



Annual Local Occurrence Score and Local Rank Update

**Terrestrial Fauna and Flora Species, and
Vegetation Communities**

July, 2016



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This report may be referenced as:

Toronto and Region Conservation Authority (TRCA). 2016. Annual
local occurrence and local rank update: terrestrial species and
vegetation communities.

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Executive Summary

The purpose of this report is to provide an update on the changes to the vegetation communities and flora and fauna species scores for the population and local distribution criteria as part of the Toronto and Region Conservation Authority ranking and scoring methodology. Although annual reporting on these updates has not been part of the process to date, the intent moving forward is to provide documentation in order to apply up to date information on the species and communities found within the region.

Vegetation Communities

This is the first reassessment of vegetation communities using the current protocol, which includes vegetation data over the 15-year period 2001-2015. A total of eight new vegetation communities have been added to the database (five in 2014 and three in 2015) (Table 19). Four of these were highly-significant dynamic barren, cliff, and oak savannah communities identified in the Rouge Park in 2014. One community, the Fresh-Moist Beech – Hardwood Deciduous Forest, was an unusual association discovered on tableland in 2015. The other three communities were either plantations or derived from them.

Four communities showed a decrease in L-rank (i.e. reduced sensitivity) and 10 showed an increase (increased sensitivity).

Flora Species

A total of 25 new flora species have been added to the flora database in the 2015 field season (Table 11). All of the new species are ruderal or adventive, found to be reproducing from plantings. They are also all exotic but 3 are native to other parts of southern Ontario.

One species of plant in TRCA was pronounced extirpated (no records for the past 15 years), small purple-fringed orchis (*Platanthera psycodes*). However, there were two species which were thought to have been extirpated previously, early saxifrage (*Micranthes virginiensis*) and sessile-fruited arrow-head (*Sagittaria rigida*), were re-located again and have been added back to the list of extant flora.

A total of 19 flora species had a change of rank since the last update a year ago; all of these experienced a change of one rank level (Table 14). Fourteen species had a decrease in rank, while 5 had an increase. The preponderance of decreases is largely due to the increased number of grid square data records leading to lower scores for Local Occurrence and thus a lower total score and rank. Many of these are the result of more accurate accounting of previously under-reported species that are actually abundant. For example, Pringle's hawthorn (*Crataegus coccinea* ssp. *pringlei*) and southern blue flag iris (*Iris virginica* ssp. *shrevei*) proved to be quite common in the Carruthers watershed at the east end of the TRCA jurisdiction. Extensive surveying

in this area in 2015 uncovered more records of these species. Their L-ranks dropped from L3 to L4.

Fauna Species

One new species was added to the regional terrestrial fauna list: northern shoveler (*Anas clypeata*) based on an observation of a male at Carruthers Marsh in 2015 during the breeding season. A total of five fauna species were removed from the current TRCA fauna list as they have not been observed in the past 10 years within the jurisdiction. Northern watersnake (*Nerodia sipedon*), was last reported for the region from the lower Humber River in 2005. It is quite possible that this species is still present in the jurisdiction but is missed during our surveys as we target mainly frogs and breeding birds. The four other species are all birds and as such their absence from inventory results is probably a true reflection of their regional status; great black-backed gull (*Larus marinus*), Wilson's snipe (*Galinago delicata*), white-winged crossbill (*Loxia leucoptera*), and yellow-breasted chat (*Icteria virens*). The yellow-breasted chat is a species that had been included in the regional breeding fauna list on the basis of a summering male recorded over the course of a couple of weeks in the summer of 2005.

One of the species reported as extirpated in 2014 has subsequently re-appeared. A live mudpuppy (*Necturus maculosus*) was caught accidentally by TRCA staff in a lamprey-trap on the Humber River.

Several meadow and forest bird species showed signs of decline. Of the meadow birds, Bobolink (*Dolichonyx oryzivorus*) showed the largest decline but also eastern meadowlark (*Sturnella magna*), showed smaller but still significant decline. Significantly, 5 other open-country obligates – field sparrow (*Spizella pusilla*), northern harrier (*Circus cyaneus*), Wilson's snipe, sedge wren (*Cistothorus platensis*), and brown thrasher (*Toxostoma rufum*) – are included in this list of declining species. Seven other species are more associated with forest habitats, and four of these are also ground-nesting: black-and-white warbler (*Mniotilta varia*), white-throated sparrow (*Zonotrichia albicollis*), mourning warbler (*Geothlypis philadelphia*) and veery (*Catharus fuscescens*).

There was a total of 10 species that showed a change in L-rank: 6 species showed a climb to the next highest L-rank, while 4 species slipped to the next rank down. Most of these changes were in large part influenced by the latest updates to the USGS North American Breeding Bird Survey Trend Results (now incorporating data from 1966 to 2013). Particularly significant were the climbs in rank for northern harrier (L3 to L2), field sparrow (L4 to L3) and veery (L3 to L2). The upgrading of the two open country species (northern harrier and field sparrow) is in keeping with the persistent declines of other meadow species in the region.

1.0 Introduction

Since 2000 the Toronto and Region Conservation Authority (TRCA) has been conducting terrestrial biological inventories of thousands of hectares of natural cover within its jurisdiction. The elements covered include flora and fauna species, and vegetation communities. The selection of sites each year is driven primarily by upcoming development issues and by management plan requirements for Conservation Authority lands. As part of this ongoing inventory a ranking and scoring system was developed and designed to indicate the conservation concern for each species and vegetation community documented.

All fauna and flora species and vegetation communities recorded within the region have been assigned a local rank (L-rank) based partly on the ecological sensitivity and partly on the population status within the TRCA jurisdiction. Since, for some species, this latter criterion is expected to change over time and potentially influence the overall local rank for those species, an annual re-assessment of the occurrence of every terrestrial flora and fauna species in the region was initiated in 2010. (Vegetation communities have been re-assessed about every 2 years with a desired goal of annual review). A description of the ranks and scores follows; more detail can be found in TRCA (2010).

The L-rank has a value ranging from L1 to L5, thus paralleling the provincial (or state) ranks of S1 to S5 as well as the corresponding national (N) and global (G) ranks. The difference is that the latter ranks are based almost entirely on population criteria, while the L-ranks which include sensitivity criteria take a more pro-active approach and can identify species of conservation concern before they become rare.

Species and communities ranked L1 to L3 are considered to be of *regional* conservation concern. That is, they are flagged as being of risk within the entire TRCA jurisdiction over the long term. They may not be currently rare, but are highly sensitive to habitat loss and disturbances associated with changes in the surrounding habitat matrix (i.e. matrix influences). In general, they are not found within the urban landscape. This is particularly true for fauna, which respond more quickly to changes in the environment. Relict populations of sensitive flora may persist within a secluded pocket of an urban ravine for decades. In addition to the L1 to L3 ranked species, a large number of currently common or secure species (or communities) 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 within urban settings.

Non-native species (as well as communities dominated by non-native species in the canopy layer) are indicated by L+, while any species that is believed to be no longer present in the jurisdiction is indicated as LX (extirpated). For fauna, any species which has not been reported for the previous 10 years is ranked LX, while the period is roughly 40 years for flora unless there is more conclusive evidence of the population no longer existing (e.g. intensive searching cannot find the plant at its historic location: some plants found as recently as 2008 have since been determined to

have died out). Some of the “extirpated” species of fauna are also those which may have occurred just as rare vagrants within the region. Finally, there are a few flora species which have unverified records within TRCA – their identification is uncertain; these are assigned a rank of LU. We are not sure if these plants actually occur within our jurisdiction without clearer evidence.

2.0 Methods

2.1 Estimating Abundance

The method of determining abundance (Local Occurrence) of flora and fauna species within the TRCA jurisdiction is based on its distribution across the area. Vegetation community abundance includes areal coverage as well as distribution. For distribution, the TRCA jurisdictional mapping is overlaid with a grid of 10x10 km UTM squares. The Toronto Region occupies a total of 44 of these 100 km² grid squares, many of which contribute only a fraction of their area to the regional surface (Figure 1). Local Occurrence scores for each species are based upon the number of grid squares within which it is found.

