex eburnea</i>	bristle-leaved sedge	3	4	4	4	15	L3
<i>Carex flava</i>	yellow sedge	3	3	5	4	15	L3
<i>Carex interior</i>	fen star sedge	2	4	4	4	14	L3
<i>Carex laevivaginata</i>	smooth-sheathed sedge	2	4	4	4	14	L3
<i>Carex leptoneuria</i>	few-nerved wood sedge	2	4	4	4	14	L3
<i>Carex plantaginea</i>	plantain-leaved sedge	2	4	5	4	15	L3
<i>Carex platyphylla</i>	broad-leaved sedge	3	4	4	3	14	L3
<i>Carex siccata</i>	hay sedge	4	3	4	4	15	L3
<i>Carex tonsa</i> var. <i>rugosperma</i>	red-seeded sedge	4	4	4	4	16	L3
<i>Carex utriculata</i>	beaked sedge	2	3	4	5	14	L3
<i>Carex viridula</i> ssp. <i>viridula</i>	greenish sedge	3	3	5	5	16	L3
<i>Celastrus scandens</i>	American bittersweet	2	4	3	5	14	L3
<i>Ceratophyllum demersum</i>	coontail	2	3	5	4	14	L3
<i>Chrysosplenium americanum</i>	golden saxifrage	3	3	5	4	15	L3
<i>Cicuta bulbifera</i>	bulblet-bearing water-hemlock	2	3	5	4	14	L3
<i>Cinna latifolia</i>	nodding wood reed	3	3	5	3	14	L3
<i>Circaea alpina</i>	smaller enchanter's nightshade	2	4	5	4	15	L3
<i>Claytonia caroliniana</i>	broad-leaved spring beauty	2	4	5	5	16	L3
<i>Collinsonia canadensis</i>	richweed	4	5	4	3	16	L3
<i>Cyperus bipartitus</i>	two-parted umbrella-sedge	4	3	4	3	14	L3
<i>Cypripedium calceolus</i> var. <i>parviflorum</i>	smaller yellow lady's slipper	3	4	4	5	16	L3
<i>Dicentra canadensis</i>	squirrel-corn	2	4	5	4	15	L3
<i>Dryopteris clintoniana</i>	Clinton's wood fern	2	4	5	4	15	L3
<i>Dryopteris cristata</i>	crested wood fern	2	4	4	4	14	L3
<i>Dryopteris x benedictii</i>	Benedict's wood fern	5	3	4	4	16	L3
<i>Epilobium leptophyllum</i>	narrow-leaved willow-herb	2	5	4	4	15	L3
<i>Equisetum fluviatile</i>	water horsetail	2	4	5	4	15	L3
<i>Equisetum pratense</i>	thicket horsetail	3	4	5	3	15	L3
<i>Equisetum scirpoides</i>	dwarf scouring-rush	2	4	5	5	16	L3
<i>Gentiana andrewsii</i>	bottle gentian	3	4	4	5	16	L3
<i>Gymnocarpium dryopteris</i>	oak fern	2	3	5	5	15	L3
<i>Hydrocotyle americana</i>	marsh pennywort	2	4	4	4	14	L3
<i>Juglans cinerea</i>	butternut	1	5	4	4	14	L3
<i>Juncus alpinoarticulatus</i>	Richardson's rush	4	3	4	3	14	L3
<i>Juniperus communis</i>	common juniper	2	3	4	5	14	L3
<i>Larix laricina</i>	tamarack	2	4	4	4	14	L3
<i>Lemna trisulca</i>	star duckweed	2	4	5	3	14	L3

Appendix 2: List of Flora Species at Brock Lands

Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Rank
		Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Lilium michiganense</i>	Michigan lily	2	4	3	5	14	L3
<i>Liparis loeselii</i>	Loesel's twayblade	3	3	5	5	16	L3
<i>Lobelia inflata</i>	Indian tobacco	3	4	4	4	15	L3
<i>Lobelia siphilitica</i>	great blue lobelia	2	3	4	5	14	L3
<i>Lysimachia thyrsoflora</i>	tufted loosestrife	3	3	4	4	14	L3
<i>Menispermum canadense</i>	moonseed	2	4	4	4	14	L3
<i>Mitchella repens</i>	partridgeberry	2	4	4	5	15	L3
<i>Mitella diphylla</i>	mitrewort	2	3	4	5	14	L3
<i>Mitella nuda</i>	naked mitrewort	2	4	5	5	16	L3
<i>Monotropa hypopithys</i>	pinemap	2	4	5	5	16	L3
<i>Monotropa uniflora</i>	Indian-pipe	2	4	5	5	16	L3
<i>Oryzopsis asperifolia</i>	white-fruited mountain-rice	2	4	4	5	15	L3
<i>Oryzopsis racemosa</i>	black-fruited mountain-rice	3	3	5	4	15	L3
<i>Osmorhiza longistylis</i>	smooth sweet cicely	4	4	4	4	16	L3
<i>Osmunda cinnamomea</i>	cinnamon fern	2	4	5	5	16	L3
<i>Penstemon digitalis</i>	foxglove beard-tongue	3	3	4	4	14	L3
<i>Picea glauca</i>	white spruce	1	5	4	4	14	L3
<i>Pilea fontana</i>	spring clearweed	2	4	4	4	14	L3
<i>Polystichum acrostichoides</i>	Christmas fern	1	3	5	5	14	L3
<i>Pyrola elliptica</i>	shinleaf	2	4	4	4	14	L3
<i>Ranunculus hispidus</i> var. <i>caricetorum</i>	swamp buttercup	3	4	4	3	14	L3
<i>Ribes triste</i>	swamp red currant	2	4	4	5	15	L3
<i>Salix lucida</i>	shining willow	2	4	5	3	14	L3
<i>Scirpus cyperinus</i>	woolly bulrush	2	3	4	5	14	L3
<i>Scirpus pendulus</i>	drooping bulrush	3	4	5	4	16	L3
<i>Sisyrinchium montanum</i>	blue-eyed grass	2	3	4	5	14	L3
<i>Solidago patula</i>	rough-leaved goldenrod	3	3	4	4	14	L3
<i>Spiranthes cernua</i>	nodding ladies' tresses	3	3	5	4	15	L3
<i>Spirodela polyrhiza</i>	greater duckweed	2	4	5	3	14	L3
<i>Sporobolus cryptandrus</i>	sand dropseed	3	3	5	3	14	L3
<i>Streptopus roseus</i>	rose twisted-stalk	2	4	4	5	15	L3
<i>Taxus canadensis</i>	Canada yew	2	4	4	5	15	L3
<i>Trientalis borealis</i> ssp. <i>borealis</i>	star-flower	2	4	4	5	15	L3
<i>Verbena stricta</i>	hoary vervain	3	5	4	4	16	L3
<i>Veronica catenata</i>	slender water speedwell	3	3	4	4	14	L3
<i>Viburnum acerifolium</i>	maple-leaved viburnum	2	3	4	5	14	L3
<i>Viola affinis</i>	Le Conte's violet	3	4	4	3	14	L3
<i>Viola canadensis</i>	Canada violet	3	4	4	4	15	L3
<i>Viola cucullata</i>	marsh blue violet	3	3	4	4	14	L3
<i>Acer rubrum</i>	red maple	2	4	1	5	12	L4
<i>Acer saccharinum</i>	silver maple	1	2	5	3	11	L4
<i>Acer saccharum</i> ssp. <i>nigrum</i>	black maple	2	3	4	2	11	L4
<i>Acer spicatum</i>	mountain maple	2	3	4	4	13	L4
<i>Actaea pachypoda</i>	white baneberry	2	3	4	3	12	L4
<i>Amelanchier</i> x <i>interior</i>	hybrid serviceberry complex	4	3	3	3	13	L4
<i>Antennaria howellii</i> ssp. <i>howellii</i>	Howell's pussytoes	4	2	3	3	12	L4
<i>Apios americana</i>	ground-nut	3	4	3	3	13	L4
<i>Apocynum androsaemifolium</i>	spreading dogbane	2	3	2	4	11	L4
<i>Apocynum sibiricum</i>	clasping-leaved hemp dogbane	4	2	3	2	11	L4
<i>Asarum canadense</i>	wild ginger	2	3	4	3	12	L4
<i>Asclepias incarnata</i> ssp. <i>incarnata</i>	swamp milkweed	1	3	4	4	12	L4
<i>Aster lanceolatus</i> x <i>puniceus</i>	panicled-swamp hybrid aster						L4
<i>Aster macrophyllus</i>	big-leaved aster	2	3	2	4	11	L4
<i>Aster oolentangiensis</i>	sky-blue aster	3	1	4	3	11	L4
<i>Aster</i> x <i>amethystinus</i>	amethyst aster	5	2	2	2	11	L4
<i>Betula alleghaniensis</i>	yellow birch	1	4	3	5	13	L4
<i>Betula papyrifera</i>	paper birch	1	4	2	4	11	L4
<i>Bidens tripartita</i>	three-parted beggar's-ticks	3	2	4	2	11	L4
<i>Caltha palustris</i>	marsh marigold	2	4	3	4	13	L4
<i>Cardamine diphylla</i>	broad-leaved toothwort	2	3	4	4	13	L4
<i>Cardamine pensylvanica</i>	bitter cress	3	2	4	4	13	L4
<i>Carex arctata</i>	nodding wood sedge	2	4	2	3	11	L4
<i>Carex aurea</i>	golden-fruited sedge	2	2	4	4	12	L4
<i>Carex communis</i>	fibrous-rooted sedge	2	4	3	3	12	L4
<i>Carex deweyana</i>	Dewey's sedge	2	4	3	3	12	L4
<i>Carex gracillima</i>	graceful sedge	2	3	4	2	11	L4
<i>Carex hystericina</i>	porcupine sedge	2	3	2	5	12	L4
<i>Carex lacustris</i>	lake-bank sedge	2	3	3	4	12	L4
<i>Carex laxiflora</i>	loose-flowered sedge	3	3	4	3	13	L4



