2015 Road Ecology and Turtle Population Study

Provincially Significant Wetland – Area "C"

May to October 2015

Etobicoke & Mimico Creek Watersheds

Toronto and Region Conservation for The Living City

Table of Contents

Table of Figures

Acknowledgements

Toronto and Region Conservation (TRCA), City of Brampton (CoB), Ontario Road Ecology Group (OREG) and partners, would like to express sincere thanks to the dedicated volunteers and project partners who participate in this road ecology and turtle population study.

Volunteers from the inception of this project continue to participate, and each year new groups are assisting. Through being involved with this study, these participants are learning about the effects of roads to wildlife and fragmented habitat. These people contribute a wealth of in-depth knowledge and experience to the welfare of this Designated Provincially Significant Wetland complex. Their continued input of equipment, time, expertise and valuable feedback to this project, add to its ongoing success.

Figure 1 - Participants 2011.

Figure 2 - Participants 2013.

Figure 3 - Participants 2014.

Figure 4 - Participants 2015.

1.0 Introduction

As part of its ongoing monitoring and stewardship roles, the TRCA has been leading a series of studies examining the wildlife fatalities along a stretch of Heart Lake Road (HLR) between Sandalwood Parkway (43°45'09.3"N 79°48'11.2"W) and Mayfield Road in Brampton, Ontario (43°45'09.2"N, 79°48'10.6"W).

In 2011, the Heart Lake Volunteer Road Monitoring Project (HLREMP) was initiated in partnership with Toronto and Region Conservation Authority (TRCA), City of Brampton (CoB), Ontario Road Ecology Group (OREG) and local volunteers. The objective of HLREMP was to better understand which species were being impacted by interactions with vehicles, how many interactions were occurring, and to suggest mitigation measures to protect local biodiversity. The HLREMP study area includes part of a designated Provincially Significant Wetland (PSW) complex bisected by Heart Lake Road between Sandalwood Parkway and Mayfield Road in Brampton, Ontario.

From data collected in 2011, hotspot wildlife fatality areas were identified and it was decided to conduct Phase II. In 2012, TRCA and City of Brampton staff met to locate existing culverts and assess the area to begin examining mitigation options. The study area (SA) was redefined to focus data collection in areas with high levels of Wildlife Vehicle Collisions (WVCs). Phase II began in 2013 and site boundaries redefined to extend along Heart Lake Road from Sandalwood Parkway to Countryside Drive. Data was collected by participants and a report of findings is available online at: http://www.trca.on.ca/dotAsset/187823.pdf

In 2014, a turtle population study was implemented as part of the component of wildlife fatality mitigation science. This portion of the study was put in place to gather demographic baseline information on in situ turtle population, before and after the proposed mitigation measures are applied. TRCA and partners agreed that it would be important to try to gain additional information on the turtle population prior to installation of any mitigation measures. A report on this study is available online at: http://www.trca.on.ca/dotAsset/201845.pdf

The following report details road ecology data collection and turtle population study from June to October 2015. Information was collected by TRCA staff and a group of students and faculty from Sir Sandford Fleming College Ecosystem Management Technology program.

Report Prepared By:
TRCA - Vince D'Elia, Project Manager
TRCA - Casey Cook, Project Coordinator
York University –Marc Dupuis-Desormeaux,
PhD. Candidate – Ecology, York University
Volunteer - Bob Noble, Data Coordinator

2.0 Rationale

In conjunction with long-term data collection of WVCs, mitigation measures include the installation of new road signs to slow traffic and proposed installation of dedicated wildlife culverts coupled with directional wildlife fencing. A turtle population study (TPS) prior to installation commenced to gather baseline information of turtle populations and a multi-year plan will be in place to track success and movement after installation. This research will require multiple annual surveys to detect any changes in population demographics stemming from the mitigation measures. Benefits of conducting and committing to a multi-year effort to surveying the turtle population include:

- gathering reliable estimates of turtle populations for the PSW adjacent to HLR in the SA and in turn produce usable mortality rates;*
- improved understanding of the local population characteristics (e.g., ratio of males to females, age class distribution);
- enriching the existing WVCs database gathered by TRCA and its volunteers;
- assisting in detecting changes in population demographics stemming from mitigation measures;
- monitoring usage of the mitigation by local turtle populations to help provide a better understanding of mitigation success; and
- engage and educate participants to natural spaces, wildlife and features of this PSW complex.

(*The mortality rates will help understand the ecological impact of the WVC losses)

3.0 Road Ecology Data Collection

3.1 Study Area

Hotspots within the Study Area (SA) defined from previous data collection have been defined into four areas (A,B,C and D) along Heart Lake Rd. from Sandalwood Pkwy to Countryside Dr. (Figure 5)

Figure 5 - Site boundaries and wetlands Heart Lake Rd. - Sandalwood Pkwy to Countryside Dr.

The water levels in Wetland A are almost level with the road, while the water levels for Wetland B, C, and D, sit at a lower elevation with an approximate 2.5 m sloped berm leading to a gravel shoulder. The surrounding roadside habitat is a mix of wetland, woodlot, field and commercial property. The land bordering the study site to the west is owned by TRCA and known as Heart Lake Conservation Area (HLCA). Found within HLCA are sections of the PSW, an Environmentally Significant Woodland area and a bog of Natural and Scientific Interest. This area provides nesting opportunities for at least seventy-five species of birds, including a regionally significant heronry and is home to thriving populations of several herpetofauna and mammal species including two species that are listed as SAR (snapping turtle, *Chelydra serpentina* and milk snake, *Lampropeltis triangulum*).

