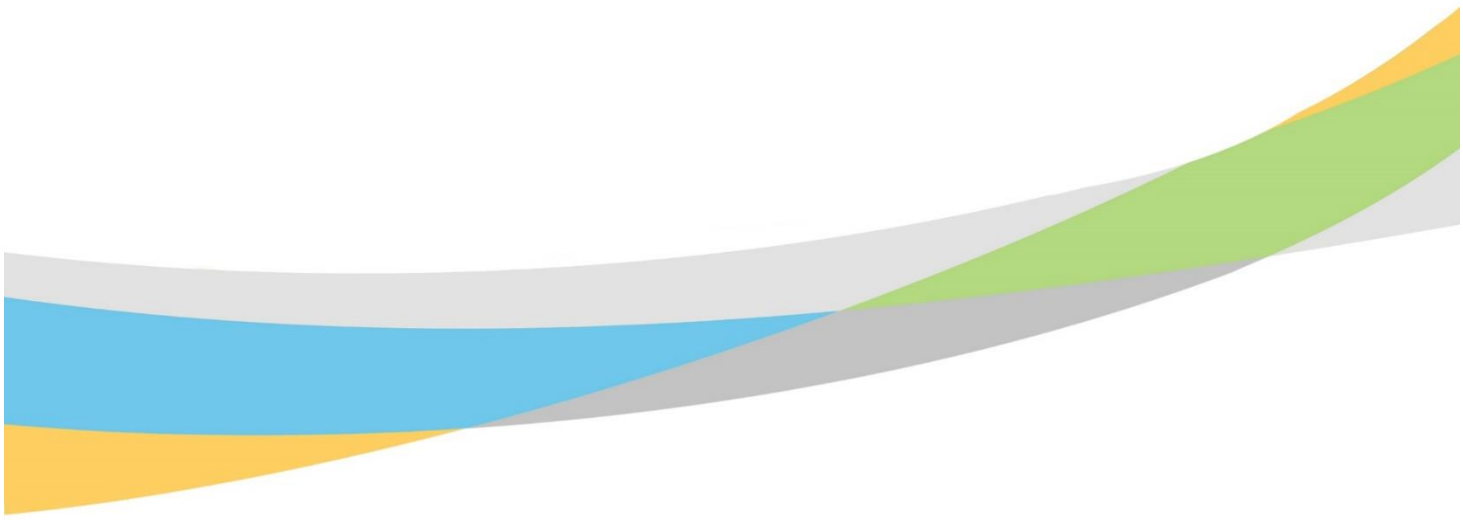

Toronto and Region Conservation Authority

Mimico Creek – Forest Plot Monitoring

Prepared by Terrestrial Inventories & Monitoring

December, 2020

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1.0 INTRODUCTION

In 2018, the Toronto and Region Conservation Authority (TRCA) set up and began monitoring forest vegetation and birds at three sites (Royal York Road, Deane Park South and Deane Park North) in the Mimico Creek watershed in the vicinity of Bloor Street West and Islington Avenue in Toronto. At each of the three sites, two monitoring plots/stations were set up: one forest vegetation plot and one forest bird station (Figure 1 and Table 1). Monitoring of these sites was continued in 2019 (forest birds) and 2020 (forest vegetation). The woodlots lie in a natural corridor of the Mimico Creek that is surrounded by residential developments and recreational parkland. This data was collected to support a Geomorphic Study of Mimico Creek being undertaken by the City of Toronto and TRCA.

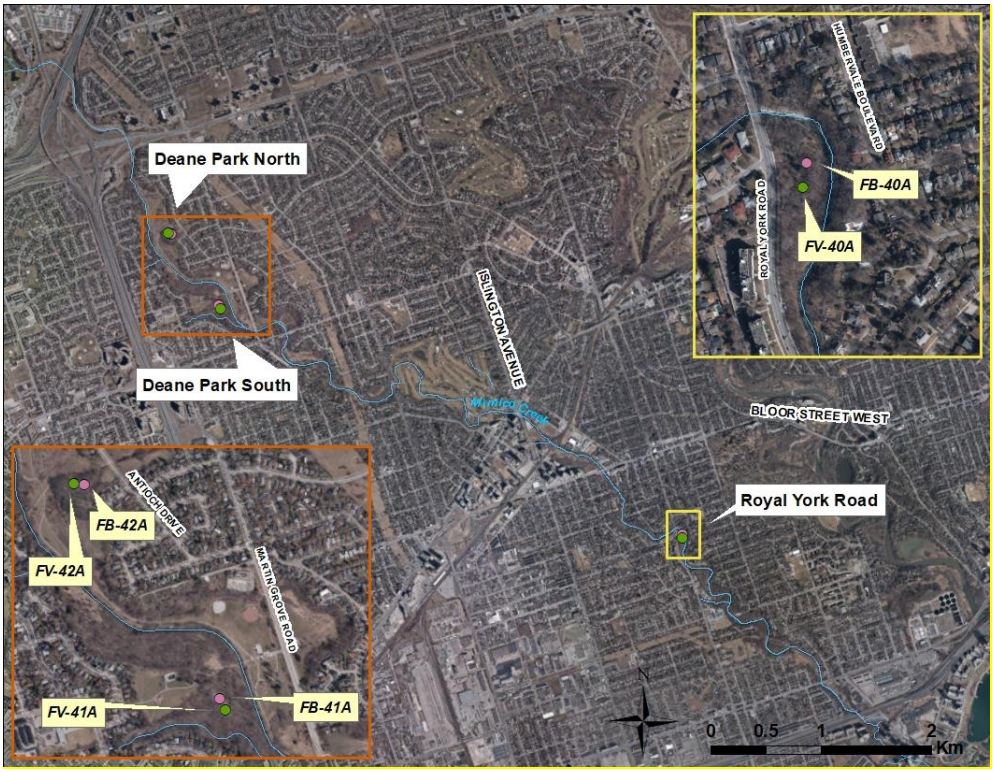

Figure 1: Locations of Mimico Creek Forest vegetation monitoring plots and bird stations.

Table 1: UTM coordinates (NAD 83 UTM Zone 17N) of Mimico Creek Forest monitoring plots and stations.

Plot/Station Name and Code	Easting (x)	Northing (y)
Royal York Road Forest Vegetation; (FV-40A)	620326	4833027
Royal York Road Forest Bird; (FB-40A)	620329	4833058
Deane Park South Forest Vegetation; (FV-41A)	616144	4835100
Deane Park South Forest Bird; (FB-41A)	616127	4835134
Deane Park North Forest Vegetation; (FV-42A)	615668	4835785
Deane Park North Forest Bird; (FB-42A)	615697	4835783

2.0 FOREST MONITORING METHODOLOGY

Forest monitoring plots at Mimico Creek were established to identify the health and condition of the vegetation and bird communities associated with this habitat feature and to track changes in their condition over time. Specifically, vegetation monitoring within the fixed plots is designed to:

- Determine the health of forests at Mimico Creek
- Determine regeneration rates in the understory of saplings
- Determine if the population and abundance of flora and fauna species, including those of conservation concern, are changing over time
- Determine the rate of spread of selected invasive species, and
- To determine if non-native invasive species are replacing native species.

2.1 Vegetation Plots

Forest plots were set up according to standards developed by Environment Canada's Ecological Monitoring and Assessment Network (EMAN, 2004a; EMAN, 2004b; Roberts-Pichette and Gillespie, 1999), with slight modifications. This is the same protocol used by TRCA to monitor a network of forest plots throughout the TRCA jurisdiction.

Detailed information on plot set-up can be found in TRCA (2016a). In summary, each forest plot consists of one 20 x 20 m square plot (i.e. 400 m^2) for monitoring tree health; and five 2 x 2 m subplots (i.e. 4 m^2) for monitoring saplings and shrubs. Four of the subplots are placed 1 m outside the perimeter of the 20 x 20 m tree health plot, and the fifth is located in its centre. Ground vegetation is measured in a 1 x 1 m subsection (1 m^2) of each subplot at its southwest quarter (Figure 2). Two visits are conducted per year: in the spring and in early-to-mid summer.