Appendix 2: List of Flora Species at Brock Lands		Local	Popn.	Hab.	Sens.	Total	Rank
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Carex peckii</i>	Peck's sedge	3	3	4	3	13	L4
<i>Carex pedunculata</i>	early-flowering sedge	2	3	3	3	11	L4
<i>Carex pennsylvanica</i>	Pennsylvania sedge	2	4	3	4	13	L4
<i>Carex pseudo-cyperus</i>	pseudocyperus sedge	2	3	3	4	12	L4
<i>Carex retrorsa</i>	retrorse sedge	2	3	3	4	12	L4
<i>Carex scabrata</i>	rough sedge	2	3	4	3	12	L4
<i>Carpinus caroliniana</i> ssp. <i>virginiana</i>	blue beech	1	3	4	3	11	L4
<i>Carya cordiformis</i>	bitternut hickory	2	4	4	2	12	L4
<i>Caulophyllum giganteum</i>	long-styled blue cohosh	2	3	4	4	13	L4
<i>Cornus rugosa</i>	round-leaved dogwood	2	4	4	3	13	L4
<i>Corylus cornuta</i>	beaked hazel	2	4	3	4	13	L4
<i>Crataegus holmesiana</i>	Holmes' hawthorn	3	3	4	3	13	L4
<i>Cystopteris bulbifera</i>	bulblet fern	2	3	4	4	13	L4
<i>Danthonia spicata</i>	poverty oat grass	2	4	3	4	13	L4
<i>Diervilla lonicera</i>	bush honeysuckle	2	3	2	4	11	L4
<i>Dryopteris intermedia</i>	evergreen wood fern	2	4	4	3	13	L4
<i>Dryopteris marginalis</i>	marginal wood fern	2	3	3	4	12	L4
<i>Elymus riparius</i>	riverbank wild rye	2	2	4	4	12	L4
<i>Epifagus virginiana</i>	beech-drops	2	3	5	2	12	L4
<i>Equisetum variegatum</i> ssp. <i>variegatum</i>	variegated scouring-rush	2	2	5	4	13	L4
<i>Eupatorium perfoliatum</i>	boneset	1	3	4	3	11	L4
<i>Fagus grandifolia</i>	American beech	1	4	3	4	12	L4
<i>Fraxinus nigra</i>	black ash	2	4	4	3	13	L4
<i>Galium aparine</i>	cleavers	3	3	4	2	12	L4
<i>Galium asprellum</i>	rough bedstraw	3	2	4	2	11	L4
<i>Glyceria grandis</i>	tall manna grass	2	3	4	2	11	L4
<i>Impatiens pallida</i>	yellow touch-me-not	3	2	4	2	11	L4
<i>Juncus balticus</i>	Baltic rush	4	2	5	2	13	L4
<i>Juncus effusus</i> ssp. <i>solutus</i>	soft rush	2	4	4	3	13	L4
<i>Juncus nodosus</i>	knotted rush	2	2	5	3	12	L4
<i>Juncus torreyi</i>	Torrey's rush	2	3	4	2	11	L4
<i>Lactuca biennis</i>	tall blue lettuce	3	4	2	4	13	L4
<i>Leersia virginica</i>	white grass	3	2	5	3	13	L4
<i>Lepidium virginicum</i>	Virginia pepper-grass	5	3	4	2	14	L4
<i>Lycopus americanus</i>	cut-leaved water-horehound	2	4	3	3	12	L4
<i>Lycopus uniflorus</i>	northern water-horehound	2	3	3	3	11	L4
<i>Maianthemum canadense</i>	Canada May-flower	1	4	1	5	11	L4
<i>Mimulus ringens</i>	square-stemmed monkey-flower	2	3	3	4	12	L4
<i>Monarda fistulosa</i>	wild bergamot	3	3	2	3	11	L4
<i>Myosotis laxa</i>	smaller forget-me-not	2	4	3	4	13	L4
<i>Osmorhiza claytonii</i>	woolly sweet cicely	2	3	4	3	12	L4
<i>Panicum acuminatum</i> var. <i>acuminatum</i>	hairy panic grass	2	3	3	3	11	L4
<i>Physalis heterophylla</i>	clammy ground-cherry	3	2	3	3	11	L4
<i>Pinus strobus</i>	white pine	1	4	3	4	12	L4
<i>Polygonatum pubescens</i>	downy Solomon's seal	2	4	2	5	13	L4
<i>Populus grandidentata</i>	large-toothed aspen	2	3	4	3	12	L4
<i>Potamogeton pectinatus</i>	sago pondweed	2	2	5	3	12	L4
<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>	heal-all (native)	4	2	3	2	11	L4
<i>Prunus pensylvanica</i>	pin cherry	2	4	3	3	12	L4
<i>Pteridium aquilinum</i> var. <i>latiusculum</i>	eastern bracken	2	4	2	4	12	L4
<i>Quercus macrocarpa</i>	bur oak	2	4	3	3	12	L4
<i>Quercus rubra</i>	red oak	1	4	2	4	11	L4
<i>Rubus pubescens</i>	dwarf raspberry	2	3	3	5	13	L4
<i>Rudbeckia hirta</i>	black-eyed Susan	1	4	4	3	12	L4
<i>Sagittaria latifolia</i>	common arrowhead	1	2	5	4	12	L4
<i>Salix amygdaloides</i>	peach-leaved willow	2	2	5	3	12	L4
<i>Salix bebbiana</i>	Bebb's willow	2	3	3	4	12	L4
<i>Salix discolor</i>	pussy willow	2	3	4	3	12	L4
<i>Salix petiolaris</i>	slender willow	2	3	5	3	13	L4
<i>Sanicula marilandica</i>	sanicle	3	3	3	3	12	L4
<i>Schizachne purpurascens</i> ssp. <i>purpurascens</i>	purple melic grass	2	3	3	5	13	L4
<i>Scirpus microcarpus</i>	barber-pole bulrush	2	2	4	3	11	L4
<i>Scirpus validus</i>	soft-stemmed bulrush	2	2	5	3	12	L4
<i>Solidago rugosa</i> ssp. <i>rugosa</i>	rough-stemmed goldenrod	3	3	2	3	11	L4
<i>Symplocarpus foetidus</i>	skunk cabbage	3	2	4	3	12	L4
<i>Thelypteris palustris</i> var. <i>pubescens</i>	marsh fern	2	4	2	4	12	L4
<i>Thuja occidentalis</i>	white cedar	1	4	1	5	11	L4
<i>Tiarella cordifolia</i>	foam-flower	1	3	3	4	11	L4
<i>Trillium erectum</i>	red trillium	1	4	3	5	13	L4

