



# Bethesda Side Road and Leslie Street Study Area

**Terrestrial Biological Inventory  
and Assessment**

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

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# Table of Contents

	page
<b>1.0 Introduction.....</b>	<b>1</b>
1.1 TRCA's Terrestrial Natural Heritage Program .....	1
<b>2.0 Study Area Description .....</b>	<b>2</b>
<b>3.0 Inventory Methodology .....</b>	<b>3</b>
3.1 Landscape Analysis .....	4
3.2 Vegetation Community and Species .....	5
<b>4.0 Results and Discussion.....</b>	<b>6</b>
4.1 Regional Context.....	6
4.2 Quantity of Natural Cover.....	7
4.3 Habitat Patch Findings for Bethesda Side Road and Leslie Street Study Area .....	7
4.4 Vegetation Community Findings for Bethesda Side Road and Leslie Street Study Area.....	8
4.4.1 Vegetation Community Representation .....	8
4.4.2 Vegetation Communities of Conservation Concern .....	9
4.5 Flora Findings for Bethesda Side Road and Leslie Street Study Area .....	10
4.5.1 Flora Species Representation.....	10
4.5.2 Flora Species of Concern .....	10
4.6 Fauna Findings for Bethesda Side Road and Leslie Street Study Area.....	12
4.6.1 Fauna Species Representation.....	12
4.6.2 Fauna Species of Concern .....	12
<b>5.0 Recommendations.....</b>	<b>16</b>
5.1 Site Highlights .....	17
5.2 Site Recommendations.....	17
<b>6.0 References .....</b>	<b>20</b>

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## List of Tables

Table 1: Habitat patch quality, rank and species response.....	4
Table 2: Schedule of the TRCA biological surveys at Bethesda Side Road and Leslie Street Study Area.....	6
Table 3: Summary of Vegetation Communities, Bethesda and Leslie .....	8
Table 4: Summary of Flora Species, Bethesda and Leslie .....	10
Table 5: Summary of Fauna Species, Bethesda and Leslie .....	13

## List of Maps

Map 1: Bethesda Side Road and Leslie Street Study Area in the Context of Regional Natural Cover .....	22
Map 2: Bethesda Side Road and Leslie Street Study Area.....	23
Map 3: Regional Natural System Habitat Patch Quality .....	24
Map 4: Distribution of Fauna Regional Species of Concern .....	25
Map 5: Habitat Patch Size Scores with Fauna Area Sensitivity Scores .....	26
Map 6: Scores for Matrix Influence and Flora Sensitivity to Development .....	27
Map 7: Scores for Matrix Influence and Fauna Sensitivity to Development .....	28
Map 8: Habitat Patch Quality .....	29
Map 9: Vegetation Communities with their Associated Local Ranks.....	30
Map 10: Location of Flora Species of Concern .....	31
Map 11: Flora Habitat Dependence Scores .....	32
Map 12: Location of Fauna Species of Concern .....	33
Map 13: Fauna Species of Concern Habitat Dependence Scores .....	34

## List of Appendices

Appendix 1: List of Vegetation Communities.....	35
Appendix 2: List of Flora Species .....	36
Appendix 3: List of Fauna Species .....	42

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## 1.0 Introduction

In 2011 the Toronto and Region Conservation Authority (TRCA) conducted flora and fauna inventories of the area south of Bethesda Side Road and east of Leslie Street to document species and vegetation communities. As shown in Map 1, the study area is located in a headwater area of the Rouge watershed within the Oak Ridges Moraine planning boundary and in the Town of Richmond Hill. Additional inventory information is available from the field surveys conducted by AECOM in April of 2009 (AECOM 2009). These additional records are included and indicated in the site fauna lists when the records satisfy the criteria imposed by the TRCA's field protocol.

The purpose of the work conducted by the TRCA during the 2011 field season was to *provide site-specific advice for future management decisions*. In order to provide this advice, detailed field work was undertaken to *characterize the terrestrial natural heritage features* of the study area. Once characterized, the site features can then be understood within the larger regional context of the Terrestrial Natural Heritage Program of the TRCA. The health of the natural system is measured at the regional scale and individual 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.

Bethesda Side Road and Leslie Street study area has been directly affected by and has contributed to the overall trend of continuous and incremental losses of natural cover and species. The large gap in natural cover that occurs between the ORM and Rouge Park (at the base of the watershed) has resulted from an even higher amount of cumulative loss. There is a great opportunity to improve the habitat at this site and thus help to increase habitat connections across the Rouge watershed and ORM natural systems.