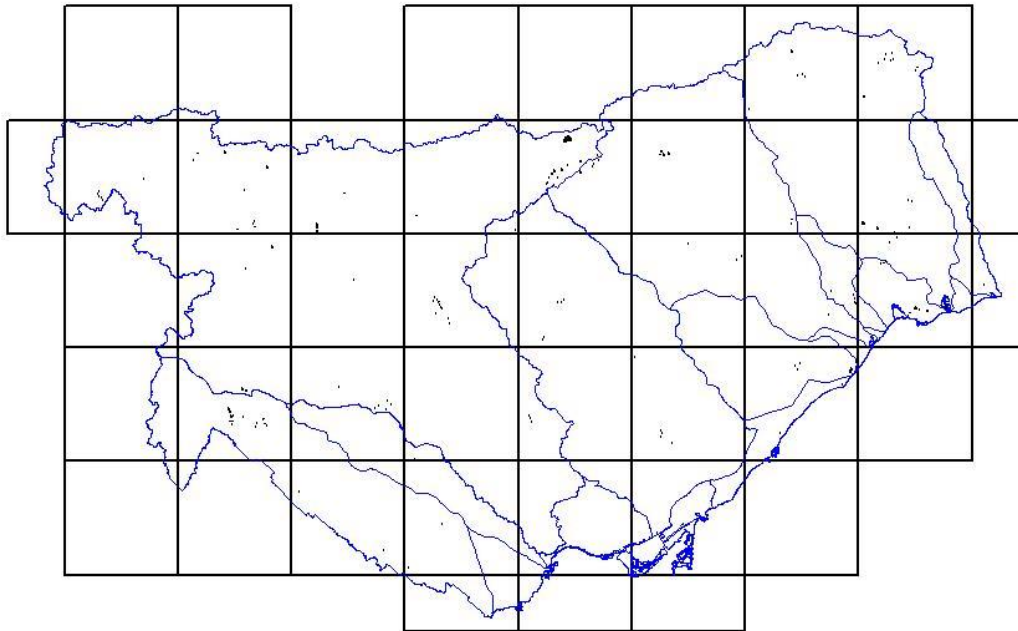


Figure 1. 10x10 km UTM grid squares overlaid on TRCA jurisdictional boundary

2.2 Flora Scoring and Ranking

Flora ranks are based upon four equally-weighted criteria, of which *local occurrence* is one. The other three criteria are *population trend*, *habitat dependence*, and *sensitivity to development*. The latter two criteria are fairly stable ecological indicators, though subject to some revision based on further information being gathered about the species. Population Trend is a judgment based largely on changes in Local Occurrence with some additional input from impressions of local naturalists. Hence, the main driver in changes in L-rank is Local Occurrence. Each of the four criteria has a score ranging up to 5; the maximum total score is 20 (Table 1).

Table 1. Total scores from the four flora scoring criteria with associated local ranks

Total Score	TRCA Local Rank
19-20	L1
17-18	L2
14-16	L3
11-13	L4
2-10	L5
not scored (probable exotic)	L+?
not scored (definite exotic)	L+
extirpated from TRCA	LX
not verified within TRCA	LU

2.2.1 Flora Local Occurrence

Each species' current "occurrence" is indicated by the number of grid squares in which the plant has been found within the last 15 years. Older records are not counted, although this does not necessarily indicate that the plant is declared extirpated from the jurisdiction, since cryptic populations of some species can be missed for decades. By implementing the 15-year threshold, however, it is intended that local declines and extirpations will be easier to identify. The Local Occurrence criterion is scored as shown in Table 2, while Population Trend scores are shown in Table 3.

Table 2. Scoring for flora Local Occurrence criterion

Number of 10x10 km UTM Grid-squares	Points Scored Under Local Occurrence
Species has been reported in 0-2 grid square in past 15 years	5
Species has been reported in 3-6 grid squares in past 15 years	4
Species has been reported in 7-15 grid squares in past 15 years	3
Species has been reported in 16-27 grid squares in past 15 years	2
Species has been reported in 28-44 grid squares in past 15 years	1

Table 3. Scoring for flora Population Trend criterion

Trend Observed	Points Scored Under Population Trend
Severe decline: at least 50% reduction in sites and/or populations; little or no reproduction	5
Moderate decline: 20-50% reduction in sites and/or populations; markedly reduced reproduction	4
Mild decline: about 10-20% reduction in sites and/or populations; slightly reduced tree reproduction (or unknown)	3
Apparently stable	2
Increasing	1

TRCA began its systematic natural heritage inventory work in 2000. Since the current level of inventory and monitoring has only been in place for the past 16 years it is only now that annual changes noted can be attributed to real population status changes rather than an artefact of the varying extent of areas inventoried.

Local Occurrence scores for flora were last updated at the end of the 2014 field-season. The intention now is to update and review the scores and their effects on Local Ranks annually; this most recent update (inclusive of data up to the end of 2015) sees the removal of our first year of inventories in 2000 as well as incidental observations and those gleaned from data-sharing from other agencies (such as the Ministry of Natural Resources and Forestry) up to that year. Any species that has not been documented in the jurisdiction over the past 15 years will automatically be scored the maximum 5 points for Local Occurrence. Consideration will then be given as to whether any species not reported in the previous 15 years is reasonably identified as regionally extirpated. In general, a judgment that a species is actually extirpated from TRCA requires evidence such as a targeted search that fails to find the plant at a known historic location or an absence of records that spans many decades. If this is the case then that species will be assigned the rank LX.

Small fluctuations, both positive and negative, in the number of squares holding various species are to be expected as a result of the variable regional coverage from year to year. If the most recent year of data collection has conducted inventories in grid-squares not visited within the past decade then many species will likely show an increase in their grid-square count. If, on the other hand, the year that falls out of the data-set was a year in which coverage was extensive, then some species' grid-square counts will be reduced. For example, the years 2001-2003 had surveys covering a wide area, while the coverage in 2000, 2006, and 2011-13 was more modest. Therefore if the coverage in 2016 is much lower than it was in 2001, then one might expect some declines in grid-square counts. However, under a regime of stable or increasing survey coverage over the 15-year interval, any species which show decreased grid-square counts should be flagged as potentially real declines.

2.3 Fauna Scoring and Ranking

Fauna species are ranked based on seven scoring 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 (Table 4). Rarity (*local occurrence*) is still considered but is just one of several criteria that make up the L-ranks, making it possible to identify communities or species of regional concern before they have become rare, and to more efficiently identify the factors that contribute to a species becoming rare.

Table 4. Total Scores for fauna species from the seven scoring criteria with associated ranks.

Total Score	TRCA Local Rank
25+	L1
20 - 24	L2
15 - 19	L3
10 - 14	L4
2 - 9	L5

Of the seven scoring criteria used to assess the overall sensitivity of a species only the three population-based criteria should change to any great extent with the passage of time. The seven criteria can be split into two groups: the ecological criteria, concerned with the biology and behaviour of the species; and the population criteria, concerned with the status of the population of the species. The ecology of any given species should remain fairly constant since this is very much dictated by the requirements and responses of that particular species to its environment. There are certainly small adjustments that occur over time as for example has been observed with Cooper's hawk (*Accipiter cooperii*), a species once considered a denizen of large forest tracts, highly sensitive to disturbance, that in the last decade has become a common sight in urban neighbourhoods, nesting in downtown ravines. Nevertheless, it is primarily the population criteria which will vary over the years. This variation will influence the total score that a species accumulates in the scoring process, and in turn this may influence the overall L-rank of the species.

2.3.1 Fauna Local Occurrence

The first of the three population criteria, and the one into which TRCA's inventories give the greatest insight, is Local Occurrence. Each species' current "occurrence" is indicated by the proportion of the total number of 10x10 km UTM grid squares occupied by that species (Figure 1).