For the first time in recent history, the water levels in all the wetland ponds within the PSW complex decreased significantly throughout the season. The wetland located on the west side of Heart Lk Rd became devoid of surface water resulting in substrate being exposed (Figure 6 and 7). Levels in the east wetland lowered as well resulting in woody debris being exposed throughout the area (Figure 8 and 9). At this time the cause(s) of the dramatic change in water levels have not been determined. Lower water levels can have a significant effect on the overwintering success of herpetofauna. Turtles (midland painted and snapping) and frogs (leopard and green) require deep ponds that have at least one metre of water to ensure that the pond does not freeze solid and a minimum 45 cm soft substrate to burrow into if they are to survive winter hibernation. TRCA staff leading this study did notify the Ministry of Natural Resources and Forestry, City of Brampton Planning and Development and TRCA hydrology staff of the significant changes in water levels for these wetlands.

Figure 6 - West wetland normal water levels as of June 2015.

Figure 7 - West wetland water levels low, substrate exposed in mid-September 2015.

Figure 8 - East wetland normal water levels as of June 2015.

Figure 9 - East wetland water levels low, woody debris exposed in mid-September 2015.

3.2 Monitoring Protocols

Participants monitor in groups of no less than two and a health and safety meeting is held prior to onset of the study and reviewed throughout the season to ensure staff and participant safety.

In 2011, TRCA staff established 30 fixed GPS points using orange survey flags which were labelled and staggered at a distance of approximately 25 metre increments within the SA. These markers were placed at a safe distance from paved surfaces. Points #1 - #15 are on the west side of HLR commencing slightly north of Sandalwood Parkway. Points #16 - #30 are on the east side commencing on the south side of Countryside Drive ending slightly north of Sandalwood Parkway (Figure 10). Dividing the study site into 25 metre increments allowed for increased sighting accuracy during data collection for the volunteers.

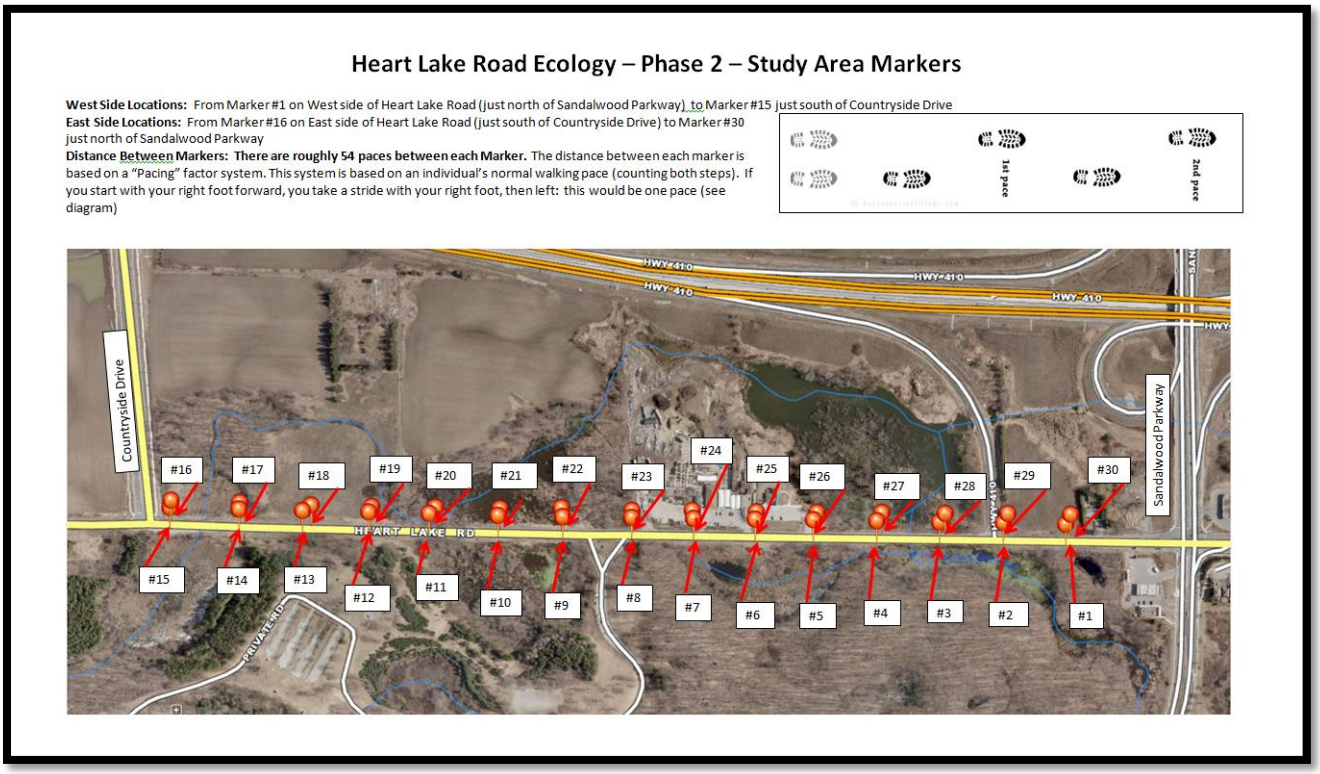

Figure 10 - Fixed GPS points for monitoring reference along Heart Lake Rd.

3.3 WVC Data Collection

Data for 2011 were collected over a 25 week study period from May 9 to October 31, 2011, with TRCA staff and over 40 community volunteers.

- Total time spent collecting field data 2011 - 420 hours.
- Actual time spent monitoring represents approximately 10% of the total available time for monitoring based on 12 daylight hours.

Results yielded a total of 1,988 wildlife observations (Figure 11). Of the total, 1,239 were fatalities and 749 were live sightings. When analyzing the relative number of WVCs, frog/toad ranked the highest with 1,044 individuals, followed by 94 turtles, 45 mammals, 25 birds, 17 snakes and 14 unknown. This was shared with CoB staff and project partners leading to further consultation and exploration of options for mitigation.