## 2.0 Study Area Description

Bethesda Side Road and Leslie Street study area is located in a headwater area of the Rouge watershed, in the Town of Richmond Hill, York Region. It lies in the block of land delineated by Leslie Street to the west, Highway 404 to the east, Bethesda Side Road to the north and Stouffville Road to the south. The Canadian National Railway (CNR) track divides the area into east and west, and Berczy Creek and two smaller tributaries run southeast on the east side of these tracks. Approximately one half of the concession block (a northeast portion and a southeast portion) was not accessed and has been excluded from the study area boundary.

The land lies entirely within the Great Lakes – St. Lawrence floristic region, composed of mixed coniferous-deciduous forest. At the coarse physiographic level, the site is mostly situated within the South Slope zone where surface geology consists primarily of glacial till of sandy silt to sand. The northwest corner lies within the Oak Ridge Moraine zone, a landform with varying soil types and significant water recharge capabilities. According to the Soil Survey of York County – Report No. 19 of the Ontario Soil Survey (Hoffman and Richards 1955), the majority of the study area is composed of Peel Clay soils that are imperfectly drained and were formed largely from stone free lacustrine materials. The soils to the east of Berczy Creek are composed of Milliken Loam and are considered imperfectly to moderately well drained. Both soils are classified as productive from an agricultural perspective. In the past the surveyed land was used for agriculture; that now appears to have been abandoned.

The land base surrounding the study area is primarily agricultural (Map 2), with high quality forest and kettle lake complexes to the west and north and larger forest patches to the southwest. The study area is surrounded by two provincially significant wetland complexes: Rouge River Headwaters and Wilcox-St. George complexes with a small wetland of the latter within the study area. Additionally, there are four different Areas of Natural and Scientific Interest (ANSI) in close proximity to the study area: Simeon Lake, Wilcox Lake Wetlands and Uplands, Jefferson Forest, and Heise Hill and three Environmentally Significant Areas (ESA's): Simeon Lake Forest Complex, Wilcox Lake Bog, and Jefferson Forest. Very little recreational traffic was observed other than occasional use by local residents.

### 3.0 Inventory Methodology

A biological inventory of Bethesda Side Road and Leslie Street study area was conducted at the levels of habitat patch (landscape analysis), vegetation community, and species (flora and fauna) according to the TRCA methodologies for landscape evaluation (TRCA 2007c) and field data collection (TRCA 2007d). Habitat patch mapping was excerpted from the regional 2007/2008 mapping of broadly-defined patch categories (forest, wetland, meadow, successional, and beach/bluff) 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 was conducted in (Table 2).

Vegetation community designations were based on the Ecological Land Classification (ELC) and determined to the level of vegetation type (Lee *et al.* 1998). Community boundaries were outlined onto printouts of 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. When necessary, flora specimens or photos were sent for identification verification to the appropriate authorities.

A fauna survey of the site was conducted by the TRCA in April to June of 2011. The spring survey searched primarily for frog species of regional concern but recorded incidentally the presence of any early-spring nocturnal bird species (owls and American woodcocks, *Scolopax minor*). Surveys in late May and June 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 twice during the breeding season to determine the breeding status of each mapped point. The methodology for identifying confirmed and possible breeding birds follows Cadman *et al.* (2007). The protocol dictates that 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 late May or 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 Bethesda Side Road and Leslie Street Study Area**

Survey Item	Survey Dates	Survey Effort (hours)
Patch / Landscape	2007/08 ortho-photos	21 hours
Vegetation Communities and Flora Species	May 18 <sup>th</sup> , June 17 <sup>th</sup> , August 3 <sup>rd</sup> and 18 <sup>th</sup> , 2011.	Approximately 17 hours
Frogs and Nocturnal Spring Birds	April 10 <sup>th</sup> , 2011.	0.25 hours
Breeding Songbirds	May 30 <sup>th</sup> and June 21 <sup>st</sup> , 2011.	6.25 hours

## 4.0 Results and Discussion

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

### 4.1 Regional Context

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

At the regional level, analysis of habitat patches shows that the present average patch quality for the entire TRCA jurisdiction is “fair” (L3). Thus the existing natural system stands below the quality target for the region (L2, “good”) which requires 30% forest and wetland cover. Furthermore the existing natural cover has a very unbalanced distribution, with large patches of forest and wetland cover restricted largely to the northern half of the TRCA jurisdiction, especially on the Oak Ridges Moraine (ORM) (Map 3). The distribution of fauna species of concern is similarly distributed with a bias to the northern part of the jurisdiction; fauna species of regional concern are generally absent from the urban matrix (see Map 4). The regional picture, being the result of a long history of land use changes, confirms that *all* site-based decisions contribute to the condition of a region.