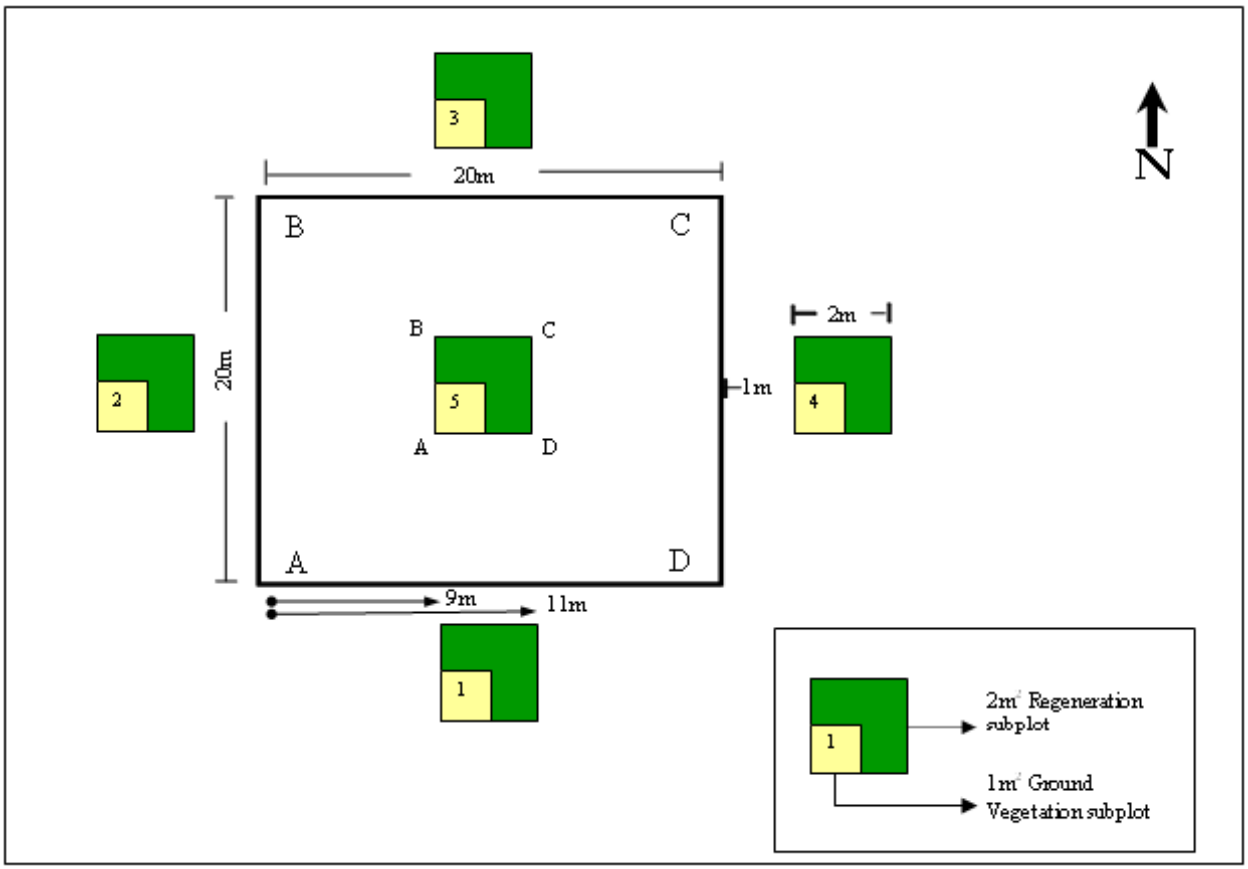

Figure 2: Forest vegetation plot design (not to scale).

Tree health is assessed in early-to-mid summer (late June to early August) when trees are in full leaf but prior to any late summer onset of natural senescence. Tree health is monitored in the 20 x 20 m plot. All trees >10 cm diameter at breast height (dbh) are assessed. Tree health assessment includes a variety of measures including age, tree height, tree diameter, condition, crown class, crown vigour and stem defects.

Tree regeneration and shrub assessment is done during the main early-to-mid summer visit (late June to early August). Assessments are undertaken in each of the 4 m^2 subplots and include all woody plants (including vines) that are over 16 cm in height but less than 10 cm dbh. Stem counts by 6 height classes (16-35, 36-55, 56-75, 76-95, 96-200 cm and over 2 m) are recorded for each species. In addition, surveyors obtain a percentage cover estimate based on those stems that originate within the subplot. Tree saplings and shrubs are measured at the same time but are separated for analysis purposes because saplings represent the future tree canopy, while shrubs always remain in the understory. Woody vines are counted with the shrubs.

Ground vegetation assessment is conducted twice per year. The first visit in May captures spring ephemerals, while the second assessment in summer at the same time as the sapling and shrub assessment captures herbaceous species that emerge more slowly and remain visible through the growing season.

Ground vegetation measurements in the 1 m^2 subsections include percentage cover of vascular plants by species and also mosses and liverworts as groups. Cover assessment includes overhanging leaves as well as stems originating from within the subsection.

Finally, a total list of all vascular plant species is taken every year for each plot. This includes all types and sizes found within the 400 m^2 tree health plot as well as the subplots. The species list yields the following information:

- Total species richness (number of species)
- Number of native versus exotic species
- Occurrence of species of regional (or urban) concern (ranks L1-L3 (L4))

2.2 Forest Bird Stations

Forest birds were monitored using the Forest Bird Monitoring Program (FBMP) protocol designed by the Ontario Ministry of Natural Resources and Forestry. This protocol was originally developed for use in large forest patches across the Province and plots are generally centred at least 100 m inside the edge of the forest patch to target forest bird species. This is not possible in many parts of the TRCA jurisdiction due to historic forest loss and fragmentation. Nevertheless, the protocol provided by the FBMP still works very well as a monitoring technique at the site level. The centre of each plot is referenced using a GPS unit to ensure repeatability at that location.

The forest bird stations are monitored twice per year at times considered optimum for recording forest bird breeding species. The first count is conducted between the 24th of May and the 17th of June; the second count is conducted no sooner than 10 days after the first visit and between the dates of June 13th and July10th. Many species that are recorded before the first week of June may still be passing through the area as migrants, therefore registering a second observation in late June or July supports the indication of a territorial and likely breeding individual. All counts are completed between 05:00 and 10:00. The second visit should maintain the same timing for each station, and likewise an attempt should be made to maintain the same schedule of visits in subsequent years for as long as the project runs.

Counts are conducted in weather conditions that optimize the detection of songbird species. Ideally there should be very little to no wind, and precipitation should be at most a light rain. Overnight rainfall will also potentially have considerable impact on the ability of the recorder to hear bird song and calls since the noise from dripping trees may be enough to mask quieter species. The FBMP requires the biologist to plot every individual bird observed and heard within a 100 m circle centred on the point station over a 10-minute period. In addition, any birds identified at distances beyond the 100 m circle are mapped at their approximate position.

3.0 RESULTS AND DISCUSSION

3.1 Flora

Forest vegetation monitoring plots were established in 2018 at three sites in the Mimico Creek watershed within Toronto city limits - Royal York Road (FV-40A), Deane Park South (FV-41A) and Deane Park North (FV-42A). Monitoring data for each vegetation plot was collected on three visits to each site during the 2018 and two visits during 2020 seasons (Table 2). The third visit in 2018 was for the collection of tree height data and to determine stand age. All the following data refers to species observed within the ground and/or woody regeneration subplots. In addition, species lists were compiled using all subplots data as well as observations from within the 20 m x 20 m plot (Appendix 1).

Table 2: Visit dates for Mimico Creek forest vegetation monitoring plots 2018 and 2020.

Station	2018	2020
Royal York Road FV-40A	May 2, July 25 & Nov 1	May 14 & July 31
Deane Park South FV-41A	May 1, July 24 & Nov 1	May 13 & July 28
Deane Park North FV-42A	May 1, July 23 & Nov 1	May 5 & July 28

Collectively, a total of 117 flora species were recorded within the Mimico Creek forest plots in 2018 and 2020, which is an addition of 10 species since the initial data collection in 2018 (Appendix 1). Of those plants found, 76 (65%) are native and 41 (35%) are exotic. Amongst this list are 6 species of regional conservation concern (i.e. ranked L2 and L3) consisting of two trees, one shrub and three forbs; namely, white oak (*Quercus alba*) shagbark hickory *(Carya ovata)*, narrow-leaved spring beauty *(Claytonia virginica)*, witch-hazel *(Hamamelis virginiana),* Michigan lily *(Lilium michiganense)* and smooth sweet cicely *(Osmorhiza longistylis)*. Also recorded are 14 species of urban conservation concern (rank L4). Examples of which include eastern hemlock *(Tsuga canadensis)*, wild leek *(Allium tricoccum)*, and wild geranium *(Geranium maculatum)*. Differences amongst the individual plots in terms of species richness and composition were observed and are discussed further below.

Royal York Road (Mimico Creek); FV-40A

Located in the lower reaches of Mimico Creek is forest plot FV-40A (Figure 1) which is situated in a lowland forest (Figure 3). The main 20 m x 20 m plot, is comprised of 6 species (a mixture of upland and lowland species); they are white ash *(Fraxinus americana)*, red ash *(Fraxinus pensylvanica)*, black walnut *(Juglans nigra)*, black cherry *(Prunus serotina)*, basswood *(Tilia americana)*, and white elm *(Ulmus americana)*. Eleven trees over 10 cm dbh were recorded; 8 were alive and 3 were dead. The number of live trees decreased by one since the last report. The largest and tallest tree is a live black walnut with a dbh of 59.4 cm and height of 25.1 cm. The average dbh of all live trees is 23.8 cm and the average tree height of live trees is 14.5 m. Sample cores taken from outside the plot to determine stand age estimated the oldest tree to be 95 years (i.e.1923); average tree age is 49 years. Canopy cover measurements showed the forest plot has 55% canopy closure in 2020; a 5% decrease from 2018.

Disturbances range from light to moderate. Evidence of human disturbance were indicated by: an informal trail, an unauthorized garden bed (in the early stages: no plants observed, only soil), light amounts of trash within the plot's vicinity, and more moderate levels in and around a homeless encampment located approximately 5m south of the plot. The encampment looks like it has not been in use since the 2018 visits. Other disturbances noted within the plot included light deer browse and moderate insect damage (i.e. defoliation). Three ash trees in the plot all had evidence of Emerald Ash Borer (in 2018 and 2020); only one of which was alive (but in severe decline) in 2020.

Figure 3: Spring (left) and summer (right) imagery of forest plot FV-40A taken from south-west corner in 2018.

A total of 52 species, comprised of 36 native and 16 exotic species were identified within FV-40A in 2018 and 2020. Native species account for 69% of the plant diversity (Figure 4) and include two species of regional concern (ranked L3) and four species of urban concern (ranked L4). They are smooth sweet cicely, grey sedge *(Carex grisea)*, Michigan lily, bitternut hickory *(Carya cordiformis)*, white trillium *(Trillium grandiflorum)* and wild geranium. All 6 species of concern found generally occur in lowland forest habitats such as riparian corridors or tableland areas with fresh-moist soil conditions.