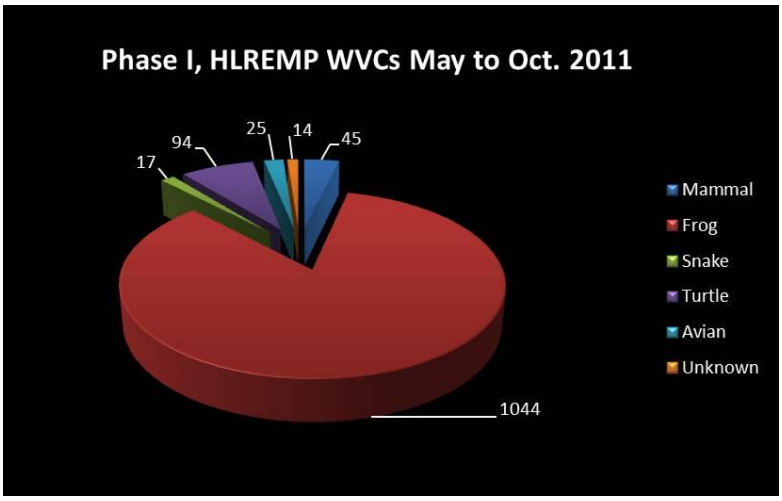

Figure 11 - Total WVCs Phase II 2011.

Data for 2013 were collected over a twenty five week study period from April 8, 2013 to September 30, 2013, with TRCA project staff and 17 volunteers.

- Total time spent collecting field data 2013 - 202 hours.
- Total monitoring sessions for the time period – 134.
- Actual time spent monitoring represents approximately 9.5% of total available time based on 12 daylight hours.

Results yielded a total of 2,078 WVCs observed (Figure 12). When analyzing the relative number of WVCs, frog/toad ranked the highest with 1,773 individuals at 85%, followed by 101 turtles at 5%, 77 mammals at 4%, 60 birds at 3%, 37 snakes at 2%, 28 unidentified at 1% and 2 salamander/newt.

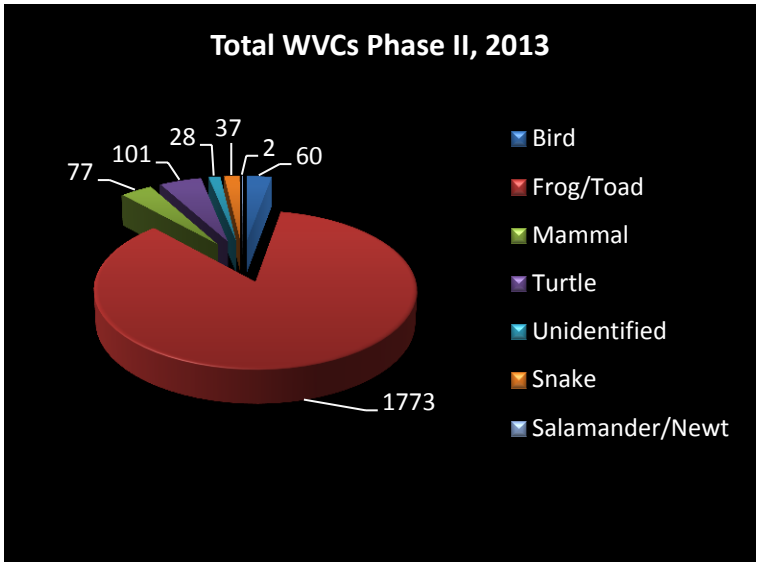

Figure 12 - Total WVCs Phase II 2013.

Data for 2015 were collected opportunistically over 15 weeks by TRCA staff, a graduate student from York University and students and faculty from Sir Sandford Fleming College, Ecosystem Management program. The duration of data collection was from June 10 to September 28, 2015.

Results yielded a total of 289 WVCs observed (Figure 13). When analyzing the relative number of WVCs, frog/toad ranked the highest with 156 individuals at 54%, followed by 56 unidentified at 19.4%, 29 birds at 10%, 24 mammals at 8.3%, 22 turtles at 7.6%, and 2 snakes at 0.7%.

- Total time spent collecting field data - 41.12 hours.
- Total monitoring sessions for the time period - 31.
- Actual time spent monitoring represents approximately 2.9% of total available time based on 12 daylight hours.

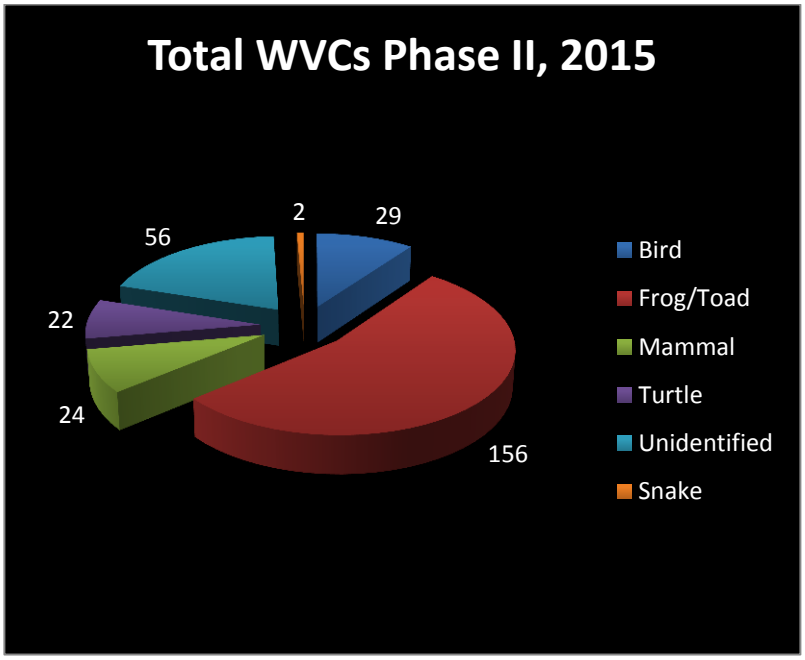

Figure 13 - Total WVCs Phase II 2015.