Only in the Rouge watershed and the neighbouring Duffins watershed does the distribution of natural cover differ markedly from the regional average. In the Rouge watershed, the majority of forest cover is situated south of Steeles Avenue; a result of the long period of protection afforded the lower Rouge watershed by the creation of the Rouge Park. In the vicinity of Bethesda Side Road and Leslie Street study area is another spot of higher density natural cover that would

ideally, in the future be strongly connected with Rouge Park through a watershed-wide natural system.

## 4.2 Quantity of Natural Cover

The area of the Rouge River watershed is approximately 33,288 ha with 22% natural cover including 4,010 ha as forest (12%), 2,841 ha as meadow (9%) and 243 ha as wetland (<1%). Bethesda Side Road and Leslie Street study area is about 50 ha, and all but the mowed hydro corridor in the northwest is natural cover (Appendix 1). There is 7.3 ha of forest, 6.2 ha of successional, 5.7 ha of wetland (including 3.7 ha of treed or shrub swamp), and 28.4 ha of meadow. The study area contains 0.1% of the total natural cover in the Rouge watershed.

## 4.3 Habitat Patch Findings for Bethesda Side Road and Leslie Street Study Area

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

### Habitat Patch Size and Shape

The study area scores mainly “fair” for size (Map 5) and mainly “poor” or “very poor” for shape. A large portion of the site was not analyzed at the landscape scale because in 2007/08 large areas were in agricultural use. In 2011, those same fields had not been cultivated for at least a couple of years and were therefore inventoried (compare to Map 9).

### Habitat Patch Matrix Influence

The entire habitat in the study area is ranked as “fair” for matrix influence (i.e. scores three out of a possible five points, see Maps 6 and 7). This score is as expected given the neutral influence afforded a largely agricultural landscape, and the fact that there is little by way of extensive patches of natural cover within the immediate landscape.

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 total score, or combination of matrix influence and habitat patch size and shape, results in an overall “fair” to “poor” or L3/L4 habitat patch quality, with the site split between the “poor” patch scores to the east of the railway tracks, and “fair” to the west (Map 8). 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. Benefits that might result from higher scores may be negated by very poor vegetation community conditions (e.g. heavy infestations of dog-strangling vine (*Cynanchum rossicum*) and European buckthorn (*Rhamnus cathartica*) or large amounts of trampling or dumping).

## 4.4 Vegetation Community Findings for Bethesda Side Road and Leslie Street Study Area

### 4.4.1 Vegetation Community Representation

The area of the vegetation communities surveyed is 47.6 ha, most of which was previously cultivated and disturbed in other ways. A total of 22 different ELC vegetation community types were described (listed in Appendix 1 and summarized in Table 3). There are 8 forest communities (5 natural forest, 3 plantation), 3 successional communities, 9 wetland communities, and 2 meadow communities. Eight of these ELC vegetation communities were recorded solely as complexes and/or inclusions within other communities.

**Table 3. Summary of Vegetation Communities, Bethesda and Leslie**

Class	Number of Types	Area (hectares)
Natural Forest	5	7.3
Plantation	3	0 (Inclusion/complex)
Successional	3	6.2
Meadow	2	28.4
Wetland	9	5.7
Aquatic	0	0
Dynamic (beach,bluff, barren)	0	0
Total	22	47.6

The site has 7.3 ha of forest, 15% of the natural cover in the study area. There are three mature forests along Leslie Street one of which is showing signs of heavy trampling and use as a local garbage dump and another has a large amount of garbage dumped adjacent to what was a bee yard (personal communication 2011). One forest community is coniferous and exotic: Dry-Fresh Scots Pine Coniferous Forest (FOC1-a), Two are mixed: Dry-Fresh White Pine - Hardwood Mixed Forest (FOM2-A) and Fresh-Moist Hardwood Mixed Forest (FOM8-B), and one is deciduous: Dry-Fresh Sugar Maple - Black Cherry Deciduous Forest (FOD5-7). An inclusion: Fresh-Moist Poplar Deciduous Forest (FOD8-1) is found within the larger FOM8-B.