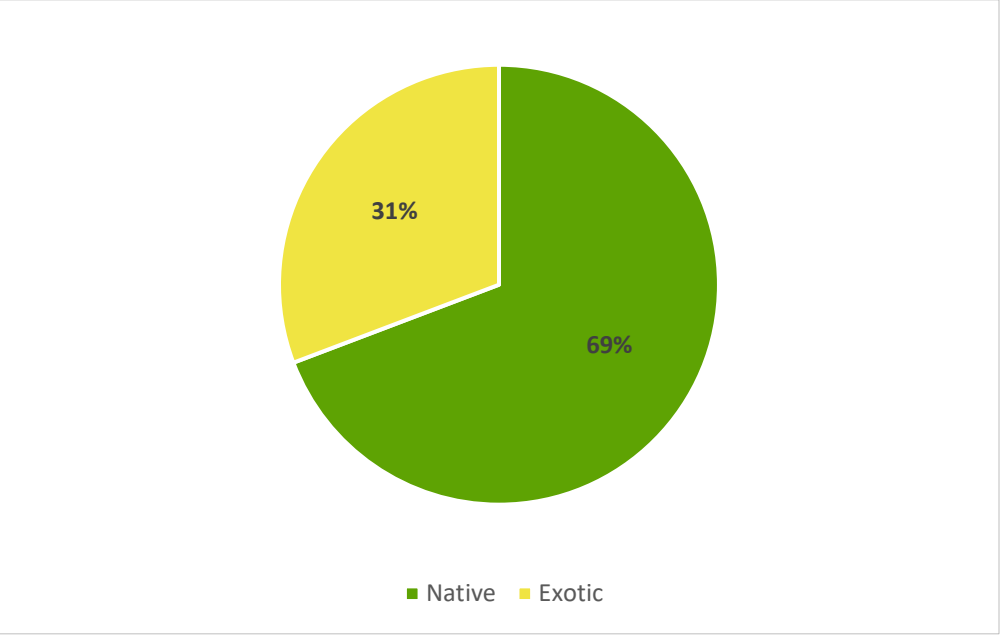

Figure 4: Proportion of native versus exotic plant species within forest plot FV-40A, 2018 and 2020.

Species diversity in the ground vegetation subplots of FV-40A is limited to 19 species: 13 native and 6 exotics in 2018 and 2020. Native species account for 99.7% of the total relative cover in the herbaceous layer. Two native species, bloodroot *(Sanguinaria canadensis)* (65% in 2018 and 79% in 2020) and zig-zag goldenrod *(Solidago flexicaulis)* (15% in 2018 and 4% in 2020) contribute well over three-quarters of the total relative cover with 80% and 83% in 2018 and 2020, respectively (Figure 5 and 6). Bloodroot can withstand considerable disturbance and clearing. Despite the presence of multiple disturbances such as trails and extensive canopy thinning, the total relative cover this species has increased by 14% since 2018. Exotic species are not abundant within the ground layer of the subplots and as seen provide <1% of the relative cover.

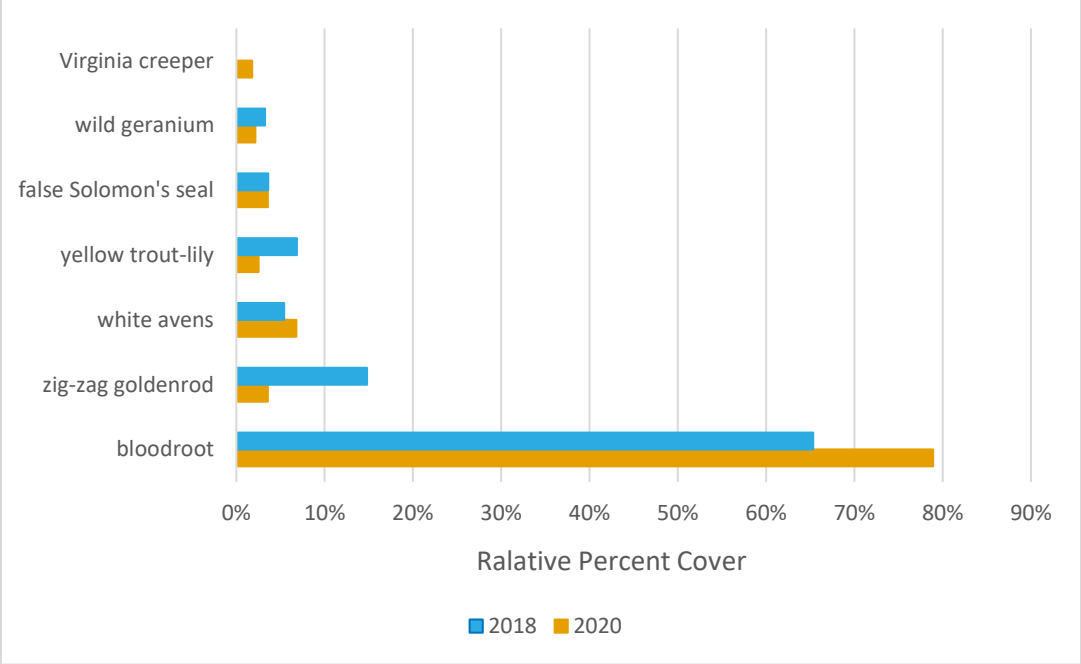

Figure 5: Relative percent cover of species in ground vegetation subplots at FV-40A in 2018 and 2020 (Only species with > 1% are listed).

Figure 6: Ground vegetation subplots at FV-40A dominated by bloodroot (Sanguinaria canadensis).

Nine species were captured within the woody regeneration subplots: 7 natives and 2 exotics. Native species provided 96% in 2018 of the woody cover in the subplots and 99% in 2020. Virginia creeper (*Parthenocissus quinquefolia*) and thicket creeper (*Parthenocissus vitacea*) provided together 78% relative cover in 2018 and 83% in 2020. These two

woody vine species also had the highest total stem count of any single species with 55 Virginia creeper and 13 thicket creeper stems in 2018 and 68 Virginia creeper and 12 thicket creeper stems in 2020. The stem counts for exotic species was 9 stems: 7 winged spindle-tree (*Euonymus alatus*) and 2 shrub honeysuckle (*Lonicera x bella*) in 2018. In 2020 there were only 2 stems of winged spindle-tree. This decrease in exotic species stem count can be in part due to an increase in native species cover and a change in height of the stems (stems less than 16 cm would not be captured in the woody regeneration subplots).

Deane Park South (Mimico Creek); FV-41A

This plot is situated higher up in the reaches of Mimico Creek in upland forest (Figure 1 and 7). Twenty-one trees over 10 cm dbh were found within the main 20 m x 20 m plot; all were alive. They are comprised of three species: silver maple *(Acer saccharinum)*, sugar maple *(Acer saccharum)* and American beech *(Fagus grandifolia)*. The latter tree species is associated with both the largest and tallest tree values (64.3 cm and 32.7 m respectively). The average dbh for all trees in the plot is 27.9 cm and the average height is 21.2 m. Average stand age was calculated to be 39 years old; the oldest tree sampled was a 52-year-old sugar maple. Canopy cover measurements showed the forest plot has 88% canopy closure in 2020; a 4% decrease from 2018.

Figure 7: Spring (left) and summer (right) imagery of forest vegetation plot FV-41A taken from south-west corner in 2018.

Disturbances affecting this plot include moderate levels of insect damage (i.e. defoliation) primarily being caused by Gypsy moth (*Lymantria dispar dispar*). Adult females of this insect were observed laying eggs; a number of trees already had egg masses attached to their stems. Defoliation caused from the feeding activities of larvae were also observed in the upper canopy layers. In addition, a large proportion of the beech trees within the main plot were in various stages of beech bark disease (both beech scale insects and/or beech cankers observed).

Light storm damage, animal browse (i.e. deer) and sapling removals were also recorded. In the latter category, saplings had been cut to make room for an informal bike trail and ramp in the center of the plot in 2018 (Figure 8). In 2020, two informal trails bisected the plot, and a new informal bike trail and ramp were observed at the border of the plot. The latter (newer) trail is bigger than the other two and potentially used more saplings cut from around the plot.

Figure 8: Human disturbance within FV-41A from installation of informal bike trail and ramp right photos from 2018, left photo from 2020 (new informal bike trail on the edge of the plot).

A total of 43 species, comprised of 28 native and 15 exotic species were identified within FV-41A in 2018 and 2020 (Figure 9). Native species account for 65% of the plant diversity and includes one species of regional conservation concern (ranked L2) and 7 species of urban concern (ranked L4). The majority (6) of those were tree and forb species typical of upland habitats such as American beech, eastern hemlock, white oak (*Quercus alba*), bur oak *(Quercus macrocarpa)*, white trillium and wild leek. Also found were 2 species more often associated with lowland communities, namely silver maple and mountain maple *(Acer spicatum)*. The arrangement of growing stems suggests that 5 of the species present within the plot were introduced to the area through plantings (Figure 10). Young hemlock, mountain maple, bur oak and white oak appear to have been planted in recent years (i.e. 5 years) while mid-aged silver maples appear to have planted within the last 40 – 50 years.

