



Oak Ridges Moraine Corridor Park Road and Trail Ecology: Baseline Monitoring Results

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1.0 Introduction

The Oak Ridges Moraine Corridor Park (ORMCP) is located within the Town of Richmond Hill and falls within the Humber watershed on the Oak Ridges Moraine (ORM). It covers approximately 428 hectares of land area and runs from Bathurst Street in the west to Bayview Avenue in the east and from Old Colony Road south to Jefferson Sideroad and Stouffville Road. It contains a variety of wetland, forest, and meadow habitats along with two kettle lakes that provide habitat for numerous flora and fauna species.

Based on the management plan for the Park, the overarching vision is to provide a sanctuary for wildlife and an opportunity for citizens to learn and interact with nature. In addition, the objectives for the natural heritage features are to protect, restore, and enhance wildlife habitats and wildlife movements (TRCA, 2006). To that end, in 2006 the Toronto and Region Conservation Authority (TRCA) conducted a terrestrial biological inventory in order to map the vegetation communities along with flora and fauna species of conservation concern within the Park. As part of these surveys, breeding wetlands for amphibians have been identified and breeding bird surveys conducted. In addition to the biological surveys, a long-term monitoring program was initiated in 2008 in order to track changes in species trends and composition over time. Permanent stations have been set-up in forest, wetland, and meadow habitat in order to track the health of the vegetation, breeding birds, and amphibians (TRCA 2010). Most recently in 2015, the TRCA conducted a road and trail mortality study of the roads and trails in and around the Park (Map 1).

The Park is bisected by a major north-south road (Yonge Street) and is surrounded on all sides by either regional roads or smaller side streets. Roads can negatively impact wildlife (Fahrig and Rytwinski, 2009) through vehicle-wildlife collisions resulting in mortality, behavioural changes due to the road acting as a barrier to movement and subsequently dividing populations (Ford and Fahrig 2008, Bouchard et al. 2009) and the direct loss of habitat through the creation of the road itself (Jaeger et al. 2005). Some studies have demonstrated that amphibians and reptiles are most susceptible to the negative impacts of roads (Glista et al. 2007, Bouchard et al. 2009, Beebee, T.J.C., 2013). Based on the landscape features in and around ORMCP (forests and wetlands) and the life history of other fauna species known to be present in the Park, it is anticipated that the herpetofauna (reptiles and amphibians) would be most negatively impacted by the roadways.

The main recreational trail system runs through the middle of the Park from Bathurst Street (at Bathurst Glen Golf Course) east to Bayview Avenue with a few secondary trails branching off that connect to the surrounding residential subdivisions. No known published ecological studies have been conducted that identify possible impacts that recreational trails have on local wildlife populations in terms of direct mortality. Some research has been done that documents the behavioural changes in bird communities (Smith-Castro and Rodewald 2010, Banks and Bryant 2007, Steven et al. 2011) but nothing on mortality. Incidental observations made by TRCA biologists suggest that there may be an issue depending on the time of year, type of trail (width, surface), location, and type of permitted uses. Snakes in particular may be impacted on paved trails during the fall as they are often attracted to the warm surface.

The purpose of this report is to provide the results of the 2015 baseline road and trail mortality study and to make recommendations for the next steps of this project.

2.0 Methodology

Road mortality surveys were completed following the methodology for data collection of similar TRCA road ecology projects. The main objective of these projects has been to identify locations where various fauna taxa cross roads and to identify any potential issues. However, some changes were needed to the protocol due to the size of the park and also to incorporate a trail mortality component. Daytime surveys were conducted by bicycle and the nighttime surveys by vehicle for safety reasons and in order to cover a large study area. For the full methodology please see TRCA 2015.

Road surveys were conducted on the residential and major roadways directly bordering ORMCP and trail surveys along a network of primary and secondary trails within the park boundaries. Approximately 19 km of roads and 8.2 km of gravel trails were surveyed.

2.1 Survey Frequency and Timing

Three monitoring periods were completed for this project beginning in August 2015 and concluding in October 2015. These periods were two weeks in length and consisted of one week of daytime visits and one week of nighttime visits. Both daylight surveys, conducted by bicycle, and nighttime surveys, conducted by car, have been included to facilitate comprehensive coverage of both roads and trails in and around the park. In addition, by incorporating both daytime and nighttime surveys a greater variety of species had the chance of being encountered. Two survey periods were shortened to four days rather than five due to Labour Day and Thanksgiving.