Plantations are small and found within larger polygons and include: Hybrid Poplar Deciduous Plantation (CUP1-4), Scotch Pine Coniferous Plantation (CUP3-3), and White Cedar Coniferous Plantation (CUP3-G).

Successional semi-woody habitat covers 6.2 ha or 13 % cover. Native treed hedgerows (CUH1-A) surround some of the meadows, the Exotic Successional Savannah (CUS1-b) is composed mostly of exotic conifers such as Scots pine (*Pinus sylvestris*), and the Exotic Successional Woodland (CUW1-b) is full of deciduous exotic species such as apple (*Malus pumila*) and common buckthorn (*Rhamnus cathartica*).

Wetlands are found in and along the streams. They occupy 5.7 ha or 12% of the natural cover in the study area. There are five swamps: Manitoba Maple Mineral Deciduous Swamp (SWD3-4), Willow Mineral Deciduous Swamp (SWD4-1), Paper Birch - Poplar Mineral Deciduous Swamp (SWD 4-3), Willow Mineral Thicket Swamp (SWT2-2), and Red-osier Mineral Thicket Swamp (SWT2-5). The thicket swamps are found in the northwest block and the deciduous swamps are in the southeast block of the surveyed area. With the exception of a Narrow-Leaved Cattail Mineral Shallow Marsh (MAS2-1b) ditch, all marshes are found in the same southeast block. They are: a Forb Mineral Meadow Marsh (MAM2-10), a Common Reed Mineral Meadow Marsh (MAM2-a) inclusion, a Broad-leaved Cattail Mineral Shallow Marsh (MAS2-1A) inclusion and complex, and two Narrow-Leaved Cattail Mineral Shallow Marsh (MAS2-1b) and one inclusion.

Bethesda Side Road and Leslie Street study area is mostly composed of meadow, totalling 28.4 ha or 60% of total natural cover. Big patches of meadow cover recently abandoned agricultural fields both east and west of the CNR tracks. Exotic Forb Meadow (CUM1-c) predominates, with lesser coverage of Native Forb Meadow (CUM1-A) with a high proportion of native goldenrods (*Solidago altissima* and *S. canadensis*).

#### **4.4.2 Vegetation Communities of Conservation Concern**

The vegetation communities that occur in the TRCA jurisdiction are scored and given a local rank from L1 to L5 based on the two criteria mentioned in Section 3.0. Vegetation communities with a rank of L1 to L3 are considered of regional conservation concern in the jurisdiction while L4 communities are considered of concern in the urban portion of the jurisdiction. The Bethesda Side Road and Leslie Street study area lies within the rural landscape and so L1 to L3 communities are mapped. On the other hand, community ranks do not take into account the intactness or quality of individual examples of communities. There is only one community of conservation concern surveyed within the study area (ranked L3): Fresh-Moist Hardwood Mixed Forest (FOM8-B) composed mainly of white ash (*Fraxinus americana*), white pine (*Pinus strobus*), apple, and sugar maple (*Acer saccharum saccharum*). This forest community type is of conservation concern because it is uncommon in the TRCA jurisdiction, although this particular example is heavily disturbed and small.

## 4.5 Flora Findings for Bethesda Side Road and Leslie Street Study Area

### 4.5.1 Flora Species Representation

Floristic surveys conducted throughout Bethesda Side Road and Leslie Street study area in 2011 identified a total of 184 species of vascular plants (Appendix 2 and Table 4). These included 179 naturally-occurring species and 5 planted species. Of the non-planted species, 114 are native (64%). The low biodiversity of this site (compared to the more biologically rich ANSI's nearby) is most likely due to the small size of forest and wetland communities, historical and ongoing human disturbance and use of the land, and fertile yet disturbed post-agricultural habitats that are dominated by exotics.

**Table 4. Summary of Flora Species, Bethesda and Leslie**

Total # of species	184
Naturally-occurring species	179
Planted only species	5
Native species	114
Non-native species	65
Number of L1 - L3 species	7
Number of L4 species	33

### 4.5.2 Flora Species of Concern

There are seven vascular plant species of regional conservation concern (ranked L3) at Bethesda Side Road and Leslie Street study area, one of which was planted, white spruce (*Picea glauca*). Appendix 2 lists plant species by ranks and locations are shown on Map 10. The ranks are based on sensitivity to human disturbance associated with development; and habitat dependence, as well as on rarity (TRCA 2010). In most cases, the species are not currently rare but are at risk of long-term decline due to the other criteria. An additional 33 species are ranked L4 but are not discussed below as the study area is in a rural matrix.