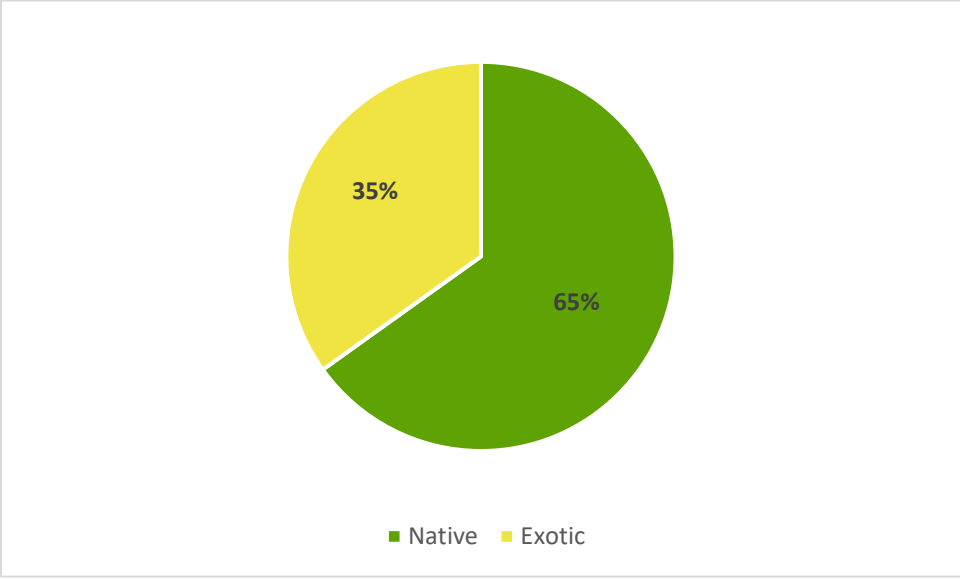

Figure 9: Proportion of native versus exotic species within forest vegetation plot FV-41A, 2018 and 2020.

Figure 10: Young white oak (Quercus alba) appears to have been planted in recent years.

Twelve species, consisting of 9 native and 3 exotic plants were recorded in the ground vegetation subplots of FV-41A in 2018 and 2020. Even though ground species diversity is largely native, the data is showing that 54% of the ground cover in subplots is exotic in 2018 and 72% in 2020. Garlic mustard accounted for 47% and 72% of the total relative cover in 2018 and 2020, respectively. This is followed by enchanter's nightshade *(Circaea canadensis ssp. canadensis),* a native species which accounted for 25% of the relative cover in 2018 and 19% in 2020 (Figure 11). Orange touch-me-not (*Impatiens capensis*), fringed loosestrife (*Lysimachia ciliata*) and urban avens (*Geum urbanum*) that were observed in 2018 were not observed in ground subplots in 2020. This could be due to two informal trails that bisect the plot.

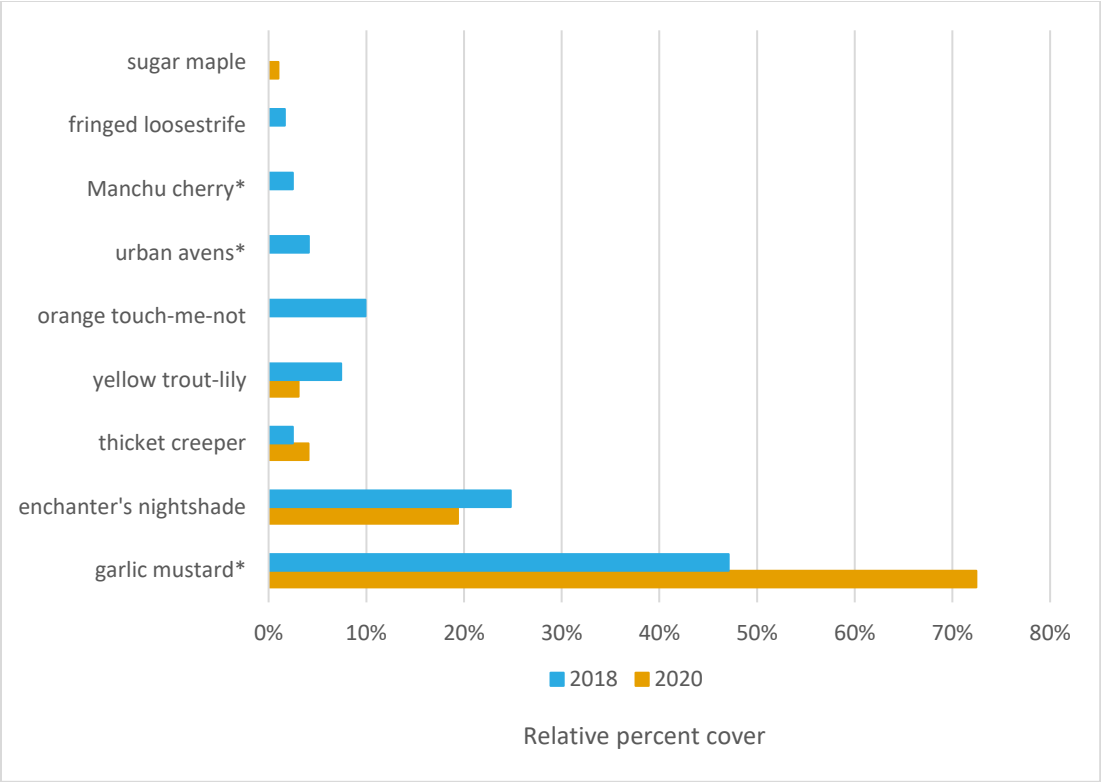

Figure 11: Relative percent cover of species in ground vegetation subplots at FV-41A in 2018 and 2020 (Only species with covers > 1% are listed). Species with an asterisk (*) are exotic.

Species diversity within the woody regeneration plots is higher than that observed in ground vegetation subplots. A total of 14 woody species, comprised of 8 native and 6 exotic species were recorded. In 2018 and 2020, exotic species within the woody regeneration constitute 43% of the species diversity in this plot. However, regeneration of exotic species rates as captured through stem counts (18% in 2018 and 19% in 2020) and relative cover estimates average (10% in 2018 and 2020) are low. European highbush cranberry *(Viburnum opulus ssp. opulus)* had the most stems (7) and covers the greatest relative area (4%) of the exotic species present in 2020. Comparatively, native species account for 81% of all the stems present and 90% of the subplots' total relative cover in 2020. Thicket creeper is the single most abundant and expansive species (native or exotic); with 42 stems (out of 67) and provides 44% of the relative cover in 2020. Thicket creeper had a growth in stem count and relative cover from 2018 to 2020.

Deane Park North (Mimico Creek); FV-42A

Plot FV-42A is the most northerly of the 3 Mimico Creek forest plots and occurs in upland forest (Figure 1 and 12). There are 31 trees over 10 cm dbh within the 20 m x 20 m plot; 23 stems were alive and 8 were dead in 2020. One tree has died since the 2018 plot visit. The plot is comprised of 7 tree species: sugar maple, white ash, red ash, white pine *(Pinus strobus)*, black cherry, buckthorn *(Rhamnus cathartica)*, and white elm. The tallest tree is a sugar maple tree 25.9m, closely followed by a white pine tree 25.3m in diameter. The biggest species (by girth) is a dead pruned (professionally cut) white ash that is 52.8 cm in diameter. This is closely followed by a live white pine that is 52.4 cm in circumference. Of the living trees, the average dbh and height is 22.1 cm and 19.6 m respectively. The average stand

age is 47 years. The oldest tree sampled was a 79-year-old white ash. Average canopy closure was 84% in 2020 which is an increase of 6% since 2018 possibly due to the cover provided by shagbark hickory saplings.

Figure 12: Spring (left) and summer (right) imagery of the forest vegetation plot FV-42A taken from south-west corner in 2018.

All ash trees had evidence of Emerald Ash Borer (in 2018 and 2020); of the 4 stems present, only one tree was alive, but it is in severe decline. Evidence of human disturbance ranging from light to moderate were indicated: light amounts of trash in the plot, professional logging, and two informal bike trails (Figure 13).

Figure 13: Human disturbance within forest vegetation plot FV-42A from installation of informal bike trails in 2020. These two informal bike trails affect the ground vegetation in the plot and its vicinity; saplings that were planted in recent years (i.e. 5 years) were pulled out for their creation.

Eighty-three plants (52 native and 31 exotic) were observed within the plot in 2018 and 2020. Species richness is largely native; 63% (Figure 14). The plot includes 3 species of regional concern (ranked L1-L3) and 9 species of urban concern (ranked L4). The most sensitive, ranked L3, are shagbark hickory, witch hazel, and narrow-leaved spring beauty. The latter species is a spring ephemeral that is commonly associated with mature deciduous and or mixed forests. It does not tolerate disturbance well; its presence provides some indication of the current site quality and condition. White pine, blue beech *(Carpinus carolinana)* and red oak *(Quercus rubra)* are a few examples of L4 species recorded. The

arrangement of growing stems suggests that 5 of the species present within the plot were introduced to the area through plantings. Young red oak, mountain maple, nannyberry *(Viburnum lentago)*, American beech and witch hazel appear to have been planted in recent years (i.e. 5 years). The last planted shrub was in decline in 2018 and not observed in 2020, possibly because of human disturbance.