Surveys conducted during daylight hours began early morning and were timed with rush hour traffic considerations in mind. Trails were always surveyed first in an effort to avoid peak vehicle volumes allowing for the road portion of the survey to be conducted during periods of lower traffic volume.

Evening surveys commenced shortly after sundown and involved driving all roads, local and regional, bordering and directly adjacent to the park. One attempt was made to complete a trail survey by bicycle in the evening, however despite additional lighting, visibility was an issue.

The scheduling of the daytime bicycle surveys was conducted to ensure coverage of both the trail network and bordering roadways (Table 1). The entire driving route is covered each night through the cycle, although the survey method differed slightly between the local residential streets and the larger roads (Yonge St., Bathurst St., Bayview Ave., Stouffville Rd., Jefferson Sideroad and Old

Colony Rd.), with the latter being driven on the shoulder of the road and completed in two passes, in opposite directions, to ensure complete coverage.

Table 1: Weekly survey schedule for daytime bicycle surveys.

Day	Trail and Road Coverage
1	All trails; all roadways
2	All trails; roads east of Yonge (northbound lanes only on Yonge St.)
3	All trails; roads west of Yonge (southbound lanes only on Yonge St.)
4	All trails; all roadways
5	Make-up day if needed

2.2 Survey Safety

Road mortality surveys are always conducted in teams of two with at least one person experienced in identifying road kill. As with any work that coincides along a busy roadway safety was a primary concern. In both day and night surveys, when a sighting was made, one team member was responsible for further examination and species identification while the other remained vigilant of traffic and any potential risk to the other observer.

2.3.1 Nighttime Survey

Night surveys required all staff to have reflective coats / shirts and a working flashlight. Due to the long length of roadway within the study area (19 km) and the high volume of traffic, a decision was made to drive the road in order to conduct the surveys. Often this type of survey would be completed on foot, but safety was a concern. Some observations may have been missed based on this survey method however, because of the large study area that was being surveyed the total number of observations missed may be minuscule based on the amount of time required to survey the entire 19 km by foot versus vehicle. In addition, the headlights on the vehicle travelling on the road gave the observers a larger field of view compared to what is available from a flashlight shining from the road's edge. Cars were driven approximately 10 km/hr along the road while having four way flashers and a roof top flashing light that rotated 360° when activated.

2.3.2 Daytime Survey

Day surveys conducted by bicycle required each staff person to wear helmets in addition to reflective clothing. Road way surveys were done by riding far off the road on the gravel shoulder in single file. Bikes were not equipped with speedometers but were ridden slowly to try and prevent missing any observations.

2.3 Data Collection

For each survey, the start and end time was documented along with the weather conditions (air temperature, Beaufort wind, % cloud cover, and precipitation). For all observations, GPS coordinates were collected along with an indication of status (alive or dead) and the location of the observation (beside or on the road or trail) (Appendix A for data sheet).

When a carcass was observed it was identified to species and then removed from the roadway to ensure that it would not be counted again. When not able to identify to the species level due to repeated trauma, observations were noted as a broader taxonomic group ex. frog species or mammal species.

All wildlife observations were digitized and subsequent analysis was conducted using ArcMap 10.2. Species distribution output mapping provided the identification of areas that are of concern and provide information for the basis of possible mitigation opportunities.

3.0 Results

3.1 Survey Effort

A total of 151 hours (two surveyors combined) of trail and road monitoring was completed spread across three two-week survey periods. Of this time, approximately 77.5 hours were spent conducting daytime surveys by bicycle and the remaining 73.5 hours were spent monitoring the major roadways by vehicle (Table 2).

Table 2: Daytime and nighttime survey dates for 2015. Total survey effort was based on a team of two staff (combined).

	Cycle 1	Cycle 2	Cycle 3	Total
Daytime Surveys (by bicycle)	August 10 th -14 th	September 8 th – 11 th	October 5 th - 9 th	77.5 hours
	22.5 hours	24.5 hours.	30.5 hours	
Nighttime Surveys (by vehicle)	August 17 th –20 th , and August 23 rd	September 15 th - 17 th and September 20 th	October 13 th – 15 th and October 18 th	73.5 hours
	24.5 hours	25 hours	24 hours	
TOTAL				151 hours

3.2 Fauna Findings

A total of 540 field observations were recorded during the road and trail surveys. The majority of the observations captured were of encounters along the roadways (467 observations) rather than the trails (73 observations) (Map 2). On the roads, there were over 5.5 times more observed mortalities compared to live species encountered. Whereas, there were 8 times more live species encountered on the trails compared to the observed mortalities (Table 3) (Map 3).