None of these plants are regionally rare (found in six or fewer of the forty-four 10x10 km UTM grid squares that cover the TRCA jurisdiction). However butternut (*Juglans cinerea*), a species at risk, occurs along an old driveway off Leslie Street. This species of concern is designated as endangered both provincially and federally.

All of the flora species of concern are sensitive to development, being vulnerable to at least one kind of disturbance that is associated with land use changes (see Map 6 for sensitivity to development scores). These changes could be hydrological changes, nutrient inputs or abundance of invasive species for example. The wetland plants such as bulblet-bearing water-hemlock (*Cicuta bulbifera*) and foxtail wood sedge (*Carex alopecoidea*) are examples of species vulnerable to hydrological changes. Nutrient and salt inputs (e.g. from stormwater, agriculture or

fill dumping) also can affect wetlands; invasive alien species such as common reed (*Phragmites australis*) and narrow-leaved cattail (*Typha angustifolia*) are taking hold in some of the wetlands. These invasive species along with others such as purple loosestrife (*Lythrum salicaria*) thrive in disturbed wetlands (Galatowitsch *et al.* 1999). Common reed can quickly displace smaller and more sensitive wetland species.

Forest ground layer species such as cut-leaved toothwort (*Cardamine concatenata*) are also vulnerable to invasive species such as dog-strangling vine (*Cynanchum rossicum*) and common buckthorn.

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. West of the hydro corridor is the only location trampling and dumping (from local residents presumably) was noticed. Garden refuse can also introduce many exotic and sometimes invasive species that out-compete native flora.

Some species may be deliberately removed if they are seen: species such as white and red trilliums (*Trillium grandiflorum* and *T. erectum*) and wild leek (*Allium tricoccum*) are not currently species of conservation concern, but they are vulnerable to wild harvesting.

Habitat fragmentation can lead to increased populations of herbivores such as white-tailed deer (*Odocoileus virginianus*); deer are significantly changing the species abundance and diversity of the forest floor in the Greater Toronto Area. Current evidence of deer browse was not obvious during field work, but it is very likely to have had some impact on the forests.

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 11. Roughly, they are found in seven or fewer vegetation cohorts (groupings of vegetation types with similar floristic characteristics) (TRCA 2010). They will not readily recover when these habitats are lost or altered. Some examples of forest species of the more moist communities include Canada yew (*Taxus canadensis*) that grows with hemlock or other conifers, and butternut. Cut-leaved toothwort grows typically only in dry sugar maple forests and blue-eyed grass (*Sisyrinchium montanum*) is found in a relatively broad range of habitats from conifer thickets to mineral fens and meadow marshes; in the study area it was found at the edge of a moist Scots Pine forest (FOC1-a). Bulblet-bearing water-hemlock is typically found in organic swamps and meadow marshes; it was found in a forb meadow marsh (MAM2-10) at the study area. Foxtail wood sedge is found in the narrow leaved cattail mineral shallow marsh (MAS2-1b) but can also occur in deciduous swamps.

### **Non-Native Invasive Species**

Non-native species and in many cases, invasive non-native species occur in larger abundance than native species in most of the surveyed area (the exception being the forests along Leslie Street). The invasive species posing the greatest threat to habitats in the study area are dog-



strangling vine, common buckthorn, common reed, and Scots pine. Dog-strangling vine doesn't currently dominate any communities however its abundance will likely increase. This plant is a formidable threat (TRCA 2008) and can easily become the dominant ground layer species in most upland habitats except for larger mature forests. Biological control is the best long-term hope for dealing with it.

Scots pine is regenerating in the northwest and southeast blocks of the surveyed area. The main threat from this tree is that it regenerates quite fast and exotic species do much better under a Scots pine canopy outcompeting native species.

Common reed is probably the main threat to the wetland habitats as it forms monocultures. During the survey it was only recorded as an inclusion in the small channel in the northwest block of the study area. Narrow-leaved cattail is found along the disturbed watercourse in the southeast and can out-compete the native broad-leaved cattail (*Typha latifolia*). Other invasive species that occur at Bethesda Side Road and Leslie Street study area include Autumn olive (*Elaeagnus umbellata*), multiflora rose (*Rosa multiflora*), purple loosestrife and a few more. Most of the exotic meadow species such as common ragweed (*Ambrosia artemisiifolia*) will eventually be out-competed by aggressive natives such as goldenrods and asters (*Aster* spp.) as long as the meadows are left fairly undisturbed.