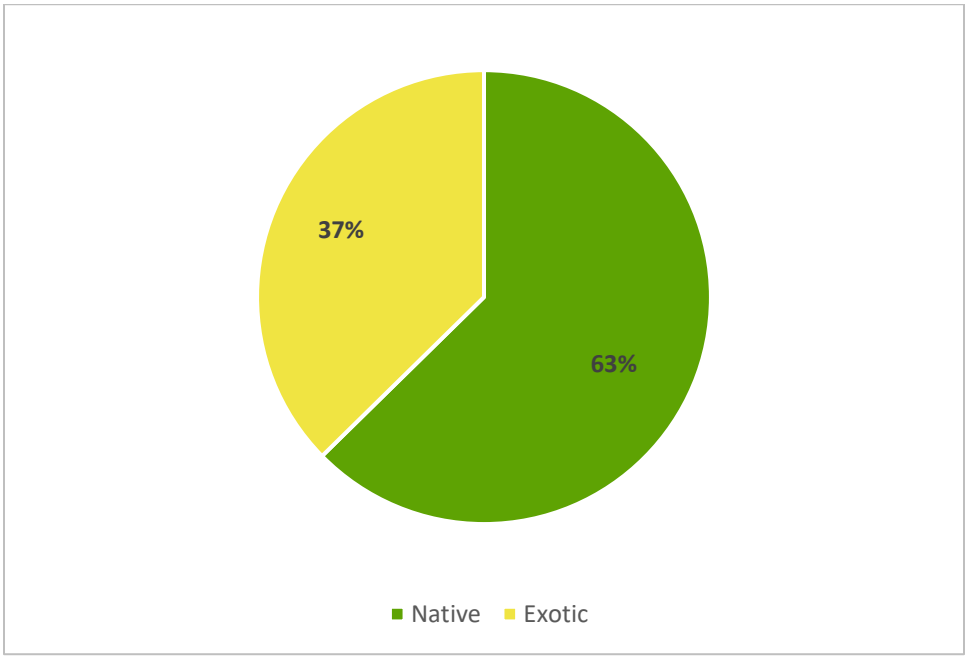

Figure 14: Proportion of native versus exotic species within the forest vegetation plot FV-42A, 2018 and 2020.

Flora observed in the ground vegetation subplots are comprised of 26 species (17 native and 9 exotic). Species richness is predominately native, however, 50% of the ground relative cover in subplots in 2018 and 34% in 2020, is of exotic species. In particular, two bull thistle *(Cirsium vulgare)* contributed 40% of the total relative ground cover in 2018 and hedge-parsley (*Torilis japonica*) contributed 18% in 2020. Enchanter's nightshade and yellow trout-lily *(Erythronium americanum ssp. americanum)* are both native species and were the second and third most widespread; providing 15% and 11% of the relative cover respectively in 2020 (Figure 15).

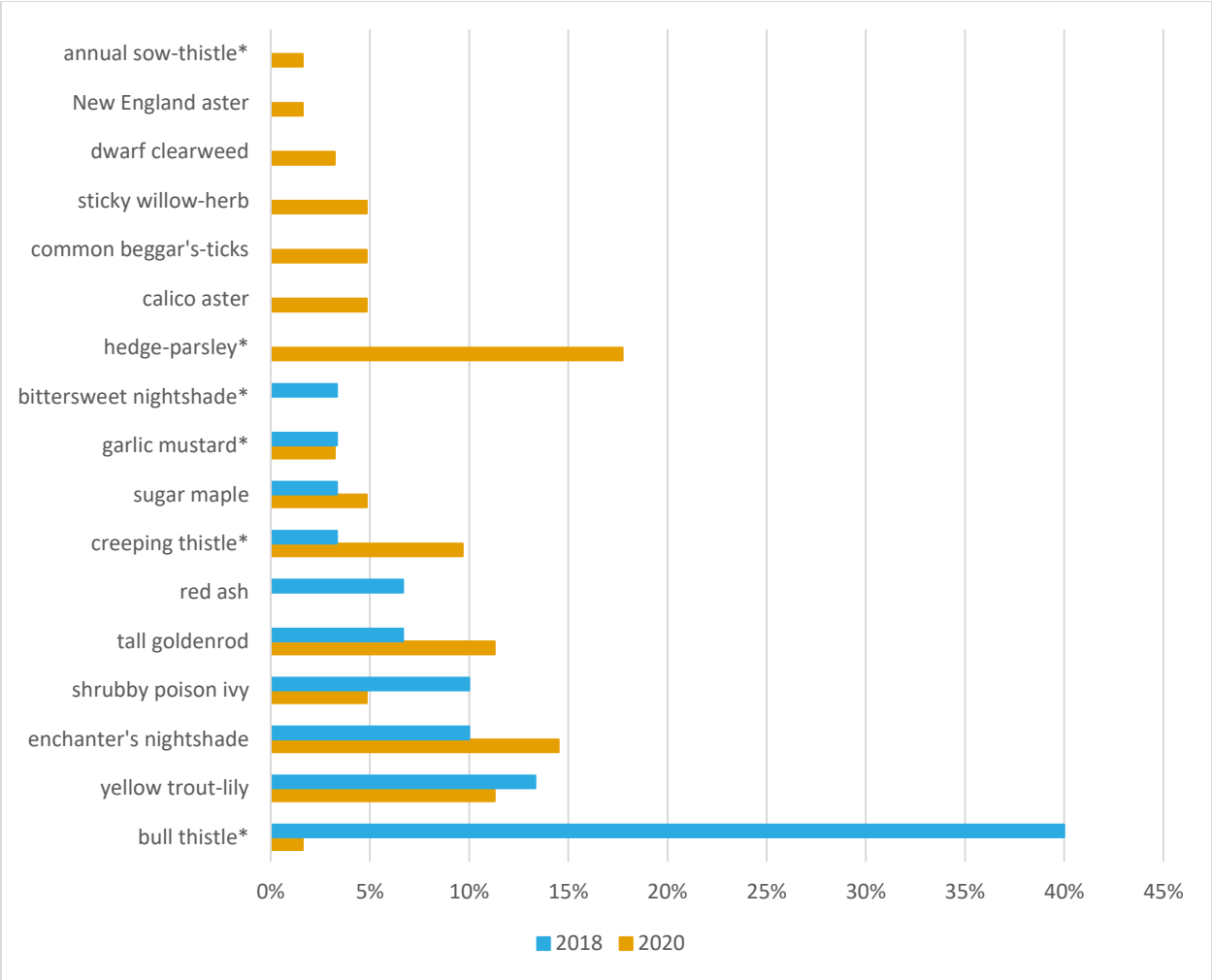

Figure 15: Relative percent cover of species in ground vegetation subplots at FV-42A in 2018 and 2020 (Only species with covers >1% are listed). Species with an asterisk (*) are exotic.

There are 13 woody species regenerating in the subplots of FV-42A in 2018 and 2020. Ten of the 13 are native. Exotics, bittersweet nightshade, white mulberry *(Morus alba)* and Manitoba maple *(Acer negundo),* represent the remaining 3 species and collectively accounted for 9% and 4% relative cover in 2018 and 2020, respectively. Comparatively, native species account for 81% of all the stems present in 2018 and 87% in and 2020. Also, native species provide 91% of the subplots' total relative cover in 2018 and 96% in 2020. Further to this, poison ivy in its shrub form had the most stems (13 in 2018 and 34 in 2020) and white elm contributed the most relative cover (40% in 2018 and 38% in 2020) of any species.

As only two years of data has been collected at the three plots, no trend data can be presented at this time. At this point, it is too early to conclusively determine regeneration rates in the understory of saplings, the rate of spread of selected invasive species and whether non-native invasive species are replacing native species.

3.2 Birds

Forest bird monitoring stations were established at three sites in the Mimico Creek watershed within Toronto city limits - Royal York Road (FB-40A), Deane Park South (FB-41A) and Deane Park North (FB-42A).

Data was collected on two visits to each site during the 2018 and 2019 bird breeding seasons (Table 3). All the following data refers to species observed within the 100 m study radius of the station that are potentially breeding within the local forest habitat.

Table 3: Monitoring dates for Mimico Creek forest bird stations 2018 and 2019.

Station	2018	2019
Royal York Road FB-40A	May 28th & June 18th	May 27th & July 5th
Deane Park South FB-41A	May 28th & June 20th	May 27th & July 5th
Deane Park North FB-42A	May 28th & June 20th	May 27th & July 5th

A total of 26 breeding bird species were observed across the 3 sites in 2018 and 2019. This list includes 8 bird species that are considered species of urban concern (ranked L4) (Table 4). Of the 26 species, 7 are forest or forest-edge dependent, including 6 of the L4 species. A further 18 bird species are habitat generalists that may also utilize the forest and surrounding habitat for breeding. A single L4 species was observed at all 3 sites in 2018 and 2019: northern flicker (*Colaptes auratus*) (Figure 16). A further 6 species that are not of conservation concern (ranked L5) were also present at all 3 sites. A full list of breeding bird species can be found in Appendix 2.

Table 4: Breeding bird species of urban concern observed within 100m at Mimico Creek forest bird stations in 2018 and 2019.

Species	L-rank	Guild	Royal York Road		Deane Park South		Deane Park North	
			2018	2019	2018	2019	2018	2019
American redstart	L4	forest-edge mid-level nester			1			
great-crested flycatcher	L4	forest upper-level nester			1			
grey catbird	L4	generalist mid-level nester	1					1
hairy woodpecker	L4	forest cavity upper-level nester				1		1
indigo bunting	L4	forest-edge mid-level nester				1		
northern flicker	L4	generalist cavity upper-level nester	1	1	1		1	1
red-eyed vireo	L4	forest mid-level nester			1	2		
white-breasted nuthatch	L4	forest cavity upper-level nester				1	1	

Figure 16: Northern flicker were observed at all three Mimico forest bird sites.