Table 3: Number of observations found on trails versus roads based on status (alive or dead).

	# Found Alive	# Found Dead
Trails	65	8
Roads	70	397

The majority of the observations for frogs, toads and turtles were found dead on arrival. The results for turtles in particular were quite striking as 98% of the turtle observations were found dead. However, for snakes 64% of the observations were found of live animals, which were predominately from observations of red-bellied snakes (*Storeria occipitomaculata*) found alive on the trail system within the park (27 of the 32 observations) (Figure 1). Overall, 25% of the fauna encountered on the trails or roads were found alive. Animals found alive were observed either basking, crossing or foraging right beside or on the trail or road. The remaining 75% were traffic mortalities encountered predominantly on or beside the road (Figure 2).



Figure 1: Red-bellied snake found alive along the ORMCP trails during the 2015 survey.

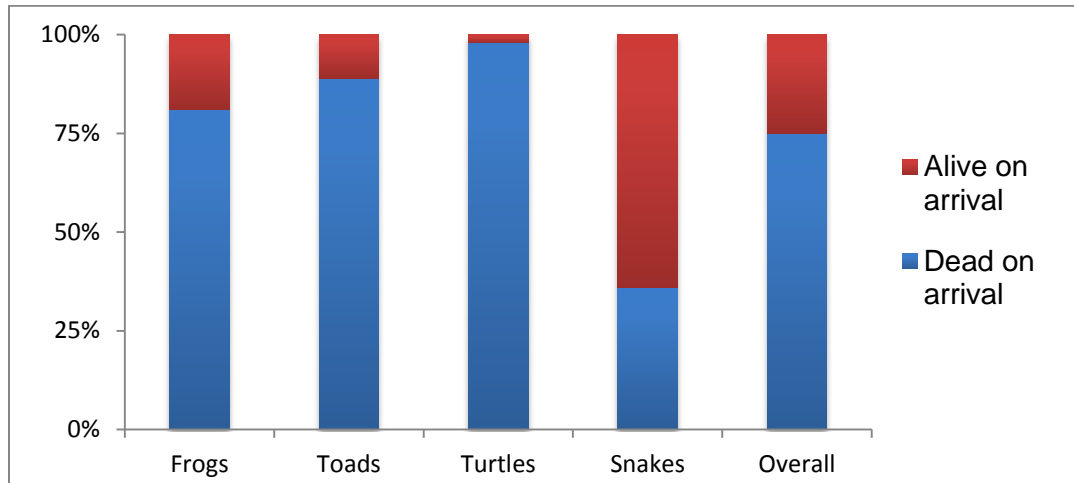


Figure 2: Amphibians and reptiles based on status of alive or dead when found, according to taxonomic grouping and overall encounters.

Frogs and toads were encountered considerably more often (68%) than reptiles (17%), mammals (14%) and birds (1%) (Figure 3). Twenty-nine different species were recorded although the top 10 species (Table 4) comprised over 70% of all sightings and deserve particular attention. American toad (*Anaxyrus americanus* - 27.6%) made up the majority of the observations closely followed by northern leopard frog (*Lithobates pipiens* - 27.1%) and red-bellied snake - 6.3%). Thirty-three observations were not identified to the species level but were determined to be frogs (25 observations), birds (1 observation) and small mammals (7 observations) with the latter most likely being either meadow voles or deer mice of the *Peromyscus* genus.