Appendix 2: List of Flora Species at Brock Lands		Local	Popn.	Hab.	Sens.	Total	Rank
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Trillium grandiflorum</i>	white trillium	1	3	4	5	13	L4
<i>Tsuga canadensis</i>	eastern hemlock	1	4	3	5	13	L4
<i>Typha latifolia</i>	broad-leaved cattail	1	4	4	4	13	L4
<i>Veronica americana</i>	American speedwell	2	3	4	4	13	L4
<i>Acalypha virginica</i> var. <i>rhomboidea</i>	three-seeded mercury	3	1	2	0	6	L5
<i>Acer saccharum</i> ssp. <i>saccharum</i>	sugar maple	1	3	0	2	6	L5
<i>Achillea millefolium</i> ssp. <i>lanulosum</i>	woolly yarrow	2	2	0	1	5	L5
<i>Actaea rubra</i>	red baneberry	2	3	1	3	9	L5
<i>Agrimonia gryposepala</i>	agrimony	2	2	0	2	6	L5
<i>Alisma plantago-aquatica</i>	water-plantain	2	2	4	2	10	L5
<i>Ambrosia artemisiifolia</i>	common ragweed	2	1	3	0	6	L5
<i>Ambrosia trifida</i>	giant ragweed	4	1	4	0	9	L5
<i>Amphicarpaea bracteata</i>	hog-peanut	2	2	2	2	8	L5
<i>Anemone canadensis</i>	Canada anemone	2	2	2	2	8	L5
<i>Anemone virginiana</i>	common thimbleweed	2	3	0	3	8	L5
<i>Apocynum cannabinum</i>	hemp dogbane	2	2	2	2	8	L5
<i>Aralia nudicaulis</i>	wild sarsaparilla	2	3	1	4	10	L5
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	1	3	2	3	9	L5
<i>Asclepias syriaca</i>	common milkweed	2	2	0	2	6	L5
<i>Aster cordifolius</i>	heart-leaved aster	2	1	0	2	5	L5
<i>Aster ericoides</i> ssp. <i>ericoides</i>	heath aster	2	1	2	1	6	L5
<i>Aster lanceolatus</i> ssp. <i>lanceolatus</i>	panicked aster	1	2	3	1	7	L5
<i>Aster lateriflorus</i> var. <i>lateriflorus</i>	calico aster	2	2	3	2	9	L5
<i>Aster novae-angliae</i>	New England aster	1	2	2	1	6	L5
<i>Aster puniceus</i> var. <i>puniceus</i>	swamp aster	2	2	2	2	8	L5
<i>Athyrium filix-femina</i> var. <i>angustum</i>	northeastern lady fern	2	3	1	3	9	L5
<i>Bidens cernuus</i>	nodding bur-marigold	2	2	3	3	10	L5
<i>Bidens frondosus</i>	common beggar's-ticks	2	1	4	0	7	L5
<i>Calystegia sepium</i>	hedge bindweed	3	2	3	2	10	L5
<i>Carex bebbii</i>	Bebb's sedge	2	2	3	3	10	L5
<i>Carex blanda</i>	common wood sedge	2	2	1	2	7	L5
<i>Carex cristatella</i>	crested sedge	2	2	4	1	9	L5
<i>Carex granularis</i>	meadow sedge	2	2	1	3	8	L5
<i>Carex radiata</i>	straight-styled sedge	2	2	2	2	8	L5
<i>Carex rosea</i>	curly-styled sedge	2	2	3	2	9	L5
<i>Carex stipata</i>	awl-fruited sedge	2	3	2	3	10	L5
<i>Carex vulpinoidea</i>	fox sedge	2	2	4	1	9	L5
<i>Chenopodium simplex</i>	maple-leaved goosefoot	4	2	3	1	10	L5
<i>Cicuta maculata</i>	spotted water-hemlock	2	2	2	2	8	L5
<i>Circaea lutetiana</i> ssp. <i>canadensis</i>	enchanter's nightshade	2	1	1	1	5	L5
<i>Clematis virginiana</i>	virgin's bower	2	2	2	3	9	L5
<i>Clinopodium vulgare</i>	wild basil	3	3	1	3	10	L5
<i>Conyza canadensis</i>	horse-weed	3	1	2	0	6	L5
<i>Cornus alternifolia</i>	alternate-leaved dogwood	2	2	1	2	7	L5
<i>Cornus foemina</i> ssp. <i>racemosa</i>	grey dogwood	2	2	4	2	10	L5
<i>Cornus stolonifera</i>	red osier dogwood	1	2	0	3	6	L5
<i>Crataegus punctata</i>	dotted hawthorn	2	2	3	3	10	L5
<i>Cryptotaenia canadensis</i>	honewort	2	2	4	1	9	L5
<i>Desmodium canadense</i>	showy tick-trefoil	2	2	3	3	10	L5
<i>Dryopteris carthusiana</i>	spinulose wood fern	2	3	2	2	9	L5
<i>Echinochloa microstachya</i>	small-spiked barnyard grass	4	2	4	0	10	L5
<i>Echinocystis lobata</i>	wild cucumber	2	2	3	1	8	L5
<i>Eleocharis erythropoda</i>	creeping spike-rush	2	2	4	1	9	L5
<i>Elymus virginicus</i> var. <i>virginicus</i>	Virginia wild rye	2	2	3	2	9	L5
<i>Equisetum arvense</i>	field horsetail	1	2	1	1	5	L5
<i>Equisetum hyemale</i> ssp. <i>affine</i>	scouring-rush	2	2	2	2	8	L5
<i>Erigeron annuus</i>	daisy fleabane	2	2	0	1	5	L5
<i>Erigeron philadelphicus</i> ssp. <i>philadelphicus</i>	Philadelphia fleabane	2	2	0	1	5	L5
<i>Erigeron strigosus</i>	rough fleabane	3	2	1	1	7	L5
<i>Erythronium americanum</i> ssp. <i>americanum</i>	yellow trout-lily	2	3	3	2	10	L5
<i>Eupatorium maculatum</i> ssp. <i>maculatum</i>	spotted Joe-Pye weed	2	2	3	3	10	L5
<i>Eupatorium rugosum</i>	white snakeroot	2	2	2	1	7	L5
<i>Euthamia graminifolia</i>	grass-leaved goldenrod	2	1	4	1	8	L5
<i>Fragaria virginiana</i>	wild strawberry	2	2	0	2	6	L5
<i>Fraxinus americana</i>	white ash	1	2	0	3	6	L5
<i>Fraxinus pennsylvanica</i> var. <i>pennsylvanica</i>	red ash	2	2	2	3	9	L5
<i>Fraxinus pennsylvanica</i> var. <i>subintegerrima</i>	green ash	2	2	2	3	9	L5
<i>Galium palustre</i>	marsh bedstraw	2	2	3	3	10	L5
<i>Galium triflorum</i>	sweet-scented bedstraw	2	2	2	2	8	L5