The age of the record is also considered; fauna populations tend to respond more quickly to changes in the environment than do flora. Thus, for terrestrial fauna species a 10-year threshold (instead of 15 years) has been imposed for inclusion in the current regional fauna dataset. By implementing this 10-year threshold it is intended that local declines and extirpations will be identified earlier. The Local Occurrence criterion is scored as shown in Table 5.

Given that fauna observations are specifically for breeding records (rather than observational records as for flora), scoring is somewhat different for fauna than for flora. Due to the likelihood of fauna breeding records being underreported (more stringent requirements for inclusion because of the presence of migrant and non-breeding individuals; shorter time-window available for registration of breeding reports results in more rapid assessment of sites), the Local Occurrence scores require a stricter threshold for rarity. For example, a flora species found in two grid squares

has a Local Occurrence score of 5 (i.e. still the rarest level), while a fauna species recorded from two grid squares has a Local Occurrence score of 4.

Table 5. Scoring for fauna Local Occurrence criterion

Number of 10x10 km UTM Grid-squares	Points Scored Under Local Occurrence
Species has been reported in 0-1 grid square in past decade	5
Species has been reported in 2-5 grid squares in past decade	4
Species has been reported in 6-10 grid squares in past decade	3
Species has been reported in 11-15 grid squares in past decade	2
Species has been reported in 16-20 grid squares in past decade	1
Species has been reported in 21 or more grid squares in past decade	0

The current level of inventory and monitoring has been in place for the past 15 years; in 2013 the data set was considered large enough to reflect real population status changes rather than an artifact of the varying extent of areas inventoried. The annual variation in the proportion of the regional grid inventoried needs to be taken into account when interpreting any apparent changes in Local Occurrence. Over the course of the first 10 year period (2001 to 2010) fauna inventories visited a total of 37 distinct 10km grid squares across the region. For the current 10 year period (2006 to 2015) this total was slightly smaller with 35 grid squares visited. This amounts to a 5.4% reduction in the total number of grid squares contributing to the calculation of Local Occurrence scores between 2010 and 2015.

Local Occurrence scores for fauna were updated at the end of the 2010 field-season, at the end of the 2013 and 2014 seasons, and then again at the end of 2015. The 2010 update saw the removal of the first year of more intensive regional inventory, 2000, from the fauna Local Occurrence calculation. For this current update, using data collected in 2015, data from 2005 was excluded. In this way it is intended that, regardless of the positioning in time of the standard 10 year period, the area of coverage considered in the updates will be approximately constant. During the first 10 year period (2001 to 2010) a total of 25,545 fauna records were registered across the region; for the period 2004 to 2013 this number dropped slightly to 24,262 records, a decrease of just 5.02%. The next 10 year period registered a total of 26,129 fauna records, a 2.3% increase over the initial 2001 to 2010 recording period. The current period registered 28,072 records – a 9.9% increase over the initial recording period.

Fauna species that have not been reported in the region since before the threshold decade, may seem to be “extirpated” because they will not appear in any grid squares. This may indeed be the case or it may be that surveys have simply omitted times or locations where these rare or cryptic species could have been observed. Any species that has not been documented in the jurisdiction

over the past decade will automatically be scored the maximum five points for Local Occurrence. Consideration will then be given as to whether any species not reported in the previous decade is reasonably identified as regionally extirpated. If this is the case then that species will be assigned the rank LX.

Small fluctuations, both positive and negative, in the number of squares holding various species are to be expected as a result of the variable regional coverage from year to year. If the most recent year of data collection has conducted inventories in grid-squares not visited within the earlier 10 year period, then many species will likely show an increase in their grid-square count. If, on the other hand, the year that falls out of the data-set was a year in which coverage was extensive, then some species' grid-square counts will be reduced. For this current report, the years 2001-2003 had surveys covering a wide area, while the coverage in 2007 and 2010 was more modest and therefore it might be expected that the majority of species should show decreases in grid-square counts. Given that there was a 5.4% decrease in the number of grid-squares inventoried between the two time periods, any decrease greater than 6% of the regional grid square total (equivalent to 2.6 grid squares) for the number of grid squares occupied by any one species may be considered a potentially real decline. In the previous two analyses, this threshold has been set at + or - 4 grid squares.

2.3.2 Fauna Population Trends

The two other population-based scoring criteria are both concerned with the trend of species' populations: one at the continental scale, and the other at the local or regional scale. The former score is derived solely from the results of the Breeding Bird Survey (BBS) data analysis conducted by the United States Geological Survey (USGS), the results of which are available through their web-site (<http://www.mbr-pwrc.usgs.gov/bbs/>). The data trend analysis posted online includes an indication of the "reliability" of the trends identified, and this reliability indication has been incorporated into the TRCA's Continental Population Trend score. The USGS updates its trend analysis periodically, the latest update – an analysis of all BBS data from 1966 to 2013 - having been posted in January, 2015.

Table 6 shows the Continental Population Trend score associated with each level of population change. These scores have been incorporated from the results shown on the USGS BBS web-site.

Table 6. Scoring for fauna Continent-wide Population Trend criterion

Score	Population Trend
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0	significant increase of >5% per year
1	increase of 0.1% to 5% per year
2	status unknown (u), or population stable
3	small decrease of -0.1% to -1% per year
4	decrease of -1% to -5% per year
5	significant decrease of more than -5% per year

The Local Population Trend score was, until the 2013 update, based entirely on experienced field-biologist interpretation. In 2013, however, it was considered that enough local occurrence data had been gathered over the previous 13 years to facilitate a slightly more rigorous approach to this scoring criterion (Table 7).

Table 7. Scoring for fauna Local Population Trend criterion

Score	Population Trend
0	significant increase of > 15 regional grid squares
1	increase of 4 to 14 regional grid squares
2	status unknown (u), or population stable (change falls between -3 to +3 grid squares)
3	small decrease of -4 to -8 regional grid squares
4	decrease of -9 to -14 regional grid squares
5	significant decrease of > -15 grid squares

2.4 Vegetation Community Scoring and Ranking

Vegetation communities in the TRCA jurisdiction are delineated and mapped using a modified version of the Ontario Ecological Land Classification (ELC) which was released by Lee *et al.* (1998). TRCA began using ELC to designate vegetation communities in 2000, and by 2001 had set up its own version which included a list of dominant plants by canopy layer and significant disturbances found in each community. This has subsequently undergone only minor changes

(for example including soil profile information and presence of vernal pools for selected polygons) (TRCA 2007). The southern Ontario ELC is currently under review for an update. In the meantime, TRCA has found numerous communities that were not in the original ELC guide. This is especially true for anthropogenically-disturbed successional communities (which are abundant in our jurisdiction), but new communities were found of every type, from forest to wetland. The TRCA-identified communities have an alphabetic character following the dash. For example, FOD7-2 (Fresh-Moist Ash Deciduous Forest) was in the original ELC, but FOD7-a (Fresh-Moist Manitoba Maple Deciduous Forest) was not. Occasionally, a community that was reported in the 1998 ELC guide is found for the first time in the TRCA jurisdiction. It retains the numeric designation, e.g. CLT1-1 (White Cedar Treed Cliff).

Vegetation community ranks are based upon two equally-weighted criteria, of which Local Occurrence is one and Geophysical Requirements the other. Geophysical Requirements is a fairly stable ecological indicator, though subject to some revision based on further information being gathered about the community. It measures how restricted the community in question is to specific soil types, moisture and disturbance regimes, and topographical situations. Hence, the main driver in changes in L-rank is Local Occurrence. However, since vegetation communities have a spatial as well as a point location, Local Occurrence is subdivided equally into a distributional score (paralleling that of species) and an area score that takes into consideration the actual amount of land covered by the community. Local Occurrence and Geophysical Requirements each have a score ranging up to 5; the maximum total score is 10 (Table 8).

Table 8. Total Scores for vegetation communities from the two scoring criteria with associated ranks.