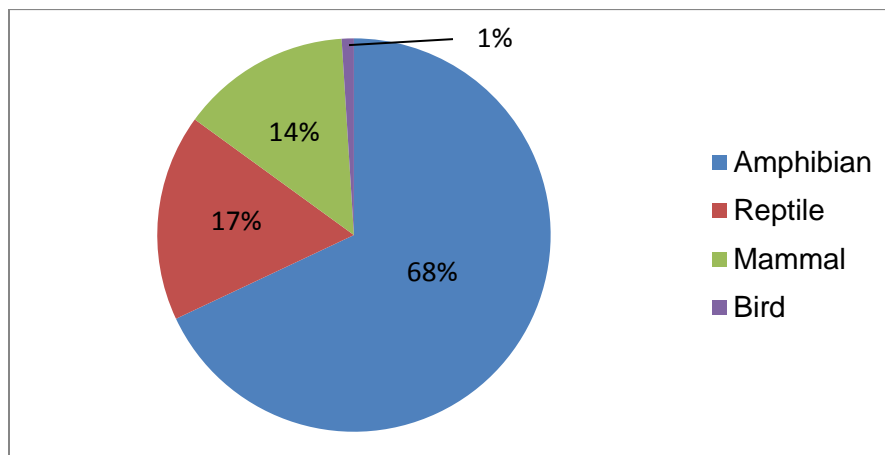


Figure 3: Taxonomic breakdown of all field observations into amphibian, reptile, mammal, and birds

Table 4: Top 10 species observed presented as total numbers and percentage of all sightings. A comprehensive list of all observations can be found in Appendix B.

Species	Number of Individuals	Percentage of Sightings
American toad	148	27.4
Northern leopard frog	147	27.2
Red-bellied snake	34	6.3
Midland painted turtle	32	5.9
Gray treefrog	21	3.9
Green frog	19	3.5
Eastern cottontail	18	3.3
Eastern gartersnake	16	3.0
Snapping turtle	12	2.2
Eastern chipmunk	10	1.9

Observations were fairly well distributed through the study area, such that nearly all portions of major and residential streets generated some data points. However, a 950 m stretch along Bathurst Street from Milos Road to just south of Kingshill Road was identified as a hotspot of activity (Map 4). This heavily traveled major roadway abuts Bathurst Glen Golf Course and bisects a series of wetland complexes. Of all 44 turtles recorded in this project only 4 individuals were found outside of this area and only one was found alive. Interestingly, all 12 snapping turtles documented were hatchlings (<5 cm carapace length) having presumably just emerged from a nearby nesting site (Figure 4).



Figure 4: Hatch-year snapping turtle found trying to cross Bathurst Street near Bathurst Glen Golf Course.

4.0 Discussion

The ORMCP is an area of land intended to serve as a wildlife refuge in a region undergoing rapid expansion and provide an undeveloped corridor facilitating east-west species movement along the Oak Ridges Moraine. Based on the results of the survey in 2015 there are several species that move in, out, and through the Park. Surveys were conducted for a three month period from August to the end of October. Ideally, surveys should be conducted in two consecutive years as the movements of species are highly variable from one year to the next. The data presented here is based only on one partial year of data with the most active period for amphibians being excluded. Therefore the results are somewhat limited in their interpretation.

Several different species (29 in total) covering 4 different taxonomic groups (amphibians, reptiles, mammals, and birds) of road kill were observed. But the most commonly encountered – amphibians and reptiles – are perhaps the most concerning as they are susceptible to long-term population declines due to their habitat requirements at all life stages and their general life history needs. Species such as raccoon (*Procyon lotor*) and skunk (*Mephitis mephitis*) for example, have a high occurrence of being road kill; however, they are generalist species that have a high reproductive capacity compared to some of the other species such as snapping turtle (*Chelydra serpentina*) that requires a more specific habitat type and is not sexually mature for approximately a decade.

An interesting observation from this initial data is the movements of amphibians across roadways leading into residential subdivisions. This may be a residual effect from this landscape being predominately in natural cover up until about 15 years ago with much of the residential housing development occurring within the past 10 years.

4.1 Road Observations

Although road mortality observations were made on most sections of the roadways there was a concentrated area of mortality along Bathurst St., where several species of herpetofauna were found. Most notably, 12 hatchling snapping turtles were found within this stretch, all but one dead on arrival. Given the limited mobility of juveniles, we can confidently say that sexually reproductive females reside in this area and are burying eggs in the gravel substrate on or beside the road shoulder. Several factors, including the nesting behavior and subsequent road mortality of this species, place populations in jeopardy and have contributed to its species at risk designation. Thirty-one adult midland painted turtles were also found dead within this area that included a mixture of males and females. In general, female turtles are typically more mobile in search of nesting opportunities but given the male movement as well, it is possible that other factors such as a paucity of basking sites or the quest for deeper water to safely overwinter may be at play, in addition to the nesting concerns discussed regarding snapping turtles. A comparison can be made between the age classes of these 2 turtle species, the potential underlying reasons they are drawn to the roadways in the first place, and ultimately the implications to their populations if mortality is not addressed.