Efforts were made to accurately identify each observation on field data sheets with corresponding digital image(s). Where required, images were reviewed by TRCA and partner ecologists and biologists to confirm identification. Some WVCs were difficult to identify due to extent carcass damage.

Along with WVCs recorded, monitoring crew were able to identify the following bird species both visually and by songs/sounds during data collection monitoring:

- American goldfinch
- Black-crowned night heron
- Cedar waxwings
- Eastern phoebe
- Gray catbird
- Great egret (tagged and un-tagged)
- Green heron
- Northern flicker
- Red-winged blackbirds
- Spotted sandpiper
- Wood duck family (10 chicks)
- American redstart
- Brown-headed cowbirds
- Common grackles
- Eastern wood pewee
- Great-crested flycatcher
- Great blue heron
- Indigo bunting
- Osprey
- Sharp-shinned hawk
- Willow flycatcher
- Yellow warbler

4.0 Turtle Population Study

The 2015 TPS focused on two wetlands just north of the Heart Lake Conservation Area entrance on both the east and west side of HLR (Figure 14).

Figure 14 - Wetland ponds, east and west side of Heart Lake Rd.

4.1 Turtle Survey Protocols

Survey protocol involved the capture, mark and release of turtles as outlined below:

- Capture turtles at the pilot site using:
  3 – "D-shaped" hoop nets purchased from Wildlife Control Supplies (WCS) Canada
  3 – basking traps – constructed by RS staff
- Attach laminated signs to all traps indicating trap number and the following information:

PLEASE DO NOT TAMPER WITH THIS LIVE TRAP

Hoop Trap #1

Tampering with this live trap is a Provincial offence
(Chapter 41, para. 13.1 of Fish and Wildlife Conservation Act, 1997).
This trap is being monitored on a regular basis and the trapping is carried out under a live trapping permit (Ministry of Natural Resources – Wildlife Scientific Collector's Authorization # 1076288). Should you wish to receive information about the project, its objectives and methods, please contact:

Mr. Vince D'Elia at the Toronto Regional Conservation Authority,
(416) 661-6600 x5667

- Take body measurement (weight, carapace and plastron length and width, depth, pre-cloacal length).
- Determine sex of adults in order to inform the demographics of the population.
- Determine age of turtle.
- Assess each animal for injuries, damage, scars, leeches or anomalies.
- Notch the shell of each captured turtle using MNRF preferred notching method (Figure 15).
- Inject Passive Integrated Transponders (PIT) tags into each captured turtle above the minimum size (70mm of carapace length).
- Place turtles in holding bins and monitor prior to releasing back to capture site.

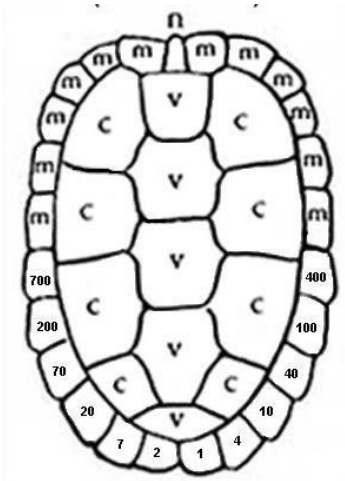

Figure 15 - MNRF notching chart.

4.2 Live Trap Equipment Set–up

Live trap tags were attached and traps were carried to the PSW sites. Bait in the traps initially consisted of small sardines, chicken, and/or cat food which produced a small number of turtle captures. In an effort to try and increase turtle captures, staff were able to obtain trout casualties from TRCAs Glen Haffy trout hatchery which were frozen and used as bait (Figure 16). It is possible this bait along with an earlier start time of the study may have contributed to higher success rates during 2015.

Figure 16 - Trout from Glen Haffy fish hatchery.

During the initial week long survey from June 15 to 19, 2015, a canoe with, paddles, PFDs, boating safety kit (kit contained: whistle, bailing bucket, flashlight, throw rope) was used to check traps. The canoe was carried to the east side of the road and staff created a small opening through vegetation for access to the wetland. Hoop traps (Figure 17) were placed along the perimeter of the wetland and three basking traps (Figure 18) set in central locations of the wetland. Staff also entered the wetland wearing chest waders, traversing using caution amidst submerged woody debris (Figure 19).

Traps were checked daily and when staff were not able to attend the site, hoop traps were set as "swim-through" and basking traps set in an "enter and exit" mode. For swim-through, the back of the hoop traps have a mesh netting and a small central opening with a drawstring attached that can be cinched closed or loosened to open up the back of the net. The tension of the drawstring determines if the end of the trap is open or closed. For basking traps, one end of the ramp portion is set inside the trap allowing turtles entering basking traps to climb out via a wooden ramp. Bait was left in the containers within the trap and replenished as needed to allow an available food source at all times. Traps remained in-situ, thus minimizing disturbance in the wetland and around traps. There were no injuries or casualties from leaving the basking traps or the hoop traps in the swim through position.

Figure 17 - TRCA staff checking hoop trap.

Figure 18 - Basking trap east wetland.

Figure 19 - TRCA staff checking basking trap.

4.3 Protocol of Data Collection

A local veterinarian, Dr. Tim Zaharchuk was contacted early in the season and similar to 2014, agreed to be available for emergency wildlife care if needed. Contact information:

> Derrydale Animal Hospital - Dr. Tim Zaharchuk (Dr. "Zee")
> 188 Main Street S., Brampton, 905-454-1600

Survey equipment was stored at HLCA and TRCA secured Ministry of Natural Resources Wildlife Scientific Collector's Authorization Permit, approval from Wildlife Animal Care Committee (Appendix A).