Total	L-Rank	Level Of Conservation Concern In TRCA Region
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Scores		
1 – 2.5	L5	Generally secure; may be a conservation concern in a few specific situations. Contributes to natural cover.
3 – 4.5	L4	Generally secure in rural matrix; of conservation concern in the urban matrix.
5 – 6	L3	Of regional concern; restricted in occurrence and/or requires specific site conditions; generally occurs in natural rather than cultural areas.
6.5 – 8	L2	Of regional concern; typically occurs in high-quality natural areas and under highly specific site conditions; probably at risk in the Toronto area.
8.5 – 10	L1	Of regional concern in TRCA jurisdiction due to rarity, stringent habitat needs, and/or threat to habitat.
Not scored	L+	Community defined by alien species (e.g. Scots pine plantation, buckthorn thicket). Contributes to natural cover at least to some extent.
Not scored	n/a	Community designation too broad or vague to score (not a currently recognized veg type).

2.4.1 Vegetation Community Local Occurrence

The Local Occurrence score for vegetation communities is the average of the Local Distribution and Area Scores. The Local Distribution Score is based upon a grid-square count similar to what is done for species (see Figure 1) except that it is logarithmically calibrated to account for a straight regression line (Table 9).

Table 9. Local Distribution scores for TRCA vegetation communities

Score	# 10 x 10 km UTM grid squares
5	< 2
4	3 – 12
3	13 – 23
2	24 – 33

The Area Score is also a logarithmic scale based on the proportion of the total area surveyed that is occupied by a given vegetation community (Table 10).

Table 10. Area Scores for TRCA vegetation communities

Score	Log (Relative Area)	Relative Area (area of community / total land surveyed last 15 years)
5	< -3	< 0.001

4	-3 to -2	0.001 to 0.01
3	-2 to -1	0.01 to 0.1
2	-1 to 0	0.1 to < 1
1	>0	> 1

For the purposes of discussing changes in Local Occurrence in this review, we will be focussing on the Local Distribution Scores, since the Distribution Score varies more incrementally and it is easier to itemize the changes. The Area Score and the number of hectares of a community, however, are essential to assessing its abundance within the jurisdiction, since a community may be widely distributed across the grid squares but present only as tiny patches.

3.0 Results and Discussion

3.1 Flora Species

A total of 25 new flora species have been added to the flora database in the 2015 field season (Table 11). All of the new species are ruderal or adventive, found to be reproducing from plantings. They are also all exotic but 3 are native to other parts of southern Ontario.

Table 11. New and recently-recognized flora species added to TRCA database in 2015

Species	Notes
<i>Achillea filipendulina</i> (fern-leaved yarrow)	Adventive from backyards near lower Carruthers Creek.
<i>Allium giganteum</i> (giant onion)	Adventive from backyards near lower Carruthers Creek.
<i>Brassica napus</i> (rapeseed)	Adventive in seed mix, Bolton Tract.
<i>Brunnera macrophylla</i> (Siberian bugloss)	Adventive from backyards near lower Carruthers Creek.
<i>Carex houghtoniana</i> (Houghton's sedge)	Adventive in unmaintained shrub bed in Don headwater subdivision north of Redelmeier property. Native to dunes and barrens of the central Great Lakes but TRCA population probably introduced.
<i>Coreopsis tripteris</i> (tall tickseed)	Prairie restoration planting at Claireville North (Ebenezer Tract). Native to southwestern Ontario
<i>Dianthus plumerius</i> (garden pink)	Established, old farmyard, lower Carruthers Creek.
<i>Euphorbia hirta</i>	Found at Lambton Prairie and in Carruthers Watershed study,

(asthma spurge)	disturbed places.
<i>Euphorbia virgata</i> (Russian leafy spurge)	Found at Lambton Prairie and in Carruthers Watershed study, disturbed places.
<i>Fragaria x ananassa</i> (domestic strawberry)	Adventive from backyards near Black Creek.
<i>Galega officinalis</i> (goat's rue)	Established near storm water pond, Carruthers Creek.
<i>Larix x pendula</i> (hybrid larch)	Planted and occasionally regenerating from parents, Carruthers Creek (and probably Duffins Creek – Brock Lands).
<i>Lathyrus sylvestris</i> (narrow-leaved everlasting pea)	Meadow, upper Don River.
<i>Ligularia dentata</i> (summer ragwort)	Adventive from backyards near lower Carruthers Creek.
<i>Liriope spicata</i> (lily-turf)	Adventive from old gardens, Morningside Park (Highland Creek).
<i>Mollugo verticillata</i> (carpet-weed)	Established on disturbed sands at Deer Creek golf club, Carruthers Creek.
<i>Muscari armeniacum</i> (Armenian grape-hyacinth)	Adventive from backyards near lower Carruthers Creek.
<i>Paeonia suffruticosa</i> (tree peony)	Persisting and perhaps spreading at old farmyard in upper Carruthers Creek.
<i>Rubus phoenicolasius</i> (wine raspberry)	Tentatively identified thorny shrub in lower Carruthers Creek, showed up in forest long-term monitoring plot.
<i>Silphium laciniatum</i> (compass-plant)	Established from prairie seed mixes near stormwater ponds at Carruthers Creek. Native to southwestern Ontario.
<i>Silene x hampeana</i> (hybrid campion)	Old farm field, Bolton Tract.
<i>Sisymbrium loeselii</i> (Loesel's tumble mustard)	Disturbed ground near Black Creek.
<i>Solanum triflorum</i> (cut-leaved nightshade)	Old farm field, Bolton Tract.
<i>Trifolium fragariferum</i> (strawberry clover)	Established at old cemetery, Carruthers Creek.
<i>Veronica austriaca</i> (broad-leaved speedwell)	Established near storm water pond, Carruthers Creek.

3.1.1 Extirpated and Rediscovered Flora Species

One species of plant in TRCA was pronounced extirpated due to 2015 field work, which investigated the species' only known location and found it drastically altered and unsuitable to support it (Table 12). On a more positive note, there were two species which were thought to have been extirpated based on reasonable evidence, but they were re-located again and so have been added back to the list of extant flora. And two species which had been of uncertain occurrence in the TRCA jurisdiction (LU) were confirmed to be present.

Table 12. Extirpated and rediscovered flora species

Species	Status
<i>Platanthera psycodes</i> (small purple-fringed orchis)	Extirpated with high degree of certainty
<i>Micranthes virginiensis</i> (early saxifrage)	Considered still extant (L1), seen at Lambton Park as recently as 2012 by park volunteer even though not observed in 2015.
<i>Sagittaria rigida</i> (sessile-fruited arrow-head)	Extant, no longer extirpated (L2)
<i>Carex billingsii</i> (Billings' three-seeded sedge)	Speculative occurrence now confirmed (L1)
<i>Physalis longifolia</i> var. <i>subglabrata</i> (smooth ground-cherry)	Speculative occurrence now confirmed (L3)

The lost species, purple-fringed orchis, had been found by Dale Leadbeater in a peaty area of Ajax Warbler Swamp in the early 1990s (Leadbeater 2015). According to her, this area was found to have been flooded by a beaver dam around 2010, then drained around 2013. It had also received some runoff from a breached storm water pond. The trees in this community are now dead, and the area is converting to a rich cattail marsh as observed during the 2015 field season. It is no longer suitable for this orchid, which has almost certainly died out from the disturbance.

On the other hand, early saxifrage was known from the Lambton Prairie until at least 1980 (Varga 2008). Some recent searches (by Peter Money of the Toronto Field Naturalists as well as by the TRCA in 2015) were unable to locate it. However, a local volunteer, Linda Read, had seen this cryptic plant there as recently as 2012 and provided photographic evidence. Therefore the plant is considered extant.

In addition, the sessile-fruited arrow-head had not been since in the TRCA jurisdiction since the 1940s (at Grenadier Pond in High Park) as well as earlier at Toronto Island (Faull 1913). A population was observed in the Carruthers Marsh in 2015 so this plant is extant (Figure 2).