4.2 Trail Observations

Trail mortalities were very low with all but 8 points (out of 73 total observations on the trail system) were of species found dead. Of the species found dead, 5 were anurans (3 American toads and 2 northern leopard frogs). The other 3 points were rodents. This would suggest that trail mortality is not an issue at the Park, or at least not during the time of year that the survey was completed (August to end of October). Even though the main trail system at ORMCP is quite wide at 2.5 metres, it is surfaced with limestone screening which does not provide the same warming conditions as pavement. Reptiles and amphibians are ectothermic which means that the environment dictates their body temperature. During the cooler fall months snakes will seek out areas that absorb sunlight such as rock surfaces and unfortunately, paved surfaces. The other factor that may have contributed to the low mortality found along the trails was that the number of trail users was relatively low (at least during the week) and there were few cyclists observed. Based on incidental observations in other parts of the TRCA's jurisdiction such as at the Leslie Street Spit, paved surfaces with cyclists can create a potential issue for snakes, in particular during the cooler autumn months. Some species such as the red-bellied snake can look very much like a stick on the trail and a cyclist going at higher speeds will probably not even notice that they are actually snakes (Figure 5); even hikers may not notice them (Figure 6).



Figure 5: A red-bellied snake on the trail at ORMCP is difficult to see when cycling



Figure 6: A red-bellied snake at ORMCP that was almost stepped on.

4.3 Existing Wildlife Crossing Structures

In 2002, five dedicated amphibian wildlife tunnels were installed along Bayview Avenue between Stouffville Road and Bethesda Side Road (Figure 7, Map 5). This was in response to the finding of a Species at Risk salamander, Jefferson Salamander (*Ambystoma jeffersonianum*), during an amphibian migration study that was completed before Bayview Avenue was extended northwards. The consultant Ecoplans Ltd. (now part of MMM Group) monitored these tunnels in 2003 / 2004 and again in 2006 / 2007 to determine their effectiveness. They found that the tunnels were being used by some amphibians, in particular frog species along with a few small mammals. They observed one Jefferson Salamander walking along the funnel wall to the end and then went up onto the road. A Spotted Salamander (*Ambystoma maculatum*) was found dead on the road between the two northern tunnels. Additional surveys were attempted by TRCA in 2007 however, several tunnels were flooded and water had ponded around the entrance. In addition, the surrounding land use was drastically changed with a new subdivision completed on the west side of Bayview Avenue and to the east the residential development was well underway. No species were found using the tunnels during this time.

Three additional wildlife crossing structures are along Old Colony Road. No known monitoring of these tunnels has been conducted so should possibly be considered in future monitoring activities.



Figure 7: Amphibian tunnel along Bayview Avenue north of Stouffville Road (Source: Geoff Gartshore, Ecoplans [member of MMM Group]).

5.0 Recommendations

- a) Additional road mortality data should be collected in 2016. At a minimum surveys to capture the spring amphibian mass migration that occurs as frogs and mole salamanders leave their overwintering sites and migrate to their breeding ponds should be conducted. As the peak breeding periods for all of the anurans (frogs and toad) is from April to the middle of June it is recommended that additional surveys be completed in 2016 during this time period.
- b) Consider placing wildlife cameras in the wildlife crossing structures along Old Colony Road to determine if they are currently being used and by which species.
- c) Explore opportunities to mitigate turtle mortality along Bathurst Street. Mitigation options may include providing additional turtle basking and nesting sites away from the road and/or the provision of wildlife passage under the roadway with appropriate directional fencing in strategic locations.
- d) Maintain the current type of trail surface throughout ORMCP; paved trails may increase mortality of snakes.

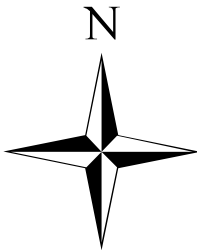
- e) Install trail counters at the trail heads in order to determine the number of trail users. Determining the number of users would be informative for the overall management of the Park but also to inform possible future trail mortality surveys.