Appendix 2: List of Flora Species at Brock Lands		Local	Popn.	Hab.	Sens.	Total	Rank
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Geum aleppicum</i>	yellow avens	2	3	3	2	10	L5
<i>Geum canadense</i>	white avens	2	2	1	2	7	L5
<i>Glyceria striata</i>	fowl manna grass	2	2	1	2	7	L5
<i>Hackella virginiana</i>	Virginia stickseed	2	2	0	2	6	L5
<i>Helianthus tuberosus</i>	Jerusalem artichoke	3	1	2	0	6	L5
<i>Hydrophyllum virginianum</i>	Virginia waterleaf	2	2	1	2	7	L5
<i>Impatiens capensis</i>	orange touch-me-not	1	2	0	2	5	L5
<i>Juglans nigra</i>	black walnut	2	1	2	1	6	L5
<i>Juncus articulatus</i>	jointed rush	2	2	4	2	10	L5
<i>Juncus bufonius</i>	toad rush	4	1	4	1	10	L5
<i>Juncus dudleyi</i>	Dudley's rush	2	2	3	1	8	L5
<i>Juncus tenuis</i>	path rush	2	2	1	1	6	L5
<i>Juniperus virginiana</i>	red cedar	2	1	4	1	8	L5
<i>Laportea canadensis</i>	wood nettle	2	3	2	2	9	L5
<i>Leersia oryzoides</i>	rice cut grass	2	2	3	2	9	L5
<i>Lemna minor</i>	common duckweed	2	2	4	2	10	L5
<i>Lysimachia ciliata</i>	fringed loosestrife	2	2	2	2	8	L5
<i>Maianthemum racemosum</i> ssp. <i>racemosum</i>	false Solomon's seal	2	3	2	3	10	L5
<i>Maianthemum stellatum</i>	starry false Solomon's seal	2	2	1	3	8	L5
<i>Matteuccia struthiopteris</i> var. <i>pensylvanica</i>	ostrich fern	1	2	2	2	7	L5
<i>Mentha arvensis</i> ssp. <i>borealis</i>	wild mint	2	2	3	2	9	L5
<i>Muhlenbergia mexicana</i> var. <i>mexicana</i>	common muhly grass	3	2	0	1	6	L5
<i>Oenothera biennis</i>	common evening-primrose	2	1	1	1	5	L5
<i>Onoclea sensibilis</i>	sensitive fern	2	3	1	3	9	L5
<i>Ostrya virginiana</i>	ironwood	2	3	2	2	9	L5
<i>Oxalis stricta</i>	common yellow wood-sorrel	3	1	1	1	6	L5
<i>Panicum capillare</i>	panic grass	3	1	4	1	9	L5
<i>Parthenocissus inserta</i>	thicket creeper	1	2	0	1	4	L5
<i>Phryma leptostachya</i>	lopseed	2	2	3	2	9	L5
<i>Pilea pumila</i>	dwarf clearweed	2	2	1	1	6	L5
<i>Plantago rugelii</i>	red-stemmed plantain	2	2	0	1	5	L5
<i>Poa palustris</i>	fowl meadow-grass	2	2	3	2	9	L5
<i>Podophyllum peltatum</i>	May-apple	1	3	3	3	10	L5
<i>Populus balsamifera</i> ssp. <i>balsamifera</i>	balsam poplar	1	2	3	2	8	L5
<i>Populus deltoides</i>	cottonwood	2	1	4	1	8	L5
<i>Populus tremuloides</i>	trembling aspen	1	3	1	3	8	L5
<i>Potentilla anserina</i> ssp. <i>anserina</i>	silverweed	3	2	3	2	10	L5
<i>Prenanthes altissima</i>	tall wood lettuce	2	3	2	2	9	L5
<i>Prunus serotina</i>	black cherry	2	2	0	2	6	L5
<i>Prunus virginiana</i> ssp. <i>virginiana</i>	choke cherry	1	2	0	1	4	L5
<i>Ranunculus abortivus</i>	kidney-leaved buttercup	2	3	1	2	8	L5
<i>Ranunculus recurvatus</i> var. <i>recurvatus</i>	hooked buttercup	2	3	2	3	10	L5
<i>Rhus radicans</i> ssp. <i>rydbergii</i>	poison ivy (shrub form)	2	2	0	2	6	L5
<i>Rhus typhina</i>	staghorn sumach	2	1	2	2	7	L5
<i>Ribes americanum</i>	wild black currant	2	3	2	2	9	L5
<i>Ribes cynosbati</i>	prickly gooseberry	2	3	2	2	9	L5
<i>Rubus allegheniensis</i>	common blackberry	2	3	0	1	6	L5
<i>Rubus idaeus</i> ssp. <i>melanolasius</i>	wild red raspberry	1	1	0	1	3	L5
<i>Rubus occidentalis</i>	wild black raspberry	2	1	0	1	4	L5
<i>Rubus odoratus</i>	purple-flowering raspberry	2	2	2	2	8	L5
<i>Salix eriocephala</i>	narrow heart-leaved willow	2	1	3	1	7	L5
<i>Salix exigua</i>	sandbar willow	2	1	5	2	10	L5
<i>Sambucus canadensis</i>	common elderberry	2	3	2	2	9	L5
<i>Sambucus racemosa</i> ssp. <i>pubens</i>	red-berried elder	2	3	2	2	9	L5
<i>Sanguinaria canadensis</i>	bloodroot	2	3	0	3	8	L5
<i>Scirpus atrovirens</i>	black-fruited bulrush	2	2	4	2	10	L5
<i>Scutellaria lateriflora</i>	mad-dog skullcap	2	2	3	3	10	L5
<i>Smilax herbacea</i>	carrion-flower	3	3	2	2	10	L5
<i>Solidago altissima</i>	tall goldenrod	1	2	0	0	3	L5
<i>Solidago caesia</i>	blue-stemmed goldenrod	2	2	4	2	10	L5
<i>Solidago canadensis</i> var. <i>canadensis</i>	Canada goldenrod	2	2	0	1	5	L5
<i>Solidago flexicaulis</i>	zig-zag goldenrod	2	1	3	2	8	L5
<i>Solidago gigantea</i>	late goldenrod	2	1	1	1	5	L5
<i>Solidago nemoralis</i> ssp. <i>nemoralis</i>	grey goldenrod	2	2	2	2	8	L5
<i>Thalictrum dioicum</i>	early meadow rue	2	3	3	2	10	L5
<i>Thalictrum pubescens</i>	tall meadow rue	2	3	2	2	9	L5
<i>Tilia americana</i>	basswood	1	4	2	3	10	L5
<i>Ulmus americana</i>	white elm	1	4	0	2	7	L5
<i>Urtica dioica</i> ssp. <i>gracilis</i>	American stinging nettle	2	3	2	2	9	L5