Figure 2. Sessile-fruited arrow-head, rediscovered in 2015 (photo TRCA, 2015)

Billings' three-seeded sedge had been discovered in a conifer swamp at Baif wetland in 2012; this plant has recently been confirmed to be taxonomically distinct from three-seeded sedge (*Carex trisperma*). Smooth ground-cherry was verified with a specimen collected at Black Creek in 2015; this plant is difficult to identify and had never been fully confirmed as being in the TRCA jurisdiction.

3.1.2 Declines and Increases in Flora

In general, we recorded numerous increases in grid-square counts since the last Local Occurrence scoring update was performed (Table 13). This is not so much a function of increased plant populations but of two other factors: a more thorough collation of plant species lists across the jurisdiction into the grid-square count, and the continuing benefits of an increase in surveyed area. There is still a net positive accumulation of records up to the end of the 2015 field season, though this is slight because we have now excluded the first (and partial) season of flora inventories that occurred in 2000.

Table 13. Number of flora species that show changes in Local Occurrence score across the region between the two inventory periods, 2000-2015 and 2001-2015

	Change in Square Count Between Inventory Periods	Number of Species	Total
Increase	+26 to 31	0	703

	+21 to 25	0	
	+16 to 20	1	
	+11 to 15	0	
	+6 to 10	5	
	+1 to 5	668	
	New, rediscovered, or newly recognized	29	
No change	0	949	949
Decrease	-1 to -5	46	48
	-6 to -10	0	
	-11 to -15	1	
	-16 to -20	1	
	-21 to -25	0	
	-26 to -31	0	

The more thorough gathering of data from site species lists now includes the annual records from the various long-term monitoring plots (forest vegetation plots and wetland vegetation transects) spread across the jurisdiction. The plots provide a stable source of records every year and thus complement the more variable biological inventory and assessment data which covers different locations and differing amounts of territory every year. In addition, extra effort was made to capture any site inventory data that had been overlooked in earlier grid square counts. The results were a more accurate assessment of the abundance of the flora species in the TRCA jurisdiction and a reduction in the bias toward increased rarity and sensitivity caused by under-reporting or overlooked records.

Two species show a greatly reduced numbers of grid squares (i.e. over 5). Both are the result of re-estimates based on removing planted records from the count. Red pine (*Pinus resinosa*) is known to have natural populations only in a few places in the Humber Plains; the other records are all planted. This species is very commonly planted in conifer plantations. The other species is also a frequently-planted conifer: white spruce (*Picea glauca*). White spruce does have scattered natural populations in headwater swamps on the Oak Ridges Moraine and in north Pickering. In both cases, the new grid square counts were estimates; the actual revision of mapped records in the GIS database has not occurred. Red pine now has a rank of L1 (formerly L2) since its natural locations and suitable habitat for natural growth are both extremely restricted even though it is abundantly planted. White spruce retains its previous rank of L3.

Some rare species seem to have shown recent declines but still have enough records less than 15 years old that the decline has not yet shown up in the grid-square count or only as a slight change. This seems to be the case with club-mosses such as ground-pine (*Dendrolycopodium dendroideum*) and with a few other species such as fragrant cudweed (*Pseudognaphalium obtusifolium*). There are far more records for these species before 2008 than after. Subtle changes

in soil nutrient levels such as increases in nitrate from atmospheric deposition may be involved, along with invasive species and deer browse for some.

The number of flora species involved in changes in Local Occurrence is so large, and so affected by data management practices and survey coverage, that a focus on actual changes in L-rank might serve better to uncover actual changes in conservation status of flora species.

3.1.3 Changes in Flora L-rank

A total of 19 flora species had a change of rank since the last update a year ago; all of these experienced a change of one rank level (Table 14). Fourteen species had a decrease in rank, while 5 had an increase. The preponderance of decreases is largely due to the increased number of grid square data records leading to lower scores for Local Occurrence and thus a lower total score and rank. Many of these are the result of more accurate accounting of previously under-reported species that are actually abundant. For example, Pringle's hawthorn (*Crataegus coccinea* ssp. *pringlei*) and southern blue flag iris (*Iris virginica* ssp. *shrevei*) proved to be quite common in the Carruthers watershed at the far east end of the TRCA jurisdiction. Extensive surveying in this area in 2015 uncovered more records of these species. Their L-ranks dropped from L3 to L4. Turion duckweed (*Lemna turionifera*) was recently considered to be taxonomically distinct from common duckweed (*Lemna minor*) and this was incorporated into the TRCA database in 2013. It appears that the newly-recognized species is actually more common, so its rank has dropped to L5 from L4.

Table 14. Number of flora species that show changes in L-rank across the region between the two inventory periods, 2000-2014 and 2001-2015

	Change in L-rank Between Inventory Periods	Number of Species	Total
Decrease	L4 to L5	2	14
	L3 to L4	9	
	L2 to L3	3	
	L1 to L2	0	
Increase	L5 to L4	0	5
	L4 to L3	1	
	L3 to L2	2	
	L2 to L1	2	

The nine species that showed an increase in L-rank (and thus of conservation concern) are listed in Table 15. Increases in rank are in all cases due to declining records and/or populations. For example, little prickly sedge (*Carex echinata*) and small yellow sedge (*Carex cryptolepis*) are generally associated with kettle wetlands on the Oak Ridges Moraine. These were heavily inventoried by the MNR in the 1990s for wetland evaluations and ANSI (Area of Natural and Scientific Interest) reports. Many of these flora records have stale-dated, being now over 15 years

old. This does not mean that these populations are extirpated, only that they cannot be included in the score and rank assessment. The only record for little prickly sedge in the past 15 years is at a kettle peatland at Albion Hills in 2001.

Table 15. Flora species showing an increase in L-rank

Species	L-rank Change	Notes
<i>Asplenium platyneuron</i> (ebony spleenwort)	L3 to L2	An escarpment species, seems to be showing slight decline in TRCA (restricted to NW of jurisdiction)
<i>Cornus obliqua</i> (silky dogwood)	L4 to L3	Uncommon and local: slightly reduced number of occurrences
<i>Lobelia cardinalis</i> (cardinal flower)	L2 to L1	Very rare natural occurrences: periodically planted in wetland projects
<i>Pinus resinosa</i> (red pine)	L2 to L1	Local distribution of natural records restricted to Humber Plains savannah: correction to score
<i>Pseudognaphalium obtusifolium</i> (fragrant cudweed)	L3 to L2	Population decline: almost all records occurred before 2005

The fully revised version of TRCA's list of vascular plants, together with updated L-ranks and scores is presented in Appendix 1.

3.2 Fauna Species

In 2015, one new species was added to the regional terrestrial fauna list: northern shoveler (*Anas clypeata*) is included due to the observation of a summering male at Carruthers Marsh in the east end of the region. Although breeding may not have actually occurred, the presence throughout the early part of the summer may be significant, perhaps even more so since the species is known to have bred at Cranberry Marsh, just 2 km to the east along the lakeshore.

The occurrence of a particular new species within a region in any one year may simply indicate an anomaly in the species' normal distribution. However, it is important to maintain a formal documentation of such records since future inventories may discover patterns in such "anomalies" leading eventually to the establishment of new populations outside of the normal, expected range. In the 2010 local occurrence update it was reported that merlin (*Falco columbarius*) had been added as a new species to the TRCA's breeding fauna list. It is exciting, therefore, to report that in 2015, after the first confirmed nesting reported from Etobicoke in 2014, another pair was discovered nesting – and successfully fledging young – south of Hwy 401 in the Don Watershed (City of Toronto).

3.2.1 Extirpated Fauna Species

A total of five fauna species were removed from the current TRCA fauna list on the basis of non-occurrence within the past decade of inventories and monitoring. It is possible that the TRCA surveys have missed one of these species – northern watersnake (*Nerodia sipedon*) - within its jurisdiction, since such non-vocalising species are difficult to assess given the rather rapid nature of the surveys conducted (which are geared primarily to audio clues from birds and frogs). Northern watersnake was last reported for the region from the lower Humber River in 2005.