6.0 References

- Banks, P.B. and J.V. Bryant. 2007. Four-legged friend or foe? Dog walking displaces native birds from natural areas. *Biology Letters* 3: 611-613.
- Beebee, T.J.C. 2013. Effects of road mortality and mitigation measures on amphibian populations. *Conservation Biology* 27: 657-668.
- Bouchard, J., Ford, A.T., Eigenbrod, F.E. and L. Fahrig. 2009. Behavioral responses of Northern Leopard Frogs (*Rana pipiens*) to roads and traffic: implications for population persistence. *Ecology and Society* 14: 23-32.
- Fahrig, L., and T. Rytwinski. 2009. Effects of roads on animal abundance: an empirical review and synthesis. *Ecology and Society* 14: 21-40.
- Ford, A.T. and L. Fahrig. 2008. Movement patterns of eastern chipmunks (*Tamias striatus*) near roads. *Journal of Mammalogy* 89: 895-903.
- Gartshore et al. 2005. Bayview Avenue Extension, Richmond Hill, Ontario, Canada. Habitat Creation and Wildlife Crossings in a Contentious Environmental Setting – A Case Study. (Ecoplans Limited and McCormick Rankin Corporation). Proceedings of the 2005 ICOET, San Diego, California.
- Glista, D.J., DeVault, T. L., and J.A. DeWoody. 2007. Vertebrate road mortality predominately impact amphibians. *Herpetological Conservation and Biology*. 3: 77-97.
- Jaeger, J. A. G., Bowman, J., Brennan, J., Fahrig, L., Bert, D., Bouchard, J., Charbonneau, N., Frank, K., Gruber, B. and K. T. von Toschanowitz. 2005. Predicting when animal populations are at risk from roads: an interactive model of road avoidance behavior. *Ecological Modelling* 185: 329-348.
- Smith-Castro, J.R. and A.D. Rodewald. 2010. Behavioral responses of nesting birds to human disturbance along recreational trails. *Journal of Field Ornithology* 81: 130-138.
- Steven, R., Pickering, C. and J.G. Castley. 2011. A review of the impacts of nature based recreation on birds. *Journal of Environmental Management* 92: 2287-2294.
- TRCA 2006. Oak Ridges Moraine Corridor Park Management Plan. Toronto and Region Conservation Authority.
- TRCA 2010. Oak Ridges Moraine Corridor Park: Terrestrial Monitoring Baseline Conditions Report. Toronto and Region Conservation Authority.

TRCA 2015. TRCA field protocol for ORMCP road and trail fauna surveys. Toronto and Region Conservation Authority.

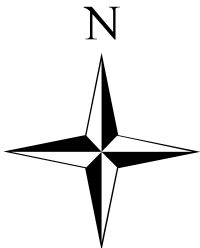
ORMCP Road and Trail Ecology Study Area (Aug. to Oct. 2015)



Legend

- ORMCP trails
- ORMCP roads

Road and Trail Observations at ORMCP By Taxa (Aug. to Oct. 2015)