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Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Rank
		Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Verbena hastata</i>	blue vervain	2	2	4	2	10	L5
<i>Verbena urticifolia</i>	white vervain	2	2	2	2	8	L5
<i>Viburnum lentago</i>	nannyberry	2	3	1	2	8	L5
<i>Viola conspersa</i>	dog violet	2	2	0	2	6	L5
<i>Viola pubescens</i>	stemmed yellow violet	2	3	1	2	8	L5
<i>Viola sororia</i>	common blue violet	2	2	0	2	6	L5
<i>Vitis riparia</i>	riverbank grape	1	1	0	0	2	L5
<i>Xanthium strumarium</i>	clotbur	3	1	4	0	8	L5
<i>Equisetum x mackaii</i>	Mack's horsetail	5	0	0	0	5	LH
<i>Pycnanthemum tenuifolium</i>	narrow-leaved mountain-mint	5	2	5	3	15	LU
<i>Acer negundo</i>	Manitoba maple	2	0	0	2	4	L+?
<i>Agrostis stolonifera</i>	creeping bent grass	3				3	L+?
<i>Chamaesyce maculata</i>	spotted spurge	5				5	L+?
<i>Cyperus esculentus</i>	yellow nut-sedge	5	0	4	1	10	L+?
<i>Eragrostis pectinacea</i> var. <i>pectinacea</i>	tufted love grass	5				5	L+?
<i>Geranium robertianum</i>	herb Robert	3				3	L+?
<i>Humulus lupulus</i>	common hops	5				5	L+?
<i>Phalaris arundinacea</i>	reed canary grass	3				3	L+?
<i>Phragmites australis</i>	common reed	3				3	L+?
<i>Polygonum hydropiper</i>	water-pepper	5				5	L+?
<i>Potentilla norvegica</i>	rough cinquefoil	4				4	L+?
<i>Sedum</i> sp.	stonecrop sp						L+?
<i>Sporobolus vaginiflorus</i>	ensheathed dropseed	5				5	L+?
<i>Veronica peregrina</i> ssp. <i>peregrina</i>	purslane speedwell	5				5	L+?
<i>Abutilon theophrasti</i>	velvet-leaf	4	0	0	2	6	L+
<i>Acer platanoides</i>	Norway maple	3				3	L+
<i>Acinus arvensis</i>	mother-of-thyme	5				5	L+
<i>Aegopodium podagraria</i>	goutweed	4				4	L+
<i>Aesculus hippocastanum</i>	horse-chestnut	4				4	L+
<i>Agrostis gigantea</i>	redtop	3				3	L+
<i>Alliaria petiolata</i>	garlic mustard	2				2	L+
<i>Allium schoenoprasum</i> var. <i>schoenoprasum</i>	chives	5				5	L+
<i>Alyssum alyssoides</i>	yellow alyssum	5				5	L+
<i>Amaranthus hybridus</i>	slender pigweed	5				5	L+
<i>Amaranthus retroflexus</i>	red-root pigweed	4				4	L+
<i>Amorpha fruticosa</i>	shrubby false indigo	5				5	L+
<i>Anagallis arvensis</i>	scarlet pimpernel	5				5	L+
<i>Arctium lappa</i>	great burdock	3				3	L+
<i>Arctium minus</i> ssp. <i>minus</i>	common burdock	3				3	L+
<i>Arenaria serpyllifolia</i>	thyme-leaved sandwort	5				5	L+
<i>Artemisia absinthium</i>	common wormwood						L+
<i>Asparagus officinalis</i>	asparagus	4				4	L+
<i>Barbarea vulgaris</i>	winter cress	3				3	L+
<i>Berberis thunbergii</i>	Japanese barberry	4				4	L+
<i>Betula pendula</i>	European white birch	4				4	L+
<i>Brassica rapa</i>	turnip	5				5	L+
<i>Bromus inermis</i> ssp. <i>inermis</i>	smooth brome grass	3				3	L+
<i>Bromus japonicus</i>	Japanese chess	5				5	L+
<i>Bromus tectorum</i>	downy chess	4				4	L+
<i>Campanula rapunculoides</i>	creeping bellflower	3				3	L+
<i>Capsella bursa-pastoris</i>	shepherd's purse	4				4	L+
<i>Carex spicata</i>	spiked sedge	3				3	L+
<i>Celastrus orbiculatus</i>	oriental bittersweet	4				4	L+
<i>Centaurea maculosa</i>	spotted knapweed	4				4	L+
<i>Cerastium fontanum</i>	mouse-ear chickweed	3				3	L+
<i>Chamaesyce serpyllifolia</i>	thyme-leaved spurge	5				5	L+
<i>Chelidonium majus</i>	celandine	3				3	L+
<i>Chenopodium album</i> var. <i>album</i>	lamb's quarters	3				3	L+
<i>Chenopodium glaucum</i>	oak-leaved goosefoot	4				4	L+
<i>Chrysanthemum leucanthemum</i>	ox-eye daisy	3				3	L+
<i>Cichorium intybus</i>	chicory	3				3	L+
<i>Cirsium arvense</i>	creeping thistle	2				2	L+
<i>Cirsium vulgare</i>	bull thistle	3				3	L+
<i>Cleome hassleriana</i>	spiderflower	5				5	L+
<i>Convallaria majalis</i>	lily-of-the-valley	3				3	L+
<i>Convolvulus arvensis</i>	field bindweed	4				4	L+
<i>Coreopsis lanceolata</i>	lance-leaved coreopsis	5				5	L+
<i>Coronilla varia</i>	crown vetch	4				4	L+
<i>Crataegus monogyna</i>	English hawthorn	3	1	4	0	8	L+

**Appendix 2: List of Flora Species at Brock Lands**

Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Rank
		Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Crepis tectorum</i>	narrow-leaved hawk's beard	5				5	L+
<i>Cucurbita maxima</i>	gourd	5				5	L+
<i>Cynanchum rossicum</i>	dog-strangling vine	3				3	L+
<i>Cynoglossum officinale</i>	hound's tongue	4				4	L+
<i>Dactylis glomerata</i>	orchard grass	3				3	L+
<i>Daucus carota</i>	Queen Anne's lace	3				3	L+
<i>Digitalis lanata</i>	Grecian foxglove	5				5	L+
<i>Digitaria ischaemum</i>	smooth crab grass	5				5	L+
<i>Digitaria sanguinalis</i>	hairy crab grass	5				5	L+
<i>Diplotaxis tenuifolia</i>	slender-leaved wall rocket	5				5	L+
<i>Echinochloa crusgalli</i>	barnyard grass	4				4	L+
<i>Echium vulgare</i>	viper's bugloss	4				4	L+
<i>Elaeagnus umbellata</i>	autumn olive	4				4	L+
<i>Elymus repens</i>	quack grass	3				3	L+
<i>Epilobium hirsutum</i>	European willow-herb	4				4	L+
<i>Epilobium parviflorum</i>	small-flowered willow-herb	4				4	L+
<i>Epipactis helleborine</i>	helleborine	3				3	L+
<i>Eragrostis minor</i>	little love grass	5				5	L+
<i>Erucastrum gallicum</i>	dog mustard	5				5	L+
<i>Euonymus alatus</i>	winged spindle-tree	5				5	L+
<i>Euonymus europaea</i>	European spindle-tree	4				4	L+
<i>Festuca pratensis</i>	meadow fescue	3				3	L+
<i>Festuca rubra</i> ssp. <i>rubra</i>	red fescue	3				3	L+
<i>Festuca trachyphylla</i>	hard fescue	5				5	L+
<i>Galeopsis tetrahit</i>	hemp-nettle	4				4	L+
<i>Galium mollugo</i>	white bedstraw	3				3	L+
<i>Geum urbanum</i>	urban avens	3				3	L+
<i>Glechoma hederacea</i>	creeping Charlie	3				3	L+
<i>Gleditsia triacanthos</i>	honey locust	5				5	L+
<i>Hemerocallis fulva</i>	orange day-lily	4				4	L+
<i>Hesperis matronalis</i>	dame's rocket	2				2	L+
<i>Hieracium caespitosum</i> ssp. <i>caespitosum</i>	yellow hawkweed	3				3	L+
<i>Hieracium piloselloides</i>	smooth yellow hawkweed	3				3	L+
<i>Hieracium</i> x <i>floribundum</i>	smoothish hawkweed	5				5	L+
<i>Hordeum jubatum</i> ssp. <i>jubatum</i>	squirrel-tail barley	4				4	L+
<i>Hosta</i> sp.	plaintain-lily						L+
<i>Hypericum perforatum</i>	common St. Johnswort	3				3	L+
<i>Impatiens glandulifera</i>	Himalayan balsam	5				5	L+
<i>Inula helenium</i>	elecampane	3				3	L+
<i>Ipomoea purpurea</i>	common morning-glory	5				5	L+
<i>Iris pseudacorus</i>	yellow flag	4				4	L+
<i>Iris sibirica</i>	Siberian blue flag	5				5	L+
<i>Juniperus chinensis</i>	Chinese juniper						L+
<i>Juniperus sabina</i>	savin juniper						L+
<i>Lactuca serriola</i>	prickly lettuce	3				3	L+
<i>Lapsana communis</i>	nipplewort	5				5	L+
<i>Leontodon taraxoides</i> ssp. <i>taraxoides</i>	rough hawkbit	5				5	L+
<i>Leonurus cardiaca</i> ssp. <i>cardiaca</i>	motherwort	3				3	L+
<i>Lepidium campestre</i>	field pepper-grass	4				4	L+
<i>Linaria vulgaris</i>	butter-and-eggs	3				3	L+
<i>Lonicera morrowii</i>	Morrow's honeysuckle	3				3	L+
<i>Lonicera tatarica</i>	Tartarian honeysuckle	4				4	L+
<i>Lonicera</i> x <i>bella</i>	shrub honeysuckle	3				3	L+
<i>Lotus corniculatus</i>	bird's foot trefoil	3				3	L+
<i>Lychnis alba</i>	white campion						L+
<i>Lycopersicon esculentum</i>	tomato (incl. cherry tomato)	5				5	L+
<i>Lycopus europaeus</i>	European water-horehound	4				4	L+
<i>Lysimachia nummularia</i>	moneywort	4				4	L+
<i>Lythrum salicaria</i>	purple loosestrife	3				3	L+
<i>Malus pumila</i>	apple	2				2	L+
<i>Matricaria matricarioides</i>	pineappleweed	5				5	L+
<i>Matricaria perforata</i>	scentless chamomile	4				4	L+
<i>Medicago lupulina</i>	black medick	3				3	L+
<i>Medicago sativa</i> ssp. <i>falcata</i>	alfalfa	5				5	L+
<i>Medicago sativa</i> ssp. <i>sativa</i>	alfalfa	3				3	L+
<i>Melilotus alba</i>	white sweet clover	3				3	L+
<i>Melilotus officinalis</i>	yellow sweet clover	3				3	L+
<i>Mentha spicata</i>	spear mint	4				4	L+
<i>Mentha</i> x <i>gentilis</i>	red mint	5				5	L+