The four other species are all birds and as such their absence from inventory results is probably a true reflection of their regional status. Great black-backed gull (*Larus marinus*) was last reported from the gull colony at Tommy Thompson Park (TTP) in 2003; certainly this is a species that could easily occur again as an occasional nester in the huge colony of ring-billed and herring gulls (*Larus delawarensis* and *L. argentatus*) at TTP, although it is a species that has been reported as showing a persistent population decline in North America according to trends published by the USGS. Wilson's snipe (*Galinago delicata*) is a species that is well-represented by numerous reports from the last decade, but all of these reports are of birds in the first half of April, when it is believed the majority of records refer to migrating individuals. The most recent report of a non-migrant was from a site in Caledon in 2004. Unlike the great black-backed gull, this species is documented as showing a slight upward trend in the continental population, but this is not the only TRCA species that shows a local population trend contradicting the continental trend. It is possible, that the regional decline is in response to the loss of marginal farmland and pastures associated with wetlands in the rural zone, either through agricultural intensification or the development of such marginal agricultural areas.

The third avian “extirpation” refers to white-winged crossbill (*Loxia leucoptera*), a species that was only included in the TRCA database due to a report from the most recent Ontario Breeding Bird Atlas which documented a nesting pair in a Caledon plantation between 2001 and 2005. This species, like its congener the red crossbill (*L. curvirostra*), is irruptive in its occurrence, distribution being tied to the success of conifer (white spruce, *Picea glauca*) cone crops. Furthermore, the species can potentially nest at any time of the year and therefore might easily be missed outside of the 6-8 week TRCA inventory period. Finally, the fourth “extirpation” refers to yellow-breasted chat (*Icteria virens*), a species that had been included in the regional breeding fauna list on the basis of a summering male recorded over the course of a couple of weeks in the summer of 2005. As with other southern overshoot migrant species, it is likely that the species will occur again but its inclusion as part of the regional biodiversity is somewhat tenuous, in much the same way as are past records of summer tanager (*Piranga rubra*), worm-eating warbler (*Helmitheros vermivorus*) and Kentucky warbler (*Geothlypis formosus*). Nevertheless, maintaining the monitoring of such occurrences is important in the light of climate change and anticipated shifts in species' distribution.

It should be noted here that one of the species reported as extirpated in the 2014 Scoring and Ranking Summary has subsequently re-appeared. On the 7th of May, 2014, TRCA staff captured a live mudpuppy (*Necturus maculosus*) in the lamprey-trap on the Humber River, this being precisely the same location at which the previous specimen was trapped in the spring of 2002! This highlights the need for targeted searches for many of the non-avian species within the region, or at least the need to be cautious about assigning “extirpated” status to any such cryptic species. Nevertheless, the 10 year threshold is a useful device for flagging species that might otherwise be overlooked. It is hoped that the same story will unfold for several of the other apparently extirpated herp and small mammal species as the TRCA improves its understanding of local biodiversity.

3.2.2 Declines and Increases in Fauna

As suggested earlier, since there is no consistency in the number of grid squares inventoried in any one year, minor fluctuations in the grid square counts for each species should be expected. Table 16 details the changes in grid square counts resulting from the most recent local occurrence update (not including extirpations or new species).

Table 16. Number of species that show changes in grid-square count across the region between the two inventory periods, 2001-2010 and 2006-2015

	Change in Square Count Between Inventory Periods	Number of Species	Total
increase	+14	1	95
	+11	1	
	+10	1	
	+6	5	
	+5	4	

	+4	12	
	+3	22	
	+2	23	
	+1	26	
no change	0	41	41
decrease	-1	36	87
	-2	14	
	-3	17	
	-4	10	
	-5	4	
	-6	3	
	-7	1	
	-8	1	
	-13	1	

As suggested above, many of the apparent declines shown in this current period may be a result of the new survey period (2006 to 2015) having dropped earlier years that had more extensive coverage (e.g. 2003). However, this is not supported by the high number of L5 species which have shown little or no change. Only six out of a total of twenty-nine L5 species showed more than a +2 or -2 point change in grid square occurrence. This suggests that species showing the larger positive and negative changes reflect real changes in status for those species.

If only the changes greater than four grid squares (i.e. greater than 8% of the regional grid) are considered there are some seemingly significant results. Table 17 lists the 44 species that appear to have undergone such significant changes in distribution across the region over the past decade. There is still the possibility that these apparent changes are a result of variation in the amount of grid squares covered in any one year but certainly several of the changes fit expected patterns.

Table 17. List of species registering greater than + or - 4 change in the count of grid square occurrences

Species (common name)	Scientific Name	Change in Square Count
bobolink	<i>Dolichonyx oryzivorus</i>	-13
black-and-white warbler	<i>Mniotilta varia</i>	-8
sharp-shinned hawk	<i>Accipiter striatus</i>	-7
least flycatcher	<i>Empidonax minimus</i>	-6
white-throated sparrow	<i>Zonotrichia albicollis</i>	-6
black-billed cuckoo	<i>Coccyzus erythrophthalmus</i>	-6
American woodcock	<i>Scolopax minor</i>	-5
Wilson's snipe	<i>Gallinago delicata</i>	-5

eastern meadowlark	<i>Sturnella magna</i>	-5
field sparrow	<i>Spizella pusilla</i>	-5
golden-winged warbler	<i>Vermivora chrysoptera</i>	-4
American green-winged teal	<i>Anas crecca</i>	-4
mourning warbler	<i>Geothlypis philadelphia</i>	-4
chestnut-sided warbler	<i>Setophaga pensylvanica</i>	-4
brown thrasher	<i>Toxostoma rufum</i>	-4
northern harrier	<i>Circus cyaneus</i>	-4
marsh wren	<i>Cistothorus palustris</i>	-4
sedge wren	<i>Cistothorus platensis</i>	-4
veery	<i>Catharus fuscescens</i>	-4
eastern screech-owl	<i>Megascops asio</i>	-4
deer mouse	<i>Peromyscus maniculatus</i>	+4
grey squirrel	<i>Sciurus carolinensis</i>	+4
eastern newt	<i>Notophthalmus viridescens</i>	+4
eastern red-backed salamander	<i>Plethodon cinereus</i>	+4
warbling vireo	<i>Vireo gilvus</i>	+4
Canada goose	<i>Branta canadensis</i>	+4
ruby-throated hummingbird	<i>Archilochus colubris</i>	+4
peregrine falcon	<i>Falco peregrines</i>	+4
purple martin	<i>Progne subis</i>	+4
cliff swallow	<i>Petrochelidon pyrrhonota</i>	+4
wild turkey	<i>Meleagris gallopavo</i>	+4
belted kingfisher	<i>Megaceryle alcyon</i>	+4
merlin	<i>Falco columbarius</i>	+5
raccoon	<i>Procyon lotor</i>	+5
purple finch	<i>Haemorhous purpureus</i>	+5
eastern bluebird	<i>Sialia sialis</i>	+5
orchard oriole	<i>Icterus spurius</i>	+6
hooded merganser	<i>Lophodytes cucullatus</i>	+6
red-bellied snake	<i>Storeria occipitomaculata</i>	+6
eastern gartersnake	<i>Thamnophis sirtalis</i>	+6
snapping turtle	<i>Chelydra serpentina</i>	+6
common raven	<i>Corvus corax</i>	+10
turkey vulture	<i>Cathartes aura</i>	+11
red-bellied woodpecker	<i>Melanerpes carolinus</i>	+14

Twenty species showed declines of 4 or more grid squares in 2015. The largest decline (a decrease of 13 grid square occurrences since the 2001 to 2010 baseline period) was shown by bobolink, with its fellow open country obligate, eastern meadowlark, showing a smaller but still significant decline (minus 5 grid squares). Significantly, 5 other open country obligates – field sparrow, northern harrier, Wilson’s snipe, sedge wren, and brown thrasher – are included in this list of declining species. As suggested in the earlier reference to the now locally extirpated

Wilson's snipe, the decline in this suite of species is in keeping with declines noted at the continental level, and is likely in part caused locally by the continued loss of marginal agricultural land in the rural zone. Such "marginal" agricultural land, perhaps only intermittently farmed, is often adjacent to or associated with wetland habitats (favoured by species such as sedge wren and Wilson's snipe). Furthermore, being open country birds, all of these species nest either on the ground or low in shrub vegetation and as such would be highly susceptible to ground-borne disturbances within their habitats. All 7 of these species also registered significant declines in the 2014 update, and all but 1 of the 7 (sedge wren) showed declines in the 2013 update.