## **4.6 Fauna Findings for Bethesda Side Road and Leslie Street Study Area**

### **4.6.1 Fauna Species Representation**

The TRCA fauna surveys at the Bethesda Side Road and Leslie Street study area in 2011 documented a total of 42 bird species, 5 mammals, and 3 herpetofauna species, bringing the total number of possible breeding vertebrate fauna species identified by the TRCA to 50. Four additional bird species and a lone mammal species (all L5 ranked species, secure within the TRCA jurisdiction) can be added from the spring survey conducted by AECOM in 2009, giving an overall total of 55 species. This total is rather low considering the northerly location and the variety of habitat types available within the study area; several species that should have been expected to be present on the site – including great-crested flycatcher (*Myiarchus crinitus*), mourning warbler (*Geothypis philadelphia*) and bobolink (*Dolichonyx oryzivorus*) - were reported during the initial breeding bird survey visit in late May but these records did not fall within the protocol date thresholds for inclusion as potential breeding species. Refer to Appendix 3 for a list of the fauna species and their corresponding L-ranks.

### **4.6.2 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 Bethesda Side Road and Leslie Street study area reported just three bird species of regional concern (L1 to L3), all ranked as L3: brown thrasher (*Toxostoma rufum*), pine warbler (*Setophaga pinus*) and vesper sparrow (*Pooecetes gramineus*). This latter species was mapped as singing from agricultural habitat just outside of the study area, but in fact was just as likely to be nesting at the field edge on the site boundary. In addition, there were two frog species of regional concern: the L2 ranked wood frog (*Lithobates sylvatica*) and spring peeper (*Pseudacris crucifer*). This brings the total to a very low five fauna species of regional concern (Table 5). Locations of these breeding fauna are depicted on Map 12. Three males of the aforementioned bobolink – assigned Threatened status on the provincial Species At Risk list - were reported from the late spring visit and it was somewhat surprising that these individuals did not maintain territories through the summer. The close proximity of the extremely busy and noisy Hwy 404 on the eastern edge of the study area may have had some influence.

**Table 5: Summary of Fauna Species, Bethesda and Leslie**

Fauna	# species	# L1–L3: Species of Regional Concern	# L4: Species of Urban Concern	Total #L1-L4: Species of Regional or Urban Concern
birds	46	3	22	25
herps	3	2	1	3
mammals	6	0	2	2
<b>TOTALS</b>	55	5	25	30

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

None of the fauna species of regional concern (ranked L1 to L3) reported from the study area are considered regionally rare. The L4 ranked turkey vulture (*Cathartes aura*), a species which has been reported as a breeding species in fewer than ten of the 10x10 km grid squares, was observed on several occasions over the site but these reports may have referred to foraging individuals, although opportunities for nesting do exist on the site.

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

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

Fauna species are considered to have a high sensitivity to development if they score three or more points (out of a possible five) for this criterion. At the Bethesda Side Road and Leslie Street study area all five 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 7).

Brown thrasher and vesper sparrow are low-nesting or ground-nesting birds and as such are 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 two other high scoring sensitive species - wood frogs and spring peeper - in their upland summer-foraging and over-wintering habitat.

The low richness and low representation of higher ranked species at this site is surprising since the landscape is still largely rural. Currently, direct disturbance across much of the site seems to be quite low, with only local residents accessing the woodlot and the open habitats either side of the railway. The main matrix influence is the close proximity of Highway 404 on the eastern border of the site. 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. Although it appears that such public use of this site is intermittent and sparse, TRCA staff were informed that the meadows east of the railway tracks are used as a dog-training facility. Such use would certainly explain the absence of any sensitive ground-nesting birds such as bobolinks. The three territorial male bobolinks were present early in the season but then absent on subsequent visits, suggesting that the birds had been disturbed.

Noise from traffic travelling on the neighbouring highway may also have some negative impacts on species attempting to hold territories in the meadow habitat close by, and perhaps explains the absence of any wetland species of regional concern in the small wetlands associated with the creeks that run through the eastern half of the site. Swamp sparrow (*Melospiza georgiana*) and common yellowthroat (*Geothlypis trichas*), both ranked L4, were the only bird species of any significance recorded in these wet areas.

