Turtle Population Study
Provincially Significant Wetland – Area "C"
Heart Lake Volunteer Road Ecology Monitoring Project

August 4 - 8, 2014

Etobicoke & Mimico Creek Watersheds

Toronto and Region Conservation for The Living City

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Acknowledgements

Toronto and Region Conservation, City of Brampton, Ontario Road Ecology Group and partners, would like to express sincere thanks to the dedicated volunteers and project partners that participated in this turtle population study.

This group of people contributed a wealth of in-depth knowledge and experience to the welfare of this Provincially Significant Wetland. They volunteered equipment, time, expertise and valuable feedback to this project laying a foundation for its future success.

From Left to Right: Vince D'Elia, Chris Edge, Nicole Richards, Jeremy Pearson, Marc Dupuis-Desormeaux, Sabrina Cirone, Mike Fraser, Barb Elliot, Paul Prior, Casey Cook

Absent from Photo: Ted Brewer, Dr. Sue Carstairs, Kawartha Turtle Trauma Centre, Mandy Karch (OREG), Suzanne MacDonald (York University), Dr. Tim Zaharchuk, on-call Veterinarian, members of the Toronto Zoo

Participants: Sabrina Cirone (University of Guelph), Casey Cook (TRCA), Vince D'Ellia (TRCA), Marc Dupuis-Desormeaux (York University, Principal Investigator), Dr. Chris Edge (University ofToronto), Barb Elliot (Sir Sandford Fleming College), Mike Fraser (Sir Sandford Fleming College), Suzanne MacDonald (York University), Jason Pearson (TRCA), Paul Prior (TRCA), Nicole Richards (Royal Ontario Museum)

Special thanks to Dr. Sue Carstairs for reviewing the capture protocols to minimize stress on the turtles and maximize the safety of TRCA staff.

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 Provincially Significant Wetland (PSW) complex bisected by Heart Lake Road (HLR) between Sandalwood Parkway and Mayfield Road in Brampton, Ontario.

In an effort to better understand "hotspots" (key areas of fatalities) identified from data in Phase I (2011), it was decided to conduct Phase II (2013). Based on findings from Phase I, Phase II study area (SA) was redefined to focus data collection in areas with high levels of Wildlife Vehicle Collisions (WVCs). Phase II site boundaries extended along Heart Lake Road from Sandalwood Parkway to Countryside Drive

A crucial component of wildlife fatality mitigation science is gathering baseline information about the populations' in-situ, 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.

This report describes results of the initial turtle population study performed between August 5th and August 8, 2014.

Study Area
The Study Area (SA) for the turtle population study was focused on a 300 metre stretch of HLR from the entrance of Heart Lake Conservation Area (43°44'27.2"N 79°47'12.9"W) to a side access road (43°44'34.2"N 79°47'22.0"W) south east of Countryside Drive.

2.0 Rationale

In conjunction with long-term data collection of WVCs, mitigation measures include proposed installation of dedicated wildlife culverts coupled with directional wildlife fencing. A crucial component of mitigation is gathering baseline information of the turtle population in-situ at the project site before and after the proposed mitigation measures are applied. TRCA and partners agreed to conduct a study to determine turtle populations prior to installation and implement a multi-year plan 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 wetlands 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 the mitigation measures; and

- monitoring usage of the mitigation by the local turtle population to help provide a better understanding of mitigation success.

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

Monitoring of the turtle population at HLR is best performed in a two-pronged approach, consisting of an initial population survey followed by yearly updates. This will be approached as an on-going monitoring program of wildlife movement through the passage.

This report describes results of the initial survey for the turtle population study performed between August 4th and August 8th, 2014.