Appendix 2: List of Flora Species at Brock Lands		Local	Popn.	Hab.	Sens.	Total	Rank
Scientific Name	Common Name	Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Mentha x villosa</i>	downy mint						L+
<i>Miscanthus sacchariflorus</i>	eulalia	4				4	L+
<i>Morus alba</i>	white mulberry	4				4	L+
<i>Mycelis muralis</i>	wall lettuce	5				5	L+
<i>Myosotis scorpioides</i>	true forget-me-not	3				3	L+
<i>Myosotis sylvatica</i>	woodland forget-me-not	5				5	L+
<i>Myosoton aquaticum</i>	giant chickweed	5				5	L+
<i>Nasturtium microphyllum</i>	small-leaved watercress	4				4	L+
<i>Nepeta cataria</i>	catnip	3				3	L+
<i>Panicum dichotomiflorum</i>	fall panic grass	5				5	L+
<i>Panicum miliaceum</i>	millet	5				5	L+
<i>Papaver rhoeas</i>	corn poppy						L+
<i>Phleum pratense</i>	Timothy grass	3				3	L+
<i>Pinus sylvestris</i>	Scots pine	3				3	L+
<i>Plantago lanceolata</i>	English plantain	4				4	L+
<i>Plantago major</i>	common plantain	3				3	L+
<i>Poa compressa</i>	flat-stemmed blue grass	3				3	L+
<i>Poa pratensis ssp. pratensis</i>	Kentucky blue grass	3				3	L+
<i>Polygonatum multiflorum</i>	European Solomon's seal	5				5	L+
<i>Polygonum achoreum</i>	striate knotweed	5				5	L+
<i>Polygonum aviculare</i>	prostrate knotweed	4				4	L+
<i>Polygonum persicaria</i>	lady's thumb	3				3	L+
<i>Populus alba</i>	white poplar	4				4	L+
<i>Populus x canadensis</i>	Carolina poplar	5				5	L+
<i>Populus x heimburgeri</i>	Heimburger's poplar	5				5	L+
<i>Portulaca oleracea</i>	purslane	5				5	L+
<i>Potentilla recta</i>	sulphur cinquefoil	3				3	L+
<i>Prunus persica</i>	peach	5				5	L+
<i>Puccinellia distans</i>	alkali grass	4				4	L+
<i>Quercus robur</i>	English oak	5				5	L+
<i>Ranunculus acris</i>	tall buttercup	3				3	L+
<i>Ranunculus repens</i>	creeping buttercup	4				4	L+
<i>Rhamnus cathartica</i>	common buckthorn	2				2	L+
<i>Ribes odoratum</i>	buffalo currant	5				5	L+
<i>Ribes rubrum</i>	garden red currant	3				3	L+
<i>Robinia pseudoacacia</i>	black locust	3				3	L+
<i>Rorippa sylvestris</i>	creeping yellow cress	5				5	L+
<i>Rosa canina</i>	dog rose	5				5	L+
<i>Rosa multiflora</i>	multiflora rose	3				3	L+
<i>Rudbeckia fulgida</i>	orange coneflower	5				5	L+
<i>Rumex acetosella ssp. acetosella</i>	sheep sorrel	4	2	5	4	15	L+
<i>Rumex crispus</i>	curly dock	3				3	L+
<i>Salix alba var. vitellina</i>	weeping willow	5				5	L+
<i>Salix fragilis</i>	crack willow	4				4	L+
<i>Salix purpurea</i>	purple-osier willow	5				5	L+
<i>Salix x rubens</i>	European tree willow	3				3	L+
<i>Salix x sepulcralis</i>	weeping willow	4				4	L+
<i>Salsola tragus</i>	Russian thistle	5				5	L+
<i>Saponaria officinalis</i>	bouncing Bet	4				4	L+
<i>Sedum acre</i>	mossy stonecrop	5				5	L+
<i>Sedum telephium</i>	live-forever	5				5	L+
<i>Senecio vulgaris</i>	common groundsel	5				5	L+
<i>Setaria faberi</i>	giant foxtail	5				5	L+
<i>Setaria glauca</i>	yellow foxtail	5				5	L+
<i>Setaria verticillata var. verticillata</i>	bristly foxtail	5				5	L+
<i>Setaria viridis</i>	green foxtail	4				4	L+
<i>Silene pratensis</i>	evening lychnis	4				4	L+
<i>Silene vulgaris</i>	bladder campion	4				4	L+
<i>Sinapis arvensis</i>	charlock	4				4	L+
<i>Solanum dulcamara</i>	bittersweet nightshade	3				3	L+
<i>Sonchus arvensis ssp. arvensis</i>	glandular perennial sow-thistle	5				5	L+
<i>Sonchus asper ssp. asper</i>	spiny sow-thistle	5				5	L+
<i>Sorbaria sorbifolia</i>	false spiraea	4				4	L+
<i>Sorbus aucuparia</i>	European mountain-ash	3				3	L+
<i>Stellaria graminea</i>	grass-leaved chickweed	4				4	L+
<i>Symphytum officinale ssp. officinale</i>	common comfrey	5				5	L+
<i>Syringa vulgaris</i>	common lilac	3				3	L+
<i>Taraxacum officinale</i>	dandelion	3				3	L+
<i>Thlaspi arvense</i>	penny-cress	3				3	L+



**Appendix 2: List of Flora Species at Brock Lands**

Scientific Name	Common Name	Local	Popn.	Hab.	Sens.	Total	Rank
		Occur.	Trend	Dep.	Dev.	Score	TRCA
		1-5	1-5	0-5	0-5	2-20	(03/2009)
<i>Tragopogon dubius</i>	lemon-yellow goat's beard	3				3	L+
<i>Tragopogon pratensis</i> ssp. <i>pratensis</i>	meadow goat's beard	3				3	L+
<i>Trifolium hybridum</i>	alsike clover	5				5	L+
<i>Trifolium pratense</i>	red clover	3				3	L+
<i>Trifolium repens</i>	white clover	3				3	L+
<i>Tussilago farfara</i>	coltsfoot	2				2	L+
<i>Typha angustifolia</i>	narrow-leaved cattail	3				3	L+
<i>Typha x glauca</i>	hybrid cattail	3				3	L+
<i>Ulmus pumila</i>	Siberian elm	4				4	L+
<i>Urtica dioica</i> ssp. <i>dioica</i>	European stinging nettle	4				4	L+
<i>Verbascum thapsus</i>	common mullein	3				3	L+
<i>Verbena bonariensis</i>	cluster-top vervain						L+
<i>Veronica officinalis</i>	common speedwell	3				3	L+
<i>Veronica serpyllifolia</i> ssp. <i>serpyllifolia</i>	thyme-leaved speedwell	5				5	L+
<i>Viburnum lantana</i>	wayfaring tree	4				4	L+
<i>Viburnum opulus</i>	European highbush cranberry	3				3	L+
<i>Vicia cracca</i>	cow vetch	3				3	L+
<i>Vicia tetrasperma</i>	slender vetch	5				5	L+
<i>Pinus resinosa</i>	red pine	2	5	5	5	17	pL2
<i>Cannabis sativa</i>	marijuana	5				5	pL+
<i>Picea pungens</i>	Colorado spruce	5				5	pL+
<i>Pinus banksiana</i>	Jack pine	5				5	pL+
<i>Pinus nigra</i>	Austrian pine	5				5	pL+
<i>Tilia cordata</i>	little-leaf linden	5				5	pL+
<i>Larix decidua</i>	European larch	4				4	pL+
<i>Picea abies</i>	Norway spruce	5				5	pL+
<i>Prunus spinosa</i>	blackthorn	5				5	pL+
<i>Vitis labrusca</i>	fox grape	5				5	pL+

Brock Lands Survey (2002, 2008, 2010 & 2011)

total number of species	579	
planted species	10	2%
naturally-occurring	569	98%
native (not planted)	354	61%
exotic (not planted)	215	37%
L1-L3 species (not planted)* includes LU, and LH	109	19%

Appendix 3: List of Fauna Species at Brock Lands, 2002 to 2011.