Notching and PIT tag locations were swabbed with isopropyl rubbing alcohol 70% USP (Figure 20), and a small amount of Xylocaine Jelly 2%, (lidocaine hydrochloride) was placed on the carapace area where notching would be done and hind leg where PIT tag was inserted. A small amount of New-Skin® was applied to the PIT tag site (Figure21) after insertion to prevent infection. Lidocaine hydrochloride takes approximately five minutes to be most effective in reducing pain thus minimizing stress to the animal. Once the topical anesthetic had taken effect, a Dremel® tool was used to notch an identification number using MNRF notching chart (Figure 7). The Dremel® tool was chosen over traditional metal files in an attempt to minimize time taken for the notching process. This method resulted in a quicker and more efficient method to notch the area as opposed to using metal files, resulting in less stress to the animal.

Figure 20 - Swabbing pit tag site with isopropyl rubbing alcohol.

Figure 21 - Nu-skin applied to pit tag insertion site.

It was important that a safe dose of topical lidocaine was calculated and administered to the Dremel® and PIT tag site beforehand in order to provide adequate pain control. PIT tags sizes were; Biomark HPT12® and HPT9, in pre-loaded trays and inserted using a Biomark® MK25 Implant Gun. Midland painted turtles (MPTU) were injected with HPT9 (9mm) tags (Figure 22), larger snapping turtles (SNTU) were injected with HPT12 (12mm) tags (Figure 23).

Figure 22 - PIT tag HPT9 inserted into midland painted turtle.

Figure 23 - PIT tag HPT12 inserted into snapping turtle.

When measuring, tagging and recording data on SNTU, a small plunger was placed over the head (Figure 24) which acted as a calming tool and assisted with prevent the animal "snapping" at staff. This method is used and was suggested for use in this study by Dr. Sue Carstairs at Kawaratha Turtle Trauma Centre. This safety method was disseminated to the North American Fresh Water Turtle Research Group and is now included into their monitoring protocol (Munscher et al. 2015, under review with the International Reptile Conservation Journal).

Turtles were weighed (Figure 25), checked for marks, scars damage and leeches were counted. Plastron and carapace length (Figure 26) and width were taken, depth measured and pre-cloacal length (Figure 27) was taken from the posterior most point of the plastron to the middle of the vent (cloaca) (this distance will be greater in males).

Figure 24 - Small plunger over snapping turtle head.

Figure 25 - Midland panted turtle being weighed.

Figure 26 - Plastron measurement taken of snapping turtle.

Figure 27 – Pre-cloacal measurement of snapping turtle.

Photos were taken of all captured turtles using a Nikon CoolPix P510® and Fuji FinePix S1®.

The protocol was repeated for each turtle captured over the study period. All turtles were placed in a large tote bin with water in a shady area and observed for approximately two (2) hours before being returned to capture location.

Equipment was placed in a secure storage area of HLCA office at the end of each day. All equipment including PFDs, waders and boat equipment were disinfected after the study was completed on September 18, 2015 in a mild solution of bleach and water.

4.4 Results

Trapping effort is measured in trap-days (td) (i.e., the number of traps set multiplied by the number of 24 hour periods in the water in the trapping position, not in swim-through mode). In 2015, trapping efforts were increased substantially compared to 2014. The trapping duration was June 12 to September 18, 2015 with a total of 6 traps being placed in the wetlands for 30 days resulting in 180 trap-days effort compared to 2014 where 8 traps were set in place for 5 days or 40 trap-days effort. Trapping effort was highly correlated with trapping success (effort = 4.5 times 2014, captures = 4.7 times 2014). On average, over the two years of study, 0.24 turtles were captured per trap day (52t/220td). This measure of capture per unit of effort (CPUE) is higher than many other studies at similar latitude sites (House, Nall, Thomas, 2011; Mali,Brown, Jones, Forstner, 2012).

Table 1 - 2015 - Results of trapping

Species	Total Captured	Total Recaptured	New	Adult Males	Adult Females	Sub-adult Males	Sub-adult Females	Unsexed Juveniles
Midland Painted	36	8	28	10	3	15	2	6
Snapping	8	1	7	2	2	0	2	1
Total 2015	44	9	35					
Total 2014	9	0	9					

Note: one juvenile MPTU turtle captured was below minimum size to pit tag and the carapace too soft to notch.

Population estimate for MPTU

Estimated baseline population has been derived using a basic Lincoln-Petersen Index corrected by a Chapman estimator N=[[(K+1)(n+1)]/(k+1)]-1], where;

N=estimated population
K=initial captured population year 1 (2014 = 9)
n=number of captured individuals year 2 (2015=36)
k=number of marked re-captures year 2 (2015=8)

The model yields an estimated population of 40 MPTU in the north east wetland. The standard deviation is 3.6, placing the population between 36 and 44 MPTU turtles. This may be overly conservative and may be attributed to the low output in the first year of sampling. Of the last 10 turtles captured in 2015, 6 were recaptures which may indicate close to a full census of the population in this section of wetland.

5.0 Discussion

5.1 Trapping Considerations

In 2015 minor modifications were made to trapping protocols.

- Trapping efforts were significantly increased;
- Trapping commenced earlier in the season;
- Trapping was completed later in the season;
- A variety of bait was used including the new bait of frozen trout casualties from Glen Haffy fish hatchery;
- No red meat has been used as bait (as per Mali I, et al 2012);
- Traps remained in the wetland during duration of the study (either in trip mode or in swim-through mode); and
- Traps were checked once per day (in the morning) to minimize disturbances in the wetland.

5.2 Population Estimate

MPTU population structure

As suspected from limited results of 2014, the results of 2015 reinforced suspicions towards a male bias in the population as outlined in Table 1 and 2 below.

Table 2 - Population Structure

Species MPTU	Adult Male	Sub-Adult Male	Adult Female	Sub-Adult Female	Juveniles	Total
2014	1	4	0	0	4	9
2015	9	10	3	2	2	26
Total	10	15	3	2	6	36
Sex Ratio	**24**		**5**			

SNTU population estimate

The number of SNTU is still too low to estimate using the L-P estimators (20 captures are required to obtain adequate information to assess) however future data collection may provide a better overview.