Legend

Observations
Taxa, Status

turtle

snake

frog

bird

mammal

ORMCP trails

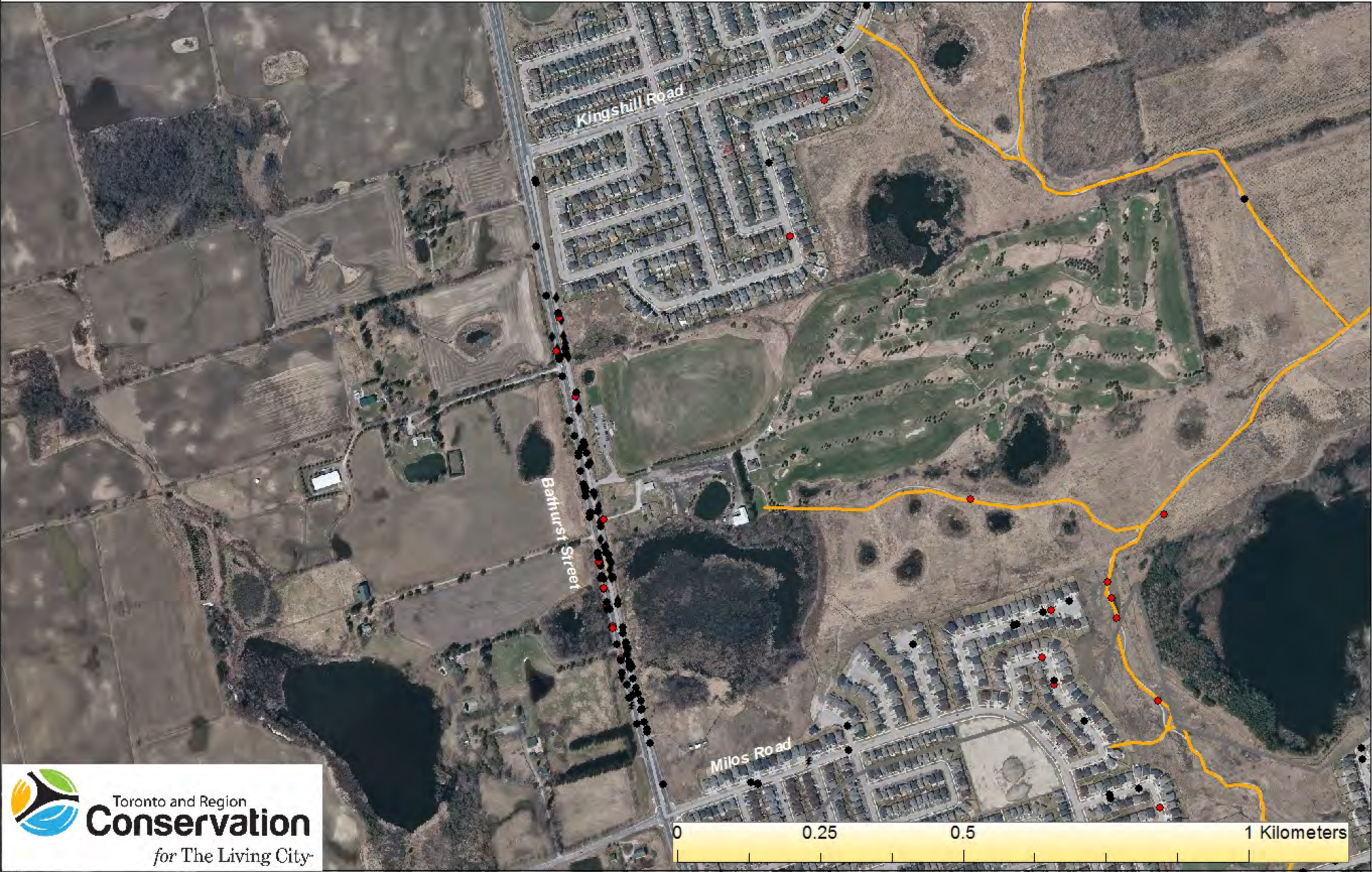
ORMCP roads

Status of Observations (Alive or Dead) Collected at ORMCP During Study (Aug. to Oct. 2015)



- Legend**
- Observations**
- Status**
- Alive
 - Dead
 - ORMCP trails
 - ORMCP roads

Reptile and Amphibian Observations Along Bathurst St. at ORMCP (Aug. to Oct. 2015)



Legend
Observations
Taxa, Status

- ♦ turtle, dead
- ⚡ snake, dead
- frog, alive
- frog, dead
- ORMCP trails
- ORMCP roads

Existing Wildlife Crossing Structures at ORMCP



Appendix A: Example of data sheet used to collect wildlife observations along the trail and roads at ORMCP.

[illegible]

Appendix B. List of all species encountered during road mortality surveys.

	Alive Beside Road	Alive On Road	Dead Beside Road	Dead On Road	Alive Beside Trail	Alive On Trail	Dead On Trail	TOTAL
Amphibians								
Frog Species	1		2	22				25
American Toad	4	13	28	93		7	3	148
Green Frog	1	3	1	12		2		19
Grey Treefrog		4	8	9				21
Leopard Frog	13	7	22	99	2	2	2	147
Wood Frog		3		2		3		8
Turtles								
Midland Painted Turtle			28	4				32
Snapping Turtle	1		5	6				12
Snakes								
Red-bellied Snake			2	5		27		34
Eastern Gartersnake			3	8	1	4		16
Mammals								
Mammal Species			2	3			2	7
Deer Mouse		1		1				2
Eastern Chipmunk				1	3	6		10
Eastern Cottontail	10		1	6	1			18
Ermine				1				1
Grey Squirrel		2	3	2		2		9
Meadow Vole		1		2		2		5
Mink				1		1		2
Muskrat				3				3
Norway Rat							1	1
Raccoon			3	1				4
Red Squirrel		1		2		1		4
Star-nosed Mole				1				1
Striped Skunk	4			1				5
White-tailed Deer						1		1
Woodchuck			2					2
Birds								
Unidentified Raptor				1				1
European starling				1				1
Wild Turkey	1							1
Grand Total	34	35	108	265	7	58	8	515