Royal York Road (Mimico Creek); FB-40A

A combined total of 15 breeding bird species were recorded at the Royal York Road site in 2018 and 2019. This list includes 2 - L4 ranked species: grey catbird (*Dumetella carolinensis*) and northern flicker. A single forest nesting species was observed, the L5 downy woodpecker (*Picoides pubescens*), with all but one of the remaining observed species being generalist breeders, including grey catbird and northern flicker.

Deane Park South (Mimico Creek); FB-41A

A combined total of 20 breeding bird species were recorded at the Deane Park South site in 2018 and 2019. This list includes 7 - L4 ranked species, of which 6 are forest or forest edge nesting species. A single L5 ranked forest or forest edge nester; downy woodpecker, brings the overall number to 7 (the highest among the 3 sites). The remaining species present were habitat generalists.

Deane Park North (Mimico Creek); FB-42A

A combined total of 17 breeding bird species were recorded at the Deane Park North site in 2018 and 2019. This list includes 4 - L4 ranked species: grey catbird, hairy woodpecker (*Picoides villosus*), northern flicker and white-breasted nuthatch (*Sitta carolinensis*). A total of 3 forest or forest edge nesting species were recorded, including hairy woodpecker and white-breasted nuthatch, along with downy woodpecker.

The following analysis compares variations of species richness (the number of different species) and breeding territory abundance (the number of breeding territories) within the three Mimico Creek sites. As only two years of data has been collected at the three plots, no trend data can be presented at this time. Some groups of species, in particular breeding birds, are highly variable from year to year and require datasets to be collected over multiple years in order to detect temporal trends in the data.

The average overall species richness across the two monitoring years shows little variability across the three sites, with Deane Park South (14 species) exhibiting slightly higher species richness than Deane Park North (12.5) and Royal York Road (12). Average breeding territory abundance exhibits a linear geographic increase from south to north, from Royal York Road (15 territories), to Deane Park South (18), and Deane Park North (20.5) (Figure 17).

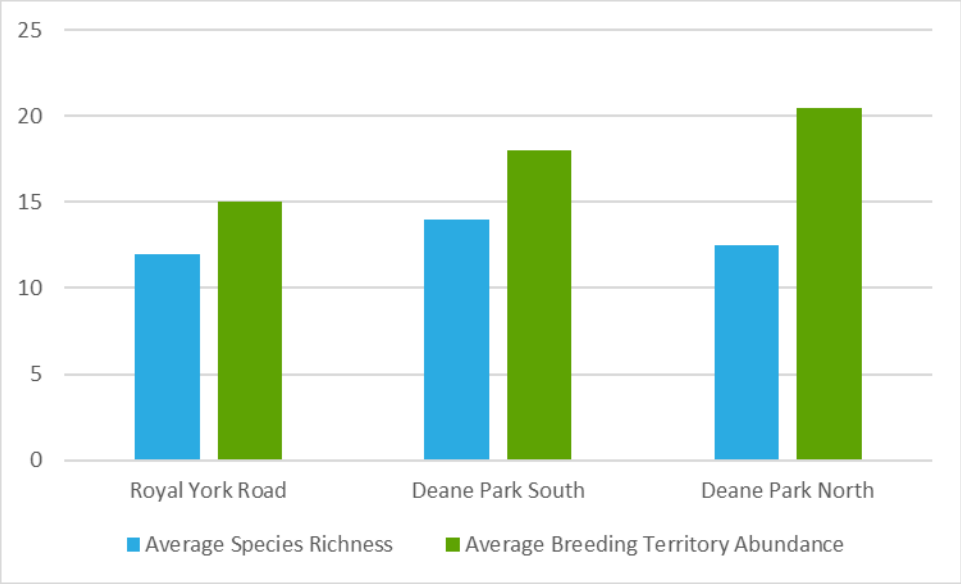

Figure 17: Average species richness and breeding territory abundance at Mimico Creek forest bird sites 2018-2019.

Analysis of urban species of concern richness and abundance over the two-year period produces markedly different results (Figure 18). More L4 ranked species and individuals were observed at Deane Park South compared to the other two Mimico Forest Bird sites, with almost double the average number of species observed than at Deane Park North and triple those observed at Royal York Road.

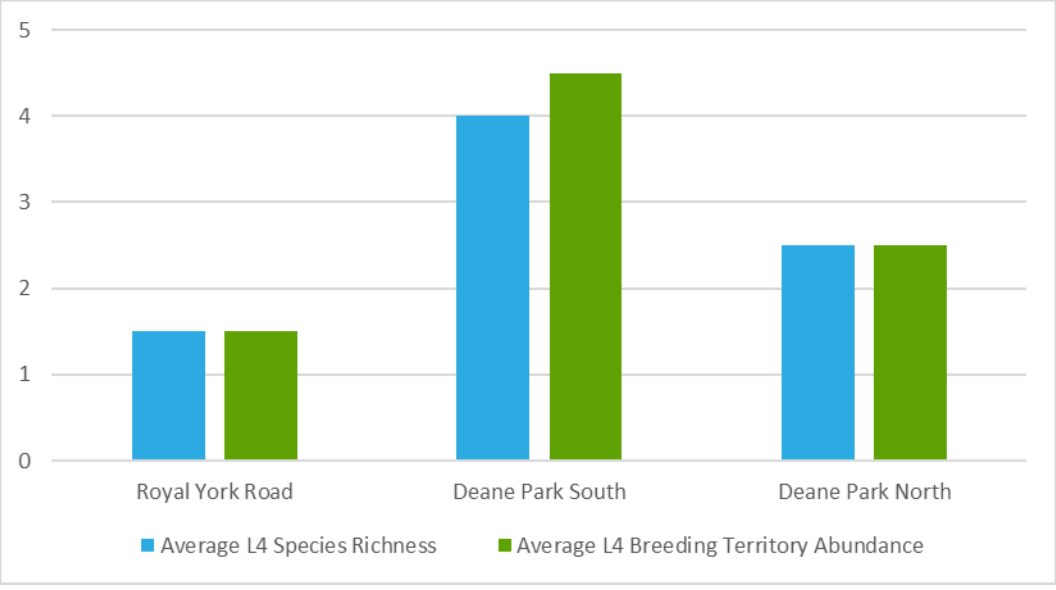

Figure 18: Average species of urban concern species richness and breeding territory abundance at Mimico Creek forest bird sites 2018-2019.

The average richness and territory abundance of forest dependent bird species (i.e. forest and forest-edge nesting species) reflects a similar trend as for L4 species; Royal York Road site exhibits the lowest numbers, followed by higher values at Deane Park North and Deane Park South. Compared with the average species richness and territory abundance across all urban forest bird monitoring sites within the TRCA jurisdiction, Deane Park South compares favourably with both jurisdiction wide averages, while Royal York Road and Deane Park North exhibit lower forest bird species for both criteria (Figure 19). These differences may be attributed to Deane Park South being located within a larger forest habitat and is the only site where the 100m monitoring radius lies (almost) entirely within forest, whereas both Royal York Road and Deane Park North are located in smaller habitat patches and a significant proportion of their 100 m monitoring radius covers non-forest habitat and urban development (Figure 20). The majority of the urban forest bird monitoring stations in the TRCA jurisdiction are centred within forest habitat at least 100m from the forest edge. The location of the Deane Park South monitoring station represents a similar location and therefore is a more like for like comparison to similar TRCA urban forest bird monitoring sites. This is reflected in comparative species richness and abundance.

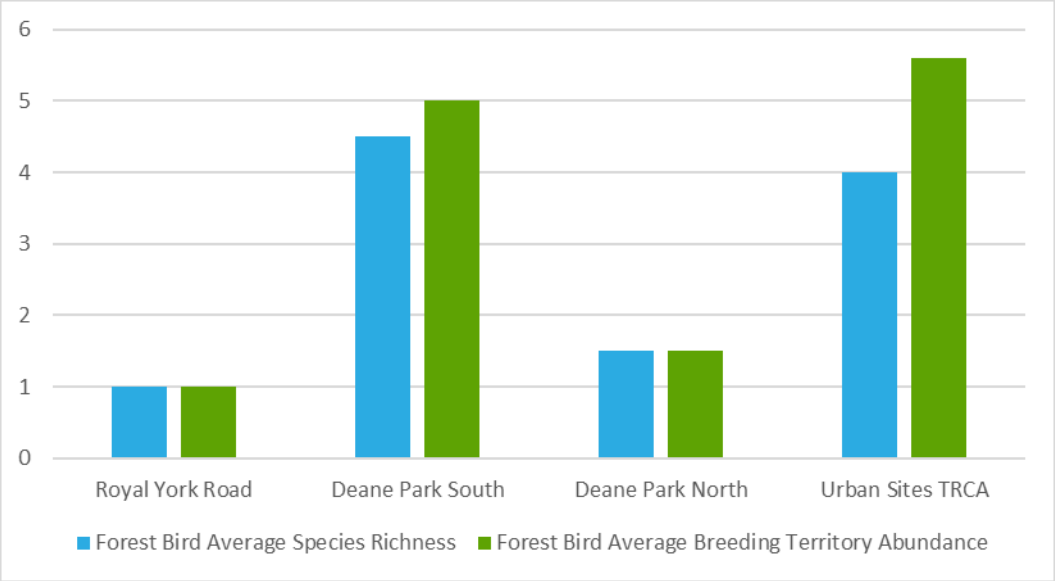

Figure 19: Average forest bird species richness and breeding territory abundance for Mimico Creek forest bird sites (2018-2019) compared to urban Forest Bird Monitoring sites in TRCA Jurisdiction (2008-2019).