Seven other species showing significant declines in the 2015 analysis are more associated with forest habitats, and four of these are also ground-nesting: black-and-white warbler, white-throated sparrow, mourning warbler and veery. The first three of these species showed declines in both the 2013 and 2014 analyses; the inclusion of veery as a declining ground-nesting forest species is further indication of how sensitive such ground-nesters are to ongoing urban encroachment and the deterioration of landscape matrix influences imposed on the remaining forest habitats.

Of the remaining six species showing significant declines, two species (black-billed cuckoo and American woodcock) appear in the list for the second and third year respectively. Their reported local declines have been considered in previous years' documents. Golden-winged warbler, American green-winged teal, chestnut-sided warbler and marsh wren, all declined by four grid squares; the first two species have always shown rather limited occurrence in the region, and have now been reduced to occurrence in just one grid square each. A small population of golden-winged warblers was still present in the East Duffins headwaters area in 2009, but, as a ground-nesting species that is now restricted to an area experiencing an increase in off-leash dog walking and hiking, there is a real possibility that this species will be lost as a regional breeding bird by 2020. American green-winged teal, yet another ground-nesting species, requires undisturbed upland meadow habitat adjacent to wetlands; the species has always been very scarce in the region and its occurrence is highly intermittent. However, if TRCA's wetland restoration projects and the management of those wetlands can place a high priority on upland breeding opportunities for waterfowl it is possible that this species, together with several other species of duck (including northern shoveler – a species reported for the first time in 2015) will continue to nest in the region. The appearance of marsh wren in the list of declining species is somewhat surprising since the Marsh Monitoring Project (MMP) in the region is reporting the species on a regular basis; however, the majority of these records are from four wetland sites in a single grid square in the south-east corner of the region (Rouge Marsh, Frenchman's Bay, Hydro Marsh and Duffins Marsh). Chestnut-sided warbler, a species of woodland edge and successional habitats, is still present in 11 regional grid-squares, but is a species reported by the USGS trend analysis as showing a small but persistent continent-wide decline.

The majority of the 24 species showing significant increases in regional occurrence are easy to explain. Three of the species – orchard oriole, red-bellied woodpecker and turkey vulture - have

been showing considerable population increases locally over the past few decades as their previously southern distributions edge slowly northwards. Common raven and merlin have also shown fairly conspicuous incursions into the city and surrounding GTA over the past few years with nests of both species having now been found in several grid squares.

Eastern bluebird, hooded merganser and purple martin are all species that take readily to artificial-nest opportunities and it is possible that the installation of nest-boxes is continuing to benefit such species. However several other species, which likewise habitually utilize nest-boxes, have shown small decreases across the region (American kestrel, *Falco sparverius*; eastern screech-owl, *Megascops asio*). Three of the species on the list – Canada goose, peregrine falcon and wild turkey – are in large part the results of successful reintroduction programs running through the early twentieth century (Canada geese) and then through the late 1980s and 90s (peregrines and turkeys).

Five of the remaining species are herpetofauna and might at first sight be considered rather surprising inclusions in a list of increasing fauna populations given the general understanding of large scale herpetofauna declines throughout southern Ontario. However, in the past couple of years, reports of several herp species have spiked dramatically due to the increase in the number of road-kill surveys that have taken place across the region. This is leading to a better understanding of the true regional distribution of these animals, but at the same time is revealing just how big a threat road-mortality is for these species. Apparent increases in raccoon, grey squirrel and deer mouse occurrences may be – much as with the indicated increases in herpetofauna – simply a result of greater visibility of these species in an urbanising landscape, in part due to road-kill. The TRCA inventories and monitoring programs are primarily geared towards the assessment of vocalising species – birds and frogs – and incidental information concerning any other taxa should be treated with caution.

This leaves five bird species undergoing increases in Local Occurrence. Of these, ruby-throated hummingbird, warbling vireo and cliff swallow are all showing population increases at the continent-wide level, and therefore, the noted local changes are in keeping with the broader picture. Each of these species seems to fare well in suburban areas, so recent urban and suburban encroachments into rural areas will not have had any particularly negative impacts on the species. The same is possibly true of purple finch, a species that in 2015 was found nesting in ornamental shrubs on a golf course and is likely just as happy in such shrub-nesting opportunities provided in a suburban landscape. However, the species is listed as a declining species at the continental level. Within the TRCA region there are several examples of species showing local trends that are in contradiction of the broader trends across the continent. One of these species is the last species on this document's list of regionally increasing birds: belted kingfisher. The status of belted kingfishers within the region is however, rather difficult to assess given the large distances that nesting birds will fly to access foraging opportunities; for example, individuals will often spend a large amount of time frequenting ornamental ponds and storm water ponds, places

where they are certainly not nesting, but places that may or may not be in fairly close proximity to their cavity nest-sites (banks, bluffs).

Omitted from this current analysis are those species which underwent smaller changes in grid-square occurrence; this is primarily due to the understanding that fauna populations are subject to variation from season to season, and that such real variation may potentially be exaggerated by the aforementioned inconsistency in the amount of landscape surveyed throughout the region from year to year. However, some of these smaller changes in grid square count may reflect very real alterations in the abundance of some of these species and as such these smaller changes are recorded in the TRCA inventory. Ovenbird (*Seiurus aurocapillus*), scarlet tanager (*Piranga olivacea*) and eastern wood-pewee (*Contopus virens*), all showed a decrease of three squares; while on the positive side, osprey (*Pandion haliaetus*), red-necked grebe (*Podiceps grisegena*) and blue-grey gnatcatcher (*Polioptila caerulea*) are maintaining the increase in populations noted in previous documents.

Of the 16 bird species showing a regional increase of greater than +4 grid squares, 12 of these same species are listed as undergoing an overall positive continent-wide population trend; only 4 species are showing an opposite decline – the aforementioned belted kingfisher and purple finch, and also purple martin and orchard oriole. Similarly, only 4 of the 19 bird species showing local declines greater than -4 grid-squares are not listed as showing similar declines at the continent-wide level (note that American woodcock is one of very few species not assessed by the USGS trend analysis): marsh wren, sedge wren, sharp-shinned hawk and Wilson’s snipe. This degree of agreement between the two analyses is encouraging as regards the efficacy of the TRCA’s breeding bird inventory and the validity of the fauna database.

3.2.3 Changes in Fauna L-rank

There was a total of 10 species that showed a change in L-rank: 6 species showed a climb to the next highest L-rank, while 4 species slipped to the next rank down. Most of these changes were in large part influenced by the latest updates to the USGS North American Breeding Bird Survey Trend Results (now incorporating data from 1966 to 2013).

Particularly significant were the climbs in rank for northern harrier (L3 to L2), field sparrow (L4 to L3) (Figure 3) and veery (L3 to L2). The upgrading of the two open country species (northern harrier and field sparrow) is in keeping with the persistent declines of other meadow species in the region. Meanwhile, veery joins ovenbird (which was upgraded a couple of years ago) as a relatively abundant forest species that is recognised as being very sensitive to ground-borne disturbances in its forest habitat – both species are ground-nesters. It is important to maintain constant monitoring of these species’ status to see whether continued increases in human recreational pressure within their core nesting habitat in public forests results in further declines in regional populations. On the other hand, ruffed grouse (*Bonasa umbellus*), another ground-nesting species, is one of the four species which have undergone relegation from a high to lower

ranking. This is counter-intuitive but the change was heavily influenced by a reported increasing trend in the USGS data. Turkey vulture is another species whose L-rank was likewise lowered by the positive trends published by the USGS, dropping from L4 to L5.