**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  $\geq 5$  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).

Three area sensitive fauna species of regional conservation concern - pine warbler, wood frog and spring peeper – occur at the Bethesda Side Road and Leslie Street study area. Pine warbler has been identified as a species that requires in excess of 20 ha of continuous coniferous or mixed forest to establish a successful territory. The forest cover at the study area does not satisfy this requirement but given that this species has undergone a dramatic increase throughout much of its range in Ontario (Cadman, 2007) it may be that the ecology of the species, including its previous preference for larger expanses of forested habitat, is changing. Certainly, the species is one of the few L3 ranked species that is encountered with any real regularity as a breeding species in the City of Toronto's ravine system – a measure of the species' changing status and perhaps ecology.

The two frog species both score 3 points a piece for Area Sensitivity, a consequence of their requirement for a combination of upland foraging/wintering habitat and wetland breeding opportunities. The largest forest patch at the Bethesda Side Road and Leslie Street study area is almost 9 ha, extending to as much as 12 ha if successional forest is included. This more than satisfies the two species' requirement for foraging and overwintering opportunities, and the presence of small vernal pools within this block and larger ponds to the west of Leslie Street provide breeding opportunities. Area sensitive meadow-species are also provided with plenty of open-habitat to satisfy their requirements – at least 28 ha of habitat identified as “meadow” by the TRCA's ELC field data, and large areas of agricultural lands - and therefore, again, it is surprising that the meadow species are so poorly represented on this site.

Species' patch-size preferences can be 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. Generally, such habitat needs are more likely satisfied within a larger extent of natural cover. One species, which until recently was considered highly area sensitive – requiring in excess of 20 ha of forest habitat - is Cooper's hawk. This species has been so successful in adapting to nesting opportunities provided by mature trees in downtown city ravines (and a ready supply of prey items), that it is no longer considered a species of regional concern. Therefore its presence in the small forest patch at the Bethesda and Leslie study area is not considered particularly significant.

**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).

Both frog species of regional concern that occur at the Bethesda Side Road and Leslie Street study area score high for patch isolation sensitivity. These herpetofaunal species are highly mobile, moving considerable distances across the local landscape to and from breeding and wintering habitats. The woodland habitat in the western half of the site appears to accommodate the non-breeding element of these species' life-cycle – over-wintering and summer foraging – but observations of both species on the stretch of Leslie Street along the western boundary suggest that animals have to leave the site to reach wetlands where they can breed. It is unlikely that all of the life-cycle requirements of these species are currently satisfied by habitats available within the site boundaries. In April 2011 observations along Leslie Street in the vicinity of the site included a report of five dead (roadkill) spring peepers, and a gravid female wood frog crossing east to west toward potential breeding ponds. If traffic volume on this road increases there would be an increase in the number of roadkill incidents for both of these species.

Fauna species that score greater than three points under the **habitat dependence** criterion are considered habitat specialists (Map 13). These species exhibit a combination of very specific habitat requirements that range from the microhabitat (e.g. decaying logs, aquatic vegetation) and requirements for particular moisture conditions, vegetation structure or spatial landscape structures, to preferences for certain community series and macro-habitat types. Only three fauna species that occur in the study area are considered habitat specialists, each associated primarily with forest habitat.

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 only a very low number of habitat dependent species, in particular, species that are dependent on forest, indicates that the forest habitat in the study area is not functioning at a particularly high level.

## 5.0 Recommendations

The recommendations for Bethesda Side Road and Leslie Street study area are given in relation to the regional targets for natural heritage in the TRCA jurisdiction. To reach the regional targets for

quality distribution and quantity of natural cover, every site will require its own individualized plan of action. Following is a short summary of the study area within the regional context, followed by specific recommendations.