3.0 Methods

3.1 Turtle Survey Protocol

Survey protocol involved the capture, mark, release and re-capture (CMRR) of turtles. The initial plan outline was to conduct a two-visit method to derive a Lincoln-Petersen Index following the steps listed below:

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

  Hoop Trap #1

  PLEASE DO NOT TAMPER WITH THIS LIVE TRAP
  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 with a number following a modified Cagle chart (see below).
- Inject Passive Integrated Transponders (PIT) tags into each captured turtle above the minimum size (70mm of carapace length).
- Blood sample taken to determine DNA.
- Place turtles in holding bins and monitor prior to releasing back to capture site.
- Within one week of the first capture and mark session, researchers would repeat the exercise noting proportion of re-captured turtles.

The Lincoln-Petersen method can derive a statistically robust and unbiased population estimate in a two-visit protocol. The population is estimated by the ratio: N=(M*C)/R, where N is the estimated population, M is the number of captured and marked individuals during the first visit, C represents the number of captured individuals in the second visit and R is the number of marked re-captured individuals from the second visit.

Recaptured turtles are identified by both their unique code notched into their carapace and their unique PIT tag identifier (activated with a PIT tag reader). In order to achieve statistical significance, a minimum of 20 turtles must be captured.

The wetlands within the SA should be extensively surveyed twice within a short time frame in its initial year in order to derive a solid population baseline estimate (closed population Lincoln-Petersen Index). Subsequent surveys may be conducted at any time during the field season and the statistical model for subsequent survey data will be switched from a closed to an open-population model (Cormack-Jolly-Seber).

Due to mitigating circumstances (weather, water temperature, feeding habits, etc.), modified protocols were required to capture and survey the local turtle population which is outlined below in the results section of this report.

3.2 Live Trap Equipment Set–up

"Persons at Work" signs were place slightly south of Countryside Drive on the west side (southbound lane) and at the north end of Lakeside Garden Gallery Nursery property (northbound lane). Traps were set up at the entrance area of Heart Lake Conservation Area (HLCA) (Figure 1). All traps were checked to ensure structures were sound (i.e. no holes in hoop trap netting) (Figure 1). "Live Trap" tags were attached and traps were carried to the PSW site. Bait in the traps consisted of small plastic containers containing sardines, chicken and cat food with holes punctured on top and sides of the container (Figure 2). A 14' Jon Boat, paddles, boating safety kit (kit contained: whistle, bailing bucket, flashlight, throw rope) were loaded into a pick-up truck and driven to the PSW wetland located on the east side of HLR. The Jon Boat was manually unloaded from the truck and a small opening was created through the vegetation for access to the wetland (Figure 3). Traps were placed along the perimeter (Figure 4) of the wetland and three basking traps set in the centre area of the wetland. Initial set up was conducted in the late afternoon into early evening of Monday August 4, 2014. All traps were in place by dusk.

Figure 1 - Checking traps prior to setting in wetland

Figure 2 - Bait for traps

Figure 3 - Access through vegetation

Figure 4 - Trap set along wetland border

3.3 Protocol of Data Collection

Participants: Sabrina Cirone (University of Guelph), Casey Cook (TRCA), Vince D'Ellia (TRCA), Marc Dupuis-Desormeaux (York University), Dr. Chris Edge (University ofToronto), Barb Elliot (Sir Sandford Fleming College), Mike Fraser (Sir Sandford Fleming College), Jason Pearson (TRCA), Paul Prior (TRCA), Nicole Richards (Royal Ontario Museum)

Veterinary Clinic Contact for Emergency Animal Care

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

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

Day one included introduction of all volunteers, a review of safety protocols and outline of monitoring protocols (Appendix B). The Jon Boat was taken to the wetland and traps were checked resulting in; 2 Midland Paint turtles from hoop trap #2, caught at approximately 9:30 a.m. In the afternoon at approximately 1:30 p.m. 1 Midland Paint turtle was caught in hoop net #1, and 1 Midland Paint turtle caught at approximately 4:00 p.m. by hand net.

Notching and PIT tag locations were swabbed with rubbing alcohol 70%, and a small amount of Xylocaine Jelly 2%, (lidocaine hydrochloride) was placed on