Figure 20: Comparison of Mimico Creek Forest Bird Sites 100m Monitoring Radii and Forest Habitat.

4.0 SUMMARY

The three forest plots distributed throughout Mimico Creek all support flora species of urban conservation concern and regional conservation concern. Interestingly, the species of concern present in each plot are different; there is very little overlap which is likely the result of differences in the habitat and/or condition of each plot. Additionally, some of the species of concern present in Deane Park South and Deane Park North appear to have been planted. Flora species diversity varies between plots but is predominately native. Proportionally, native species account for 63-69% of a given plot's total species richness. Similarly, vegetative cover in all the plots, as acquired from ground and woody regeneration subplot data, is largely native. The only exception is ground vegetative cover in FV-41A that is mainly exotic. Total cover estimates and stem counts are highest at FV-40A (located in the lower reaches of Mimico Creek) and lowest at FV-42A. The 2018 and 2020 data show a noticeable decrease in total cover estimates and native proportion from species richness as each plot ascends north.

These initial findings from the Mimico Creek forest vegetation plots are largely in keeping with findings from nearby urban forest plots (e.g. Portage Trail) in terms of species richness and diversity. Species richness increased (native and exotic) in all plots likely due to the presence of multiple disturbances such as informal trails and extensive canopy thinning. Trails compact the soil and might provide a route for new species that are more generalist to establish. The extra light in the forest that results from canopy thinning could encourage the growth of weedy native species as well as the invasion by exotic species into the plot more successfully. Sensitive species such as narrow-leaved spring beauty are at risk of disappearance while others less sensitive such as white avens that can survive considerable disturbance and clearing, are likely to flourish.

All three forest bird sites supported species of urban conservation concern (ranked L4) and forest dependent species in 2018 and 2019. Deane Park South exhibited the highest number of such species as well as the highest overall species richness and territory abundance of the sites. Both Royal York Road and Deane Park North supported similar numbers of species of urban conservation concern and forest bird species and territories. Unlike the linear geographic trend shown by the forest vegetation plots, the differences in numbers of breeding bird territories appear dependent on habitat size: Deane Park South is the largest continuous forest patch and contains the largest number of breeding forest bird species and territories. Deane Park South was the only site that compares favourably with other urban forest bird monitoring sites within the TRCA jurisdiction in terms of forest bird species richness and abundance. Again, this is likely due to the larger forest habitat size present at Deane Park South compared to the other two Mimico Creek sites.

As only two years of monitoring data have been collected, no trend data for changes in population and abundance of flora and bird species, or regeneration and invasive species spread rates, can be presented at this time. This information would be available in the future after follow-up monitoring.

5.0 REFERENCES

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TRCA 2016b. ***Forest Bird Monitoring Protocol - Terrestrial Long-term Fixed Plot Monitoring Program*** – Regional Watershed Monitoring and Reporting. Toronto and Region Conservation Authority

Scientific Name	Common Name	Rank TRCA (Apr-20)	Plant Type	Royal York Road 2018 & 2020	Deane Park South 2018 & 2020	Deane Park North 2018 & 2020	Mimico Creek 2018 &2020
				52	43	83	117
Quercus alba	white oak	**L2**	TR		X		X
Carya ovata	shagbark hickory	**L3**	TR			X	X
Claytonia virginica	narrow-leaved spring beauty	**L3**	FO			X	X
Hamamelis virginiana	witch-hazel	**L3**	SH			X	X
Lilium michiganense	Michigan lily	**L3**	FO	X			X
Osmorhiza longistylis	smooth sweet cicely	**L3**	FO	X			X
Acer nigrum	black maple	**L4**	TR			X	X
Acer saccharinum	silver maple	**L4**	TR		X		X
Acer spicatum	mountain maple	**L4**	SH		X	X	X
Allium tricoccum	wild leek	**L4**	FO		X		X
Carex grisea	grey sedge	**L4**	SE	X			X
Carpinus caroliniana ssp. virginiana	blue beech	**L4**	SH			X	X
Carya cordiformis	bitternut hickory	**L4**	TR	X		X	X
Fagus grandifolia	American beech	**L4**	TR		X	X	X
Geranium maculatum	wild geranium	**L4**	FO	X			X
Pinus strobus	white pine	**L4**	TR			X	X
Quercus macrocarpa	bur oak	**L4**	TR		X	X	X
Quercus rubra	red oak	**L4**	TR			X	X
Trillium grandiflorum	white trillium	**L4**	FO	X	X	X	X
Tsuga canadensis	eastern hemlock	**L4**	TR		X		X
Acer saccharum	sugar maple	**L5**	TR	X	X	X	X
Arisaema triphyllum	Jack-in-the-pulpit	**L5**	FO	X			X
Asclepias syriaca	common milkweed	**L5**	FO			X	X
Bidens frondosa	common beggar's-ticks	**L5**	FO			X	X
Cardamine maxima	hybrid toothwort	**L5**	FO	X			X
Carex rosea	curly-styled sedge	**L5**	SE	X			X
Carex vulpinoidea	fox sedge	**L5**	SE			X	X
Circaea canadensis ssp. canadensis	enchanter's nightshade	**L5**	FO	X	X	X	X
Cornus alternifolia	alternate-leaved dogwood	**L5**	SH	X	X	X	X
Cornus sericea	red-osier dogwood	**L5**	SH			X	X
Crataegus coccinea var. coccinea	scarlet hawthorn	**L5**	TR	X			X
Epilobium ciliatum ssp. ciliatum	sticky willow-herb	**L5**	FO			X	X
Erigeron annuus	daisy fleabane	**L5**	FO			X	X
Erigeron philadelphicus var. philadelphicus	Philadelphia fleabane	**L5**	FO			X	X
Erythronium americanum ssp. americanum	yellow trout-lily	**L5**	FO	X	X	X	X
Fraxinus americana	white ash	**L5**	TR	X		X	X
Fraxinus pennsylvanica	red ash	**L5**	TR	X	X	X	X
Galium aparine	cleavers	**L5**	FO			X	X
Galium asprellum	rough bedstraw	**L5**	FO		X		X

Scientific Name	Common Name	Rank TRCA (Apr-20)	Plant Type	Royal York Road 2018 & 2020	Deane Park South 2018 & 2020	Deane Park North 2018 & 2020	Mimico Creek 2018 &2020
Geum canadense	white avens	**L5**	FO	X	X	X	X
Glyceria striata	fowl manna grass	**L5**	GR			X	X
Hackelia virginiana	Virginia stickseed	**L5**	FO		X		X
Heracleum maximum	cow-parsnip	**L5**	FO	X			X
Hydrophyllum virginianum	Virginia waterleaf	**L5**	FO	X			X
Impatiens capensis	orange touch-me-not	**L5**	FO		X		X
Juglans nigra	black walnut	**L5**	TR	X			X
Lysimachia ciliata	fringed loosestrife	**L5**	FO	X	X		X
Maianthemum racemosum	false Solomon's seal	**L5**	FO	X		X	X
Nabalus altissimus	tall wood lettuce	**L5**	FO			X	X
Ostrya virginiana	ironwood	**L5**	TR		X	X	X
Oxalis dillenii	deflexed yellow wood-sorrel	**L5**	FO			X	X
Oxalis stricta	common yellow wood-sorrel	**L5**	FO		X	X	X
Parthenocissus quinquefolia	Virginia creeper	**L5**	VW	X			X
Parthenocissus vitacea	thicket creeper	**L5**	VW	X	X	X	X
Pilea pumila	dwarf clearweed	**L5**	FO			X	X
Prunus serotina	black cherry	**L5**	TR	X		X	X
Prunus virginiana var. virginiana	choke cherry	**L5**	SH	X	X	X	X
Ranunculus abortivus	kidney-leaved buttercup	**L5**	FO			X	X
Ribes cynosbati	prickly gooseberry	**L5**	SH			X	X
Rubus idaeus ssp. strigosus	wild red raspberry	**L5**	SH			X	X
Rubus occidentalis	wild black raspberry	**L5**	SH	X	X	X	X
Sanguinaria canadensis	bloodroot	**L5**	FO	X	X		X
Smilax herbacea	carrion-flower	**L5**	VI			X	X
Solidago altissima	tall goldenrod	**L5**	FO	X	X	X	X
Solidago caesia	blue-stemmed goldenrod	**L5**	FO			X	X
Solidago flexicaulis	zig-zag goldenrod	**L5**	FO	X			X
Symphyotrichum lanceolatum var. lanceolatum	panicled aster	**L5**	FO			X	X
Symphyotrichum lateriflorum var. lateriflorum	calico aster	**L5**	FO	X		X	X
Symphyotrichum novae-angliae	New England aster	**L5**	FO			X	X
Thalictrum pubescens	tall meadow rue	**L5**	FO	X			X
Tilia americana	basswood	**L5**	TR	X	X	X	X
Toxicodendron radicans var. rydbergii	shrubby poison ivy	**L5**	SH			X	X
Ulmus americana	white elm	**L5**	TR	X		X	X
Viburnum lentago	nannyberry	**L5**	SH			X	X
Viola pubescens var. scabriuscula	smooth yellow violet	**L5**	FO	X			X
Viola sp.	violet sp.	**L5?**	FO		X		
Vitis riparia	riverbank grape	**L5**	VW	X	X	X	X
Acer negundo	Manitoba maple	**L+?**	TR	X	X	X	X
Epilobium sp.	willow-herb sp.	**L+?**	FO		X		