Figure 3. Field Sparrow is one of two open-country species that have been re-ranked and are now considered species of regional concern (photo TRCA, 2015).

This down-grading of turkey vulture from L4 to L5 is one of the more significant changes, since now the species supposedly does not warrant concern in even the urban landscape. In such an instance, where the resulting L-rank is at odds with TRCA staff knowledge and understanding the species will be flagged in all data mapping exercises in the hopes that any local changes in population status are promptly noted. The exact opposite situation has arisen with killdeer, which acquired Species of Urban Conservation Concern status in 2015 due exclusively to the latest trend data from the USGS which indicates a persistent continent-wide decline for the species.

Overall, however, despite the odd anomaly, the ranks and scores are in agreement with the published nation-wide trends for breeding birds. On the non-avian front there is just one species

that has undergone a change in L-rank: snapping turtle has been down-graded from L2 to L3. This is entirely due to the large increase in reports of this species from various road ecology studies conducted throughout the region in the past few years. Although, on the face of it, this decline in L-rank suggests that the species is faring well, it maintains its status as a Species of Regional Conservation Concern.

As should be expected, the changes in grid-square totals between the first inventoried period, 2001 to 2010, and the first update (2004 to 2013) were more apparent (21 L-rank changes) than those changes between the first update and the second update (2005 to 2014, 5 L-rank changes). The total of 10 species showing a change in L-rank in this current period (2006 to 2015) is a little higher than expected, but may be explained by the increasing degree of confidence in the USGS dataset. Presumably, going forwards, this confidence will be maintained and there should be fewer large scale alterations affecting the TRCA's database. The fully revised version of TRCA's list of breeding terrestrial fauna, together with updated L-ranks and scores is presented in Appendix 2.

3.3 Vegetation Communities

This is the first reassessment of vegetation communities using the current protocol, which includes vegetation data over the 15-year period 2001-2015. The last update of vegetation communities was in 2014, incorporating data up to 2013. However, the previous updates did not have a fixed time frame of 15 years and included estimates for communities that were not originally delineated according to the current ELC protocol, which we adopted in 2001.

A total of eight new vegetation communities have been added to the database (five in 2014 and three in 2015) (Table 19).

Table 18. New and recently-recognized vegetation communities added to TRCA database

Vegetation Community	ELC Code	L-rank	Notes
Fresh-Moist Black Cherry Deciduous Forest	FOD7-G	L4	Found at Palgrave in 2014, resulting from the replacement of dying Jack pine in a plantation by natural black cherry regeneration.
Fresh-Moist Beech – Hardwood Deciduous Forest	FOD9-D	L3	Found in the headwaters of Carruthers Creek in 2015, beech with ironwood, sugar maple and oak essentially absent.
Native Poplar Deciduous Plantation	CUP1-4A	L5	Scattered plantings at Bolton Tract and Highland Creek, mapped in 2015
Cherry – Plum Deciduous Plantation	CUP1-g1	L5	Plantings of cherry near Highland Creek, 2015. This type could theoretically include any of the

			trees in the Rosaceae with drupe-style fruit (<i>Prunus</i> spp) such as plum or peach.
White Cedar Treed Cliff	CLT1-1	L2	Small areas of shale cliff with cedar growing on them mapped at Rouge Park in 2014 (incidentally observed on Etobicoke Creek in early 2016 but not surveyed). In original 1998 ELC but found for first time in TRCA.
Mixed Sedge Sand Barren	SBO1-2A	L2	Found in Rouge Park in 2014, sedges include slender umbrella sedge (<i>Cyperus lupulinus</i>), muhly sedge (<i>Carex muhlenbergii</i>), and red-seeded sedge (<i>Carex tonsa</i> var. <i>rugosperma</i>).
Mixed Oak – Pine Tallgrass Savannah	TPS1-2A	L1	Very small patches found in Rouge Park in 2014: red and white oak, and white pine.
Mixed Oak – Pine Tallgrass Woodland	TPW1-A	L1	Very small patches found in Rouge Park in 2014: red and white oak, and white pine.

Four of these were highly-significant dynamic barren, cliff, and oak savannah communities identified in the Rouge Park in 2014. They were all in the area south of Twyn Rivers Drive and had been identified as significant features in the earlier Rouge Park study from 1980s field work (Varga *et al.* 1991). However, there was no formal ELC system of community classification then. The White Cedar Treed Cliff community, which is mostly found on the Niagara Escarpment in southern Ontario, was mapped at the Rouge Park in 2014 and then observed informally (though not mapped by TRCA) at Etobicoke Creek in 2016 (Figure 4).



Figure 4. White Cedar Treed Cliff community observed at Etobicoke Creek (photo: Gavin Miller, 2016)

One community, the Fresh-Moist Beech – Hardwood Deciduous Forest, was an unusual association discovered on tableland in 2015. The other three communities were either plantations or derived from them.

3.3.1 Declines and Increases in Vegetation Communities

There appears to be an overall trend toward a net increase in grid-square counts for vegetation communities, following the same pattern as for flora species. However, this assessment is the first time we have a clear 15-year record (2001-2015) for vegetation communities mapped according to our current ELC protocol. Thus any results cannot be discussed in a detailed, quantitative fashion. Schematically, there were a total of 144 communities that appeared to show an increase in grid-square count, 155 with no change, and 90 showing an apparent decrease.

A few communities such as Fresh-Moist White Birch – Poplar Coastal Mixed Forest (FOM8-A) probably still occur on Toronto Island, but the site hasn't been surveyed since 2000, before the current recording period of 2001-2015. In one case, a rare vegetation type - Dry-Fresh Black Oak Deciduous Forest (FOD1-3) in the South Humber got converted through ecological restoration (i.e. thinning of weedy overgrown understorey and prescribed fires) into Black Oak Tallgrass Woodland (TPW1-1).

3.3.2 Changes in Vegetation Community L-rank

Four communities showed a decrease in L-rank (i.e. reduced sensitivity) and 10 showed an increase (increased sensitivity). Those that have increased are described below (Table 19).

Table 19. Vegetation communities showing an increase in L-rank

Vegetation Community	ELC Code	L-rank change	Notes
Red Osier Dogwood Shrub Beach	BBS1-A	L3 to L2	Formerly at base of Leslie Spit in 2000, resurveyed as thicket swamp and may no longer occur in jurisdiction.
Mineral Open Bluff	BLO1	L4 to L3	Decline in relative area (i.e. less bluff proportionally surveyed in 2015 than in 2000).
Round-leaved Dogwood Deciduous Thicket	CUT1-D	L3 to L2	An area of this mapped in the Don Valley in 2000 is no longer included in the calculation of Local Occurrence.
Dry-Fresh White Cedar - Poplar Mixed Forest	FOM4-2	L4 to L3	Decline in relative area (i.e. less proportionally surveyed in 2015 than in 2000).
Forb Mineral Meadow Marsh	MAM2-10	L5 to L4	May be declining due to replacement of native forbs in these habitats by reed canary grass
Water Milfoil Mixed Shallow Aquatic	SAM1-7	L3 to L2	Most water milfoil communities are submergent rather than mixed floating-submergent
Willow Shrub Sand Dune	SDS1-A	L3 to L2	Found on Toronto Island in 2000, this record no longer included in the calculation of Local Occurrence.
White Elm Mineral Deciduous Swamp	SWD4-2	L4 to L3	Declining due to Dutch elm disease.
Swamp Maple Organic Deciduous Swamp	SWD6-3	L3 to L2	There seems to be less coverage, possibly due to less proportionally surveyed in 2015, but could be real loss or conversion of this vegetation type.
Red Maple - Conifer Mineral Mixed Swamp	SWM2-1	L3 to L2	There seems to be less coverage, possibly due to less proportionally surveyed in 2015, but could be real loss or conversion of this vegetation type.

The fully revised version of TRCA's list of vegetation communities, together with updated L-ranks and scores is presented in Appendix 3.

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