Table 3 - SNTU Population Structure

Species SNTU	Adult Male	Sub-Adult Male	Adult Female	Sub-Adult Female	Juveniles	Total
2015	2	0	2	3	1	8
Sex Ratio	**2**		**5**			

The current observed ratio is of 2:5 is not uncommon for this species as males are territorial and will defend their territories from other breeding males (Galbraith, Chandler, & Brooks, 1987; Obbard, 1983).

5.3 Male Bias in the Results:

Insufficient numbers of turtles were captured in 2014 to have a significant statistical sample however it is noteworthy that no female turtles were captured.

The 2015 data and current observed sex ratio in the MPTU population is 24:5 (or 83% of sexed population) and highly skewed towards the male population and indicative of a population under stress from WVCs (Gibbs & Steen, 2005). Based on literature reviews related to the TPS, this ratio is lower than 165 turtle population comparative studies conducted in the USA over the last century.

5.4 Volunteer effort:

Engaging volunteers not only provides much needed assistance required to implement the TPS, but also helps raise awareness of the effects roads have on fragmented habitat, WVCs, turtle mortality issues and the importance of partner collaboration.

Participation support at onset of the study was through a group of fourteen Sir Sandford Fleming College Ecosystem Management students and three faculty members. Highlights of this contribution can be viewed at the following TRCA website link.

http://trca.on.ca/the-living-city/watersheds/etobicoke-mimico-creek/accomplishments.dot

The group contributed valuable input and gained field experience during the turtle population study through the following:

- assisted in wildlife fatality data collection within the study area;
- educated on road ecology and turtle population protocols;
- guided on best practices for wildlife handling, specifically snapping turtle to minimize stress to animal and safety to handler;
- assisted with PIT tagging and monitoring - 2 snapping and 4 midland painted turtles;
- conducted a clean-up* along the SA collecting 12 construction-size garbage bags of litter and debris (apx. 250 lbs.)

(* Note: this section of Heart Lake Road is heavily impacted by illegal dumping. TRCA organizes several community and corporate clean-up events throughout the season to remove extensive construction debris, electronics, household garbage, litter and more.)

5.5 The Protocol

Protocols in place were well organized and capture, measure, notch, PIT tag and photographing were all completed with minimal stress on the turtles. All turtles were placed in holding bins prior to being released to the original capture site, monitored and showed minimal stress when released.

Volunteer feedback was positive and indicated each member walked away with additional knowledge and having had a very positive experience. Later correspondence from Fleming faculty informed TRCA staff that attending students were able to utilize snapping turtle handling protocols later in the season to assist turtles crossing roads in rural areas.

6.0 Management Consideration

6.1 Recommendations

Based on the experiences and outcomes from our 2015 TPS, staff directly involved with the study have provided the following recommendations:

- Continue to vary bait on a regular basis.
- Future turtle surveys in Wetland C should be conducted after the mitigation measures have been implemented.
- Suggest surveying wetlands every five years i.e., in 2020, 2025, 2030.
- Survey Wetland A and B in 2016 - population south of HLCA entrance and north of Sandalwood.
- Survey source population at Heart Lake in 2016.

6.2 Awareness Signage

This year City of Brampton has implemented and put the following signs and traffic slowing methods in place along Heart Lake Road including:

- Significant Natural Area signs on the east and west side of Heart Lake Road (Figure 28).
- Wildlife crossing signs (Figure 29).
- Solar operated; “Seasonal wildlife crossing – reduce speed when flashing” signs (Figure 30).
- Reflector strips (Figure 31).

Figure 28 - City of Brampton significant natural area sign.

Figure 29 - City of Brampton wildlife crossing sign.

Figure 30 - City of Brampton solar reduce speed sign.

Figure 31 - City of Brampton reflective strips to reduce speed.

7.0 Conclusion

Results have allowed a better understanding of the turtle population within hotspot wetland Area C, and how WVCs have affected the demographics of the MPTU population. Through our field investigations and data analysis, TRCA has recommended that the City of Brampton consider and/or implement a number of mitigation measures, from directional fencing, under road ecopassages, habitat enhancements (nesting beaches, deep overwintering pools) be implemented in the immediate future.

References

Galbraith, D. A., Chandler, M. W., and Brooks, R. J. (1987). "The fine structure of home ranges of male chelydra-serpentina, are snapping turtles territorial?" *Canadian Journal of Zoology*, 65(11), 2623-2629.

Gibbs, J. P., & Steen, D. A. (2005). "Trends in sex ratios of turtles in the United States: Implications of road mortality." *Conservation Biology, 19*(2), 552-556. doi: 10.1111/j.1523-1739.2005.000155.x

House, W.J., Nall, I.M., and Thomas, R. B. (2011). "Selected aspects of semi-aquatic turtle assemblages in east-central Kansas ponds." Transactions of the Kansas Academy of Science, 114(3-4), 239-244.

Mali, I., Brown, D. J., Jones, M. C., and Forstner, M. R. J. (2012). "Switching Bait as a Method to Improve Freshwater Turtle Capture and Recapture Success with Hoop Net Traps." *Southeastern Naturalist*, 11(2), 311-318. doi: 10.1656/058.011.0212

Obbard, M. E. (1983). Population ecology of the common snapping turtle, *Chelydra serpentina*, in north-central Ontario (Ph.D.), University of Guelph.