## 5.1 Site Highlights

1. Adjacent to the Oak Ridges Moraine and surrounded by a matrix of relatively high quality habitat, the study area has the potential to contribute to a higher functioning natural system (i.e. the Terrestrial Natural Heritage target system).
2. Twenty-two vegetation types were observed, including 8 forest communities (5 natural forest, 3 plantation), 3 successional communities, 9 wetlands, and 2 meadows types (8 of these are inclusions and complexes).
3. The site accommodates one vegetation community of conservation concern - a small, disturbed Fresh-Moist Hardwood Mixed Forest (FOM8-B).
4. One hundred and eighty-four flora species were observed of which seven are species of conservation concern (L1 to L3); flora species of concern were associated with wetland, successional, and forest habitats.
5. One flora Species at Risk was documented in the study area; Butternut (ranked L3). is a species at risk A total of just 55 terrestrial fauna species was reported from the study area (combining reports from the TRCA and from AECOM), very low given both the northerly location and rural matrix of the site.
6. The forest component of the site provides foraging and overwintering opportunities for both wood frog and spring peeper, species that are an important feature of the local landscape.
7. The meadow habitat on the site accommodates many L4 open habitat species but is surprisingly lacking in L3 ranked species representation. This may be due to the proximity of Hwy 404, local agricultural practices, or the reported use of the meadow as a dog-training facility (personal communication 2011).

## 5.2 Site Recommendations

In order to restore and maintain a healthy level of biodiversity at the Bethesda Side Road and Leslie Street study area, the overall integrity of the natural heritage system that includes the site must be protected. Therefore, habitat patch size and shape need to be optimized so as to provide large enough habitat patches with interior habitat to support sensitive flora and fauna sustainably. In addition, connectivity between natural habitats within and beyond the site boundaries must be improved.

Furthermore, if development proceeds in and around this rural site, habitat quality and integrity must be protected from the negative matrix influences described in the body of the report. This includes managing public use, allowing healthy dynamic natural processes to proceed, buffering the more sensitive habitat, and controlling invasive species.

The following recommendations address the above natural heritage concerns, with an emphasis on bolstering the rather limited forest cover on the site and re-establishing connectivity along this section of the Oak Ridges Moraine. It is recommend overall that **1) existing habitats and features be protected and enhanced**, and **2) the site be managed as an element in the west-east connection along the Oak Ridges Moraine**.

### 1) Protect and Enhance Existing Features

The first priority should be to focus on **enhancing conditions that will allow existing communities of species of conservation concern to thrive**. Currently, neither the west-side forest nor the meadow habitats are fully functioning with respect to fauna.

- a) Increase forest cover through strategic plantings and managed regeneration to improve the patch size and shape to 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.
- b) Maintain conditions for existing communities or species of conservation concern. Ecological restoration should focus on efforts that allow these species to thrive and expand.
- c) Consider enhancing and expanding wetland habitats associated with the creeks in the eastern section of the study area.
- d) Identify ways of controlling sources of disturbance such as nutrient input and trampling. This would in turn help to manage harder to control invasive species such as dog-strangling vine, common reed, and common buckthorn. Competitive plantings may play a role in containing exotic invasions, and biological control may act in the longer term.
- e) Include the removal of invasive species in restoration plans when feasible (such as Scots pine and common reed).
- f) Direct visitor pressure away from locations of flora and fauna species of concern. Target non-sensitive areas in restoration plans unless they are invasive species removal projects or inter-planting projects that are carefully planned and carried out.
- g) Should trails be installed, educate visitors as to which activities can diminish biodiversity and ecosystem function, and which can positively impact the area.

- h) If indeed bobolinks have been prevented from nesting in the eastern meadow by dog-training activities then management needs to act accordingly on behalf of this protected species. Perhaps the best course of action would be to prohibit dogs for the duration of the late spring and early summer nesting season of this species.

## **2) Re-establish Connectivity Along this Section of the Oak Ridges Moraine**

At the broader landscape scale, the study area becomes significant as a potential link between larger areas of natural habitat along the Oak Ridges Moraine Corridor – namely between the Jefferson/West Gormley forest to the south and west and the Bloomington Wetland complex to the north-east. The loss of even small elements of natural connections in this landscape exert considerable stress on the natural flow and dispersal of native terrestrial fauna across the landscape, which in turn has serious implications for the persistence of local fauna populations. This is especially true for the amphibian species which are known to be using the study area and which are already under considerable pressure from other developments within the landscape.

- a) Monitor amphibian and reptile crossings over Leslie Street on the western edge of the study area to fully understand the potential for roadkill hotspots.
- b) Ensure effective and adequate passage (e.g. tunnels) for amphibians and mammals across or under Leslie Street and Bethesda Side Road where appropriate and whenever road widening or other constructions are planned.
- c) Ensure wide natural cover connections linking the study area to other habitat patches on the ORM such as Bloomington Wetland and West Gormley sites.
- d) Pursue further opportunities for improving habitat connectivity along this section of the Oak Ridges Moraine Corridor including but not limited to ecological restoration and the provision of wildlife connections as mentioned above.



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