Common Name	Code	Scientific Name	number of points			LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
			Brock North	Brock South	combined										
<b>Survey Species:</b> species for which the TRCA protocol effectively surveys.															
<b>Birds</b>															
black and white warbler	BAWW	<i>Mniotilta varia</i>	9		9	1	3	2	4	2	2	5	1	20	L2
blue-winged warbler	BWWA	<i>Vermivora pinus</i>	2	6	8	3	3	2	3	1	2	5	1	20	L2
broad-winged hawk	BWHA	<i>Buteo platypterus</i>		1	1	3	2	3	5	1	4	3	1	22	L2
grasshopper sparrow	GRSP	<i>Ammodramus savannarum</i>	2		2	3	4	3	2	2	3	3	0	20	L2
ruffed grouse	RUGR	<i>Bonasa umbellus</i>		2	2	1	3	3	3	2	2	5	1	20	L2
American woodcock	AMWO	<i>Scolopax minor</i>	(8)	2(7)	2	0	2	3	3	2	2	4	0	16	L3
black-throated green warbler	BTNW	<i>Dendroica virens</i>	3		3	1	4	2	3	1	3	4	0	18	L3
bobolink	BOBO	<i>Dolichonyx oryzivorus</i>	7	1	8	0	3	3	3	1	1	5	1	17	L3
brown creeper	BRCR	<i>Certhia americana</i>	4		4	1	2	2	3	2	2	4	0	16	L3
brown thrasher	BRTH	<i>Toxostoma rufum</i>	9	1	10	0	3	3	2	2	1	4	0	15	L3
clay-coloured sparrow	CCSP	<i>Spizella pallida</i>	3	1	4	3	3	2	2	1	1	4	0	16	L3
common raven	CORA	<i>Corvus corax</i>	1		1	4	1	1	1	1	4	3	0	15	L3
eastern towhee	EATO	<i>Pipilo erythrophthalmus</i>	1	5	6	2	3	2	2	2	1	4	0	16	L3
hooded merganser	HOME	<i>Lophodytes cucullatus</i>	1		1	3	2	2	4	2	2	2	0	17	L3
mourning warbler	MOWA	<i>Oporornis philadelphia</i>	8	1	9	0	3	2	2	2	2	4	0	15	L3
Nashville warbler	NAWA	<i>Vermivora ruficapilla</i>	14	2 (2002)	16	2	1	2	2	1	2	5	1	16	L3
northern harrier	NOHA	<i>Circus cyaneus</i>		1	1	2	3	2	4	1	3	3	0	18	L3
northern waterthrush	NOWA	<i>Seiurus noveboracensis</i>	3		3	1	2	2	3	1	4	5	1	19	L3
ovenbird	OVEN	<i>Seiurus aurocapillus</i>	30	6	36	0	2	3	4	2	4	4	0	19	L3
pileated woodpecker	PIWO	<i>Dryocopus pileatus</i>	3	1	4	0	2	2	4	1	3	3	0	15	L3
pine warbler	PIWA	<i>Dendroica pinus</i>	19	1	20	1	2	2	4	1	3	3	0	16	L3
scarlet tanager	SCTA	<i>Piranga olivacea</i>	1		1	1	2	2	4	1	3	4	0	17	L3
veery	VEER	<i>Catharus fuscescens</i>	21	1	22	1	3	2	3	1	2	5	1	18	L3
white-throated sparrow	WTSP	<i>Zonotrichia albicollis</i>	1	1	2	2	3	2	2	2	1	4	0	16	L3
wild turkey	WITU	<i>Meleagris gallopavo</i>	1	1	2	2	1	0	4	3	4	3	0	17	L3
winter wren	WIWR	<i>Troglodytes troglodytes</i>	6		6	1	2	2	3	2	3	5	1	19	L3
wood duck	WODU	<i>Aix sponsa</i>	1		1	1	2	1	3	2	2	4	0	15	L3
wood thrush	WOTH	<i>Hylocichla mustelina</i>	10	4	14	0	3	2	3	2	2	4	0	16	L3
yellow-rumped warbler	YRWA	<i>Dendroica coronata</i>	1		1	3	1	2	3	1	2	4	0	16	L3
alder flycatcher	ALFL	<i>Empidonax alnorum</i>	x	1	x	1	2	2	1	1	2	4	0	13	L4

**Appendix 3: List of Fauna Species at Brock Lands, 2002 to 2011.**

Common Name	Code	Scientific Name	Brock North	Brock South	combined	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
barn swallow	BARS	<i>Hirundo rustica</i>	x	x	x	0	2	3	1	1	2	1	0	10	L4
belted kingfisher	BEKI	<i>Ceryle alcyon</i>	x		x	0	3	2	2	1	2	2	0	12	L4
blue-grey gnatcatcher	BGGN	<i>Polioptila caerulea</i>	x		x	1	1	1	3	1	1	3	0	11	L4
cliff swallow	CLSW	<i>Petrochelidon pyrrhonota</i>	11		11	2	2	2	1	1	2	1	0	11	L4
common yellowthroat	COYE	<i>Geothlypis trichas</i>	x	x	x	0	2	2	1	2	1	4	0	12	L4
Cooper's hawk	COHA	<i>Accipiter cooperii</i>	1	x	x	0	2	1	4	1	3	2	0	13	L4
eastern kingbird	EAKI	<i>Tyrannus tyrannus</i>	x	x	x	0	4	2	2	1	1	3	0	13	L4
eastern meadowlark	EAME	<i>Sturnella magna</i>	x	2	x	0	3	2	3	1	1	3	0	13	L4
eastern screech-owl	EASO	<i>Otus asio</i>	1		x	0	2	2	1	2	3	3	0	13	L4
eastern wood-pewee	EAWP	<i>Contopus virens</i>	x	x	x	0	4	2	2	1	1	3	0	13	L4
field sparrow	FISP	<i>Spizella pusilla</i>	26	11	37	0	3	2	2	1	1	4	0	13	L4
great-crested flycatcher	GCFL	<i>Myiarchus crinitus</i>	x	x	x	0	2	2	3	1	2	2	0	12	L4
green heron	GRHE	<i>Butorides virescens</i>	1		1	0	3	2	2	1	2	4	0	14	L4
grey catbird	GRCA	<i>Dumetella carolinensis</i>	x	x	x	0	2	2	1	1	1	3	0	10	L4
hairy woodpecker	HAWO	<i>Picoides villosus</i>	x	x	x	0	2	2	3	1	2	2	0	12	L4
indigo bunting	INBU	<i>Passerina cyanea</i>	x	x	x	0	2	2	1	1	2	4	0	12	L4
northern flicker	NOFL	<i>Colaptes auratus</i>	x	x	x	0	3	2	1	1	2	3	0	12	L4
northern rough-winged swallow	NRWS	<i>Stelgidopteryx serripennis</i>	x		x	0	1	2	1	1	3	2	0	10	L4
red-breasted nuthatch	RBNU	<i>Sitta canadensis</i>	x	x	x	0	1	2	3	1	1	2	0	10	L4
red-eyed vireo	REVI	<i>Vireo olivaceus</i>	x	x	x	0	2	2	2	1	1	3	0	11	L4
rose-breasted grosbeak	RBGR	<i>Pheucticus ludovicianus</i>	x	x	x	0	2	2	3	1	2	3	0	13	L4
ruby-throated hummingbird	RTHU	<i>Archilochus colubris</i>		x	x	0	2	2	1	1	2	2	0	10	L4
savannah sparrow	SAVS	<i>Passerculus sandwichensis</i>	x	x	x	0	3	2	1	1	1	4	0	12	L4
spotted sandpiper	SPSA	<i>Actitis macularia</i>	x	x	x	0	2	3	1	2	1	4	0	13	L4
swamp sparrow	SWSP	<i>Melospiza georgiana</i>	1		1	0	1	2	1	2	1	5	1	13	L4
tree swallow	TRES	<i>Tachycineta bicolor</i>	x	x	x	0	2	2	1	1	2	2	0	10	L4
turkey vulture	TUVU	<i>Cathartes aura</i>	1	x	x	4	1	1	1	1	2	1	0	11	L4
white-breasted nuthatch	WBNU	<i>Sitta carolinensis</i>	x	x	x	0	2	2	3	1	2	2	0	12	L4
willow flycatcher	WIFL	<i>Empidonax traillii</i>	x		x	0	4	2	1	1	1	3	0	12	L4
American Crow	AMCR	<i>Corvus brachyrhynchos</i>	x	x	x	0	1	2	1	1	0	0	0	5	L5
American goldfinch	AMGO	<i>Carduelis tristis</i>	x	x	x	0	2	2	1	1	0	1	0	7	L5
American robin	AMRO	<i>Turdus migratorius</i>	x	x	x	0	1	2	1	1	0	1	0	6	L5
Baltimore oriole	BAOR	<i>Icterus galbula</i>	x	x	x	0	2	2	1	1	0	1	0	7	L5
black-capped chickadee	BCCH	<i>Parus atricapillus</i>	x	x	x	0	1	2	1	1	0	1	0	6	L5