Appendix A

Ontario

Ministry of Natural Resources

Ministère des Richesses naturelles

Wildlife Scientific Collector's Authorization
Autorisation pour faire la collecte scientifique d'animaux sauvages

Authorization No. / N° d'autorisation: 1079993

Local Reference No. / N° de référence local:

Issuer Account No. / N° de compte du délivreur de permis: 10003011

This authorization is issued under Section 39 of the Fish and Wildlife Conservation Act, 1997 to:
Cette autorisation est délivrée en vertu de l'article 39 de la Loi sur la protection du poisson et de la faune de 1997 à:

	Last Name / Nom de famille	First Name / Prénom	Middle Name / Second Prénom
Name of Authorization holder / Nom du titulaire de l'autorisation	Mr. D'Elia	Vince	

Name of Business/Organization/Affiliation (if applicable) / Nom de l'entreprise/de l'organisme/de l'affiliation (le cas échéant):
Toronto and Region Conservation Authority

	Street Name & No./PO Box/RR#/Gen. Del./ N° rue/C.P./R.R./poste restante	Province/State / Province/État	Postal Code/Zip Code / Code Postal/Zip
Mailing address of Authorization holder / Adresse postale du titulaire de l'autorisation	5 Shoreham Drive		
	City/Town/Municipality / Ville/village/municipalité: Toronto	ON	M3N 1S4

This authorization permits the above-named person to:
Cette autorisation permet à la personne nommée ci-haut de:

[X] Capture wildlife of the species and sex, in the numbers, and in the area set out be below.
Capturer les espèces d'animaux sauvages selon le nombre et le sexe indiqués ci-dessous dans les lieux indiqués ci-dessous

and/or / et/ou

[ ] Keep game wildlife or specially protected wildlife in captivity for the purposes of education or science.
Garder des animaux sauvages spécialement protégés et du gibier sauvage en captivité à des fins éducatives et scientifiques

[X] Release the captured wildlife in the area of capture, if the captured wildlife is not to be removed from that area.
Remettre en liberté les animaux sauvages capturés dans la zone de capture si les animaux captures ne doivent pas être enlevés de cette zone

OR / OU

[ ] Capture and kill wild life of the species and sex, in the numbers, and in the area set out be below.
Capturer et tuer les espèces d'animaux sauvages selon le nombre et le sexe indiqués ci-dessous dans les lieux indiqués ci-dessous

Species / Especés	Sex / Sexe	Numbers / Nombre	Location / Endroit
Snapping Turtle			Heart Lake Road as described in Condition 1 of Schedule A
Midland Painted Turtle			Heart Lake Road as described in Condition 1 of Schedule A
Others as captured			Heart Lake Road as described in Condition 1 of Schedule A

Yes/Oui [ ] Additional list attached / Liste additionnelle ci-jointe

Authorization Dates / Dates d'autorisation	Effective Date / Date d'entrée en vigueur (YYYY-MM-DD)	Expiry Date / Date d'expiration (YYYY-MM-DD)
	2015-06-11	2015-10-30

Authorization conditions / Conditions de l'autorisation: This authorization is subject to the conditions contained in Schedule A if included./Cette autorisation doit respecter les conditions de l'annexe A si celle-ci est jointe.

Yes/Oui	No/Non	
[X]	[ ]	Schedule A included. / Annexe A ci-jointe

Authorized by (please print) / Autorisé par (veuillez écrire en caractères d'imprimerie)	Signature of Authorizer / Signature de la personne chargée d'autoriser	Date of Issue/Date de délivrance (YYYY-MM-DD)
John Almond	John Almond	2015-06-11

Signature of Authorization holder / Signature du titulaire de l'autorisation	Date (YYYY-MM-DD)
Vince D'Elia	Vince D'Elia 2015-06-11

Personal information contained on this form is collected under the authority of the Fish and Wildlife Conservation Act, 1997 and will be used for the purpose of licencing, identification, enforcement, resource management and customer service surveys. Please direct further inquiries to the District Manager of the MNR issuing district.

Les renseignements personnels dans ce formulaire sont recueillis conformement à la Loi sur la protection du poisson de la faune, 1997, et ils seront utilises aux fins de délivrance de permis, d'identification, d'application des règlements, de gestion des ressources et de sondage sur les services a la clientèle. Veuillez communiquer avec le chef du district du MRN qui délivré le permis si vous avez des questions.

FW2018 (04/C01)

Wildlife Scientific Collector's Authorization
Autorisation pour faire la collecte scientifique d'animaux sauvages
Schedule A – Authorization conditions
Annexe A - Conditions de l'autorisation

Authorization No.
No d'autorisation. 1079993

This authorization is subject to the conditions listed below.

1. This authorization is valid at Heart Lake Road, between Sandalwood Parkway north of Country Side Drive, City of Brampton, Regional Municipality of Peel.

2. This authorization is valid only for the persons, species, numbers, areas and calendar year indicated. A written report covering the operation of the preceding year must be submitted to the authorization issuer within 30 days of the termination date, but in no case later than January 31 next following the year of issue. The report shall contain a statement outlining the objectives of the operations, the methods used, the number and species of wildlife caught and their fate as well as a map indicating where the collections took place. An analysis is not required. The submission of a satisfactory report is a prerequisite to any subsequent renewals.

3. Before carrying out any operation under the authorization in any area the authorized person shall inform the Area Supervisor of his or her intentions at least a week before commencing work and include information as to the type of operation, location, duration, and the name or names of personnel involved. The forgoing does not apply to the collection of road killed specimens of a type indicated on the authorization.

4. When possible, all wildlife captured under this authorization shall be released alive in the area of capture. When further examination of the animal is necessary in the laboratory permission must be obtained as part of this authorization under section 40(2)(4) of the Fish and Wildlife Conservation Act. Where furbearing mammals are collected the authorized person must contact the issuing office and make arrangements to pay the royalty. Dead animals which are no longer required must be cremated or buried. The authorized person will inform the issuer of any burial site. Any animal suspected of being infected with a communicable disease shall be incinerated in a facility approved under the Environmental Protection Act for that purpose.

5. A copy of the original authorization must be carried by the authorized person when working at the designated sites. An assistant of the authorized person who is carrying out activities under this authorization during the absence of the authorized person shall carry a copy of the authorization on his or her person.