Scientific Name	Common Name	Rank TRCA (Apr-20)	Plant Type	Royal York Road 2018 & 2020	Deane Park South 2018 & 2020	Deane Park North 2018 & 2020	Mimico Creek 2018 &2020
Geranium robertianum	herb Robert	**L+?**	FO			X	X
Acer campestre	hedge maple	**L+**	TR		X		X
Acer platanoides	Norway maple	**L+**	TR	X	X	X	X
Alliaria petiolata	garlic mustard	**L+**	FO	X	X	X	X
Arctium minus	common burdock	**L+**	FO			X	X
Cerastium fontanum	mouse-ear chickweed	**L+**	FO			X	X
Cirsium arvense	creeping thistle	**L+**	FO			X	X
Cirsium vulgare	bull thistle	**L+**	FO			X	X
Convallaria majalis	lily-of-the-valley	**L+**	FO	X			X
Crataegus monogyna	English hawthorn	**L+**	TR			X	X
Dipsacus fullonum	teasel	**L+**	FO			X	X
Epilobium parviflorum	small-flowered willow-herb	**L+**	FO			X	X
Epipactis helleborine	helleborine	**L+**	FO	X		X	X
Euonymus alatus	winged spindle-tree	**L+**	SH	X			X
Euonymus europaeus	European spindle-tree	**L+**	SH	X	X		X
Euonymus fortunei	wintercreeper euonymus	**L+**	SH	X	X		X
Geum urbanum	urban avens	**L+**	FO	X	X	X	X
Hesperis matronalis	dame's rocket	**L+**	FO	X			X
Lactuca serriola	prickly lettuce	**L+**	FO			X	X
Ligustrum vulgare	privet	**L+**	SH	X			X
Lonicera morrowii	Morrow's honeysuckle	**L+**	SH	X		X	X
Lonicera x bella	shrub honeysuckle	**L+**	SH	X		X	X
Malus pumila	apple	**L+**	TR			X	X
Morus alba	white mulberry	**L+**	TR			X	X
Plantago major	common plantain	**L+**	FO			X	X
Prunus avium	mazzard cherry	**L+**	TR			X	X
Prunus tomentosa	Manchu cherry	**L+**	SH		X		X
Rhamnus cathartica	common buckthorn	**L+**	SH	X	X	X	X
Ribes rubrum	garden red currant	**L+**	SH			X	X
Robinia pseudoacacia	black locust	**L+**	TR		X		X
Rosa multiflora	multiflora rose	**L+**	SH		X	X	X
Solanum dulcamara	bittersweet nightshade	**L+**	VW		X	X	X
Sonchus arvensis ssp. arvensis	glandular perennial sow-thistle	**L+**	FO			X	X
Sonchus oleraceus	annual sow-thistle	**L+**	FO			X	X
Taraxacum officinale	dandelion	**L+**	FO		X	X	X
Taxus cuspidata	Japanese yew	**L+**	SH	X		X	X
Torilis japonica	hedge-parsley	**L+**	FO			X	X
Tussilago farfara	coltsfoot	**L+**	FO			X	X
Ulmus glabra	Scotch elm	**L+**	TR	X			X
Viburnum opulus ssp. opulus	European highbush cranberry	**L+**	SH		X	X	X

Scientific Name	Common Name	Rank TRCA (Apr-20)	Plant Type	Royal York Road 2018 & 2020	Deane Park South 2018 & 2020	Deane Park North 2018 & 2020	Mimico Creek 2018 &2020

Legend

L1-L3: species of regional conservation concern
L4: species of conservation concern in urban area
L5: species not of conservation concern at this time
LX: species is extirpated from TRCA
L+: introduced species, not native to TRCA
L+?: species is probably introduced

Total # of species in Mimico Creek forest vegvegetation monitoring plots	117
L1 to L3 native species of regional conservation concern	5
L4 native species of conservation concern in urban area	17
L5 native species not of conservation concern at this time	54
L+ and L+? Introduced species, not native and probably introduced	41

Appendix 2: Breeding Bird Species for Mimico Creek Forest Bird Stations, 2018 and 2019.

Survey Species: species for which the TRCA protocol effectively surveys.

Birds

Common Name	Scientific Name	Code	FB-40A - Royal York Road				FB-41A - Deane Park South				FB-42A - Deane Park North				LO	PTn	PTt	AS	PIS	StD	HD	+	TS	L-Rank
			2018		2019		2018		2019		2018		2019											
			# of Territories	Max Breeding Status	# of Territories	Max Breeding Status	# of Territories	Max Breeding Status	# of Territories	Max Breeding Status	# of Territories	Max Breeding Status	# of Territories	Max Breeding Status										
American redstart	*Setophaga ruticilla*	AMRE					1	PR							0	3	1	3	1	4	2	0	14	**L4**
great-crested flycatcher	*Myiarchus crinitus*	GCFL					1	PR							0	2	1	3	1	2	2	0	11	**L4**
grey catbird	*Dumetella carolinensis*	GRCA	1	PO									1	PO	0	2	2	1	1	3	1	0	10	**L4**
hairy woodpecker	*Picoides villosus*	HAWO							1	PO			1	PO	0	2	2	3	1	2	2	0	12	**L4**
indigo bunting	*Passerina cyanea*	INBU							1	PR					0	3	2	1	1	4	2	0	13	**L4**
northern flicker	*Colaptes auratus*	NOFL	1	PO	1	PO	1	PO			1	PO	1	PO	0	4	2	1	1	3	2	0	13	**L4**
red-eyed vireo	*Vireo olivaceus*	REVI					1	PR	2	PR					0	1	2	2	1	3	1	0	10	**L4**
white-breasted nuthatch	*Sitta carolinensis*	WBNU							1	PO	1	PO			0	2	1	3	1	2	2	0	11	**L4**
American goldfinch	*Spinus tristis*	AMGO	2	PO			1	PO	1	PO	1	PO	1	PO	0	3	1	1	1	1	0	0	7	**L5**
American robin	*Turdus migratorius*	AMRO	2	PR	1	PR	3	PO	1	PO	3	PR	2	PR	0	1	1	1	1	1	0	0	5	**L5**
Baltimore oriole	*Icterus galbula*	BAOR			1	PO	1	PR							0	4	2	1	1	1	0	0	9	**L5**
black-capped chickadee	*Parus atricapillus*	BCCH	1	PO			3	PO	1	PO					0	1	1	1	1	1	0	0	5	**L5**
blue jay	*Cyanocitta cristata*	BLJA	1	PO	2	PR	2	PO	1	PR			1	PR	0	3	1	1	1	1	0	0	7	**L5**
brown-headed cowbird	*Molothrus ater*	BHCO	1	PO	1	PO	1	PO	1	PO					0	3	1	1	1	1	0	0	7	**L5**
cedar waxwing	*Bombycilla cedrorum*	CEDW									1	PO			0	2	1	1	1	1	0	0	6	**L5**
common grackle	*Quiscalus quiscula*	COGR	1	PR	1	PO	2	PO	1	PR			3	PR	0	4	1	1	1	1	0	0	8	**L5**
downy woodpecker	*Picoides pubescens*	DOWO			1	PO	1	PO	1	PO	1	PR			0	2	1	1	1	1	1	0	7	**L5**
house wren	*Troglodytes aedon*	HOWR									2	PO			0	1	2	1	2	1	1	0	8	**L5**
mallard	*Anas platyrhynchos*	MALL	1	PO	1	PO									0	1	1	1	2	1	0	0	6	**L5**
northern cardinal	*Cardinalis cardinalis*	NOCA	2	PR	3	PR			1	PR	1	PR	2	PR	0	1	1	1	1	2	1	0	7	**L5**
red-winged blackbird	*Agelaius phoeniceus*	RWBL	1	PO			2	PR	1	PO	3	PR	3	PR	0	3	1	1	1	1	0	0	7	**L5**
song sparrow	*Melospiza melodia*	SOSP									1	PR	3	PR	0	3	1	1	1	2	0	0	8	**L5**
warbling vireo	*Vireo gilvus*	WAVI					1	PO			2	PR	1	PO	0	1	1	1	1	2	1	0	7	**L5**
yellow warbler	*Setophaga petechia*	YEWA							1	PO					0	3	2	1	1	2	0	0	9	**L5**
European starling	*Sturnus vulgaris*	EUST	1	PO	1	PO			1	PO	1	PO			0	4								**L+**
house sparrow	*Passer domesticus*	HOSP	1	PO	1	PR					2	PO	2	PO	0	4								**L+**

BREEDING STATUS

PO = Possible

PR = Probable

CO = Confirmed

LEGEND

LO = local occurrence STD = sensitivity to development

PTn = National population t HD = habitat dependence

PTt = TRCA population tren + = additional points

AS = area sensitivity TS = total score

PIS = Patch Isolation Sensiti L-rank = TRCA Rank, March, 2019 - based on data up to 2018 inclusive

L1 = Species of Regional Conservation Concern, regionally scarce due to either accidental occurrence or extreme sensitivity to human impacts

L2 = Species of Regional Conservation Concern, somewhat more abundant and generally slightly less sensitive than L1 species

L3 = Species of Regional Conservation Concern, generally less sensitive and more abundant than L1 and L2 ranked species

L4 = Species of Urban Concern; occur throughout the region but could show declines if urban impacts are not mitiagted effectively

L5 = species that are considered secure throughout the region

L+ = introduced species, not native to the Toronto region

LX = extirpated species; species not recorded in the region in the past 10 years

LV = sporadic breeder ("Vagrant"); species not recorded in the region in the past 10 years