**Appendix 3: List of Fauna Species at Brock Lands, 2002 to 2011.**

Common Name	Code	Scientific Name	Brock North	Brock South	combined	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
blue jay	BLJA	<i>Cyanocitta cristata</i>	x	x	x	0	4	2	1	1	0	1	0	9	L5
brown-headed cowbird	BHCO	<i>Molothrus ater</i>	x	x	x	0	2	2	1	1	0	1	0	7	L5
Canada goose	CANG	<i>Branta canadensis</i>	x	x	x	0	1	1	1	2	1	0	0	6	L5
cedar waxwing	CEDW	<i>Bombycilla cedrorum</i>	x	x	x	0	1	2	1	1	0	1	0	6	L5
chipping sparrow	CHSP	<i>Spizella passerina</i>	x	x	x	0	2	2	1	1	0	2	0	8	L5
common grackle	COGR	<i>Quiscalus quiscula</i>	x	x	x	0	3	2	1	1	0	1	0	8	L5
downy woodpecker	DOWO	<i>Picoides pubescens</i>	x		x	0	3	2	1	1	1	1	0	9	L5
eastern phoebe	EAPH	<i>Sayornis phoebe</i>	x		x	0	2	2	1	1	2	1	0	9	L5
house wren	HOWR	<i>Troglodytes aedon</i>	x	x	x	0	2	2	1	2	1	1	0	9	L5
killdeer	KILL	<i>Charadrius vociferus</i>	x	x	x	0	2	2	1	2	0	2	0	9	L5
mallard	MALL	<i>Anas platyrhynchos</i>	x	x	x	0	2	2	1	2	0	1	0	8	L5
mourning dove	MODO	<i>Zenaida macroura</i>	x	x	x	0	2	2	1	1	0	0	0	6	L5
northern cardinal	NOCA	<i>Cardinalis cardinalis</i>	x	x	x	0	2	2	1	1	1	2	0	9	L5
northern mockingbird	NOMO	<i>Mimus polyglottos</i>	x		x	0	2	0	1	1	1	1	0	6	L5
orchard oriole	OROR	<i>Icterus spurius</i>	x		x	2	2	1	1	1	0	1	0	8	L5
red-tailed hawk	RTHA	<i>Buteo jamaicensis</i>	x		x	0	2	2	2	1	1	1	0	9	L5
red-winged blackbird	RWBL	<i>Agelaius phoeniceus</i>	x	x	x	0	2	2	1	1	0	2	0	8	L5
song sparrow	SOSP	<i>Melospiza melodia</i>	x	x	x	0	2	2	1	2	0	2	0	9	L5
warbling vireo	WAVI	<i>Vireo gilvus</i>	x	x	x	0	1	2	1	1	1	2	0	8	L5
yellow warbler	YWAR	<i>Dendroica petechia</i>	x	x	x	0	1	2	1	1	1	3	0	9	L5
European starling	EUST	<i>Sturnus vulgaris</i>	x	x	x										L+
<b>Herpetofauna</b>															
grey treefrog	TGTF	<i>Hyla versicolor</i>	1	2	3	1	3	3	3	4	2	5	1	22	L2
northern spring peeper	SPPE	<i>Pseudacris crucifer crucifer</i>	8	4	12	0	2	3	3	4	3	5	1	21	L2
wood frog	WOFR	<i>Rana sylvatica</i>	13	2	15	0	2	3	3	4	3	5	1	21	L2
northern leopard frog	LEFR	<i>Rana pipiens</i>	2	1	3	0	3	2	1	4	2	5	1	18	L3
American toad	AMTO	<i>Bufo americanus</i>	x	x	x	0	3	2	1	4	0	4	0	14	L4
green frog	GRFR	<i>Rana clamitans</i>	x	x	x	0	2	2	1	3	1	4	0	13	L4
<b>Incidental Species: species that are reported on as incidental to the TRCA protocol.</b>															
<b>Mammals</b>															
meadow jumping mouse	MJMO	<i>Zapus hudsonius</i>	1		1	3	2	2	2	3	2	3	0	17	L3

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Common Name	Code	Scientific Name	Brock North	Brock South	combined	LO	PTn	PTt	AS	PIS	HD	StD	+	TS	L-Rank
beaver	BEAV	<i>Castor canadensis</i>	x		x	1	2	1	2	3	1	3	0	13	L4
eastern chipmunk	EACH	<i>Tamias striatus</i>	x	x	x	0	2	2	2	3	1	3	0	13	L4
eastern cottontail	EACO	<i>Sylvilagus floridanus</i>	x	x	x	0	2	2	1	3	1	2	0	11	L4
muskrat	MUSK	<i>Ondatra zibethicus</i>	x		x	1	2	2	1	3	1	3	0	13	L4
red squirrel	RESQ	<i>Tamiasciurus hudsonicus</i>	x	x	x	0	2	2	1	3	1	2	0	11	L4
white-tailed deer	WTDE	<i>Odocoileus virginianus</i>	x	x	x	0	2	1	3	2	2	1	0	11	L4
woodchuck	WOOD	<i>Marmota monax</i>	x		x	1	2	2	1	3	0	1	0	10	L4
coyote	COYO	<i>Canis latrans</i>	x		x	0	2	2	1	3	0	1	0	9	L5
grey squirrel	GRSQ	<i>Sciurus carolinensis</i>	x	x	x	0	2	2	1	3	0	0	0	8	L5
raccoon	RACC	<i>Procyon lotor</i>	x	x	x	0	2	2	1	3	1	0	0	9	L5
striped skunk	STSK	<i>Mephitis mephitis</i>		x	x	1	2	2	1	3	0	0	0	9	L5
domestic cat	DOCA	<i>Felis catus</i>		x	x										L+
<b>Herpetofauna</b>															
common snapping turtle	SNTU	<i>Chelydra serpentina serpentina</i>	3		3	2	3	3	1	5	2	5	2	23	L2
midland painted turtle	MPTU	<i>Chrysemys picta marginata</i>	2		2	1	2	2	1	5	1	4	1	17	L3
northern red-bellied snake	RBSN	<i>Storeria occipitomaculata</i>	1		1	3	2	2	2	3	1	5	1	19	L3
eastern gartersnake	EAGA	<i>Thamnophis sirtalis sirtalis</i>	x		x	0	2	2	1	3	0	3	0	11	L4
<b>LEGEND</b>															
LO = local occurrence		PIS = Patch Isolation Sensitivity													
PTn = population trend, continent-wide		STD = sensitivity to development													
PTt = population trend, TRCA		+ = additional points													
HD = habitat dependence		TS = total score													
AS = area sensitivity		L-rank = TRCA Rank, October, 2008													