6. All collection gear shall be clearly marked with the authorized person's and the organization's name.

7. This authorization is not valid in Provincial Parks, park reserves, National Parks, Conservation Areas, Crown game preserves or sanctuaries established under the Migratory Birds Convention Act without written permission from the authorized person in charge of the area concerned.

8. Hoop, basking and wire mesh (spring loaded doors) traps and hand nets to be used for capture.

9. This authorization does not allow access to any property without permission of the landowner.

10. Sections 5 and 6 of the Fish and Wildlife Conservation Act 1997, and the provisions of the regulations relating to open seasons and bag limits do not apply to a person capturing or killing wildlife under this authorization.

11. The authorization holder may be assisted by: Marc Dupuis-Desormeaux and B. Casey Cook.

Signature of authorization holder / Signature du titulaire de l'autorisation **Date**

Vince D'Elia June 11, 2015

ONTARIO MINISTRY OF NATURAL RESOURCES

WILDLIFE ANIMAL CARE COMMITTEE

RESEARCH PROTOCOL APPLICATION

START DATE 1-Apr-15 COMPLETION DATE 30-Oct-15

Submit TWO MONTHS before start date

Protocol Number 15-322 ☐ New ☑ Amendment

This project has been submitted to:
- ☑ MNR District Office
- ☐ Ontario Parks
- ☐ Species at Risk

Category: C

- A: Experiments on most invertebrates or on live isolates (ie Observational Studies)
- B: Experiments which cause little or no discomfort (ie *No* Capture or Handling)
- C: Experiments which cause minor stress or pain levels (ie Capture/ PIT tagging/Notching/Tissue Samples)
- D: Experiments which cause moderate to severe distress or discomfort (ie Surgery/Pursuit)
- E: Procedures which cause severe pain, at, or above pain threshold of unanesthetized conscious animals (ie Toxicity Studies)

Project Title

Objective

Max Char 420
Count 419

Continued turtle population study from 2014 to gauge demographic significance of fatalities on local SAR population. Site is a Provincially Significant Wetland bisected by Heart Lake Road. Project in conjunction with road ecology study from 2010 to date. Population survey study could yield reliable estimates of turtle populations for the PSW and Heart Lake Conservation Area, in turn producing usable mortality rates.

Principal Investigator: Vince D'Elia, Project Manager - Etobicoke and Mimico (EM) Creek Watersheds

Company Affiliation: Toronto and Region Conservation Authority

Branch: Watershed Management - EM Creek Watersheds
Section:
Address: 101 Exchange Avenue, Concord Ontario
Telephone: 647-237-3711
Email: vdelia@trca.on.ca

Secondary Investigator(s): Paul Prior

Company Affiliation: Biologist, Toronto and Region Conservation Authority

Branch: Ecology
Section:
Address: 5 Shoreham Drive, Toronto Ontario
Telephone: 416-661-6600 Ext: 5328
Email: pprior@trca.on.ca

Target Species

Snapping Turtle	Number(s) to be handled	TBD
Midland Painted Turtled	Number(s) to be handled	TBD
	Number(s) to be handled	

Location(s) of Projects (Municipality/MNR District)

Heart Lake Road, Brampton ON - MNR Aurora District

☑ Research ☑ Management ☑ Teaching

Type of Research: ☑ Non-Invasive ☐ Invasive ☐ Surgery

Stress Level: ☐ Nil ☑ Low ☐ Moderate ☐ High

Pain Level: ☐ Nil ☑ Low ☐ Moderate ☐ High

Drugs: ☑ Anaesthetic ☐ Analgesic ☐ Other Topical Lidocaine

Samples: ☑ Blood ☐ Tooth ☐ Hair / Feather ☐ Tissue ☐ Other

Capture and Handling

Chase Method: ☐ Aircraft/Helicopter ☐ Snowmobile ☐ Powerboat ☐ Other

Animals to Be: ☑ Released at capture site ☐ Transported & Released ☐ Long Term Captive ☐ Terminated

Traps: ☐ Lethal ☐ Leg Snare ☐ Mist Net ☑ Live Trap Hoop, Basking, ☐ Net Gun ☐ Other

Marking Method: ☑ PIT Tag ☐ Fur/Feather Clip ☐ Dye ☐ Tattoo ☑ Other Notching Carapace

Device fixed to Animal: ☐ Radio Collar ☐ Leg Band ☐ Implanted Tag ☐ Other

Lay Summary:

Max Char 840

Count 813

Project staff to use hoop nets, basking traps & wire mesh traps and hand nets for snapping/midland,turtle to capture, mark, release turtles in PSW for population survey. Traps baited and checked every 3-4 hrs. Capture at 2 locations with staff at each location. Will be measured, weighed, anomalies noted. Shell notched with Dremel tool and PIT tag inserted with sterilized syringe.Injection site sterilized with rubbing alcohol, Lidocaine topical anesthetic and closed with NuSkin liquid bandage. Turtles monitored in recovery containers then released where caught. Equipment will be removed at completion of each study day. Notching conducted to allow future ID if PIT tag is ejected from turtle. All equipment will be sterilized and cleaned to prevent transfer of bacteria or other organisms between wetlands.

Declaration:

All animals used in this research will be cared for in accordance with the recommendations of the Canadian Council on Animal Care and the requirements under the Animals for Research Act, (Ont. 1980).

By submitting this form I hereby indicate my agreement not to make major changes to the research procedures without obtaining approval of a new Animal Use Protocol from the MNR WACC. I also affirm that I understand that no work may be performed prior to approval of this protocol by the MNR WACC.

NOTE: I understand that portions of this protocol may be used to develop a "**Standard Species Protocol**" to be used by other researchers.

For electronic submissions please sign below and scan, or check box:

☑ I, as principal investigator, am responsible for the information submitted.

Vince D'Elia — Signature (Principal Investigator)

February 23, 2015 — Date Submitted

The project described in this protocol is approved under the terms of the Animals for Research Act, (Ont. 1980)

Sarah Fraser — Approved by

February 22, 2015 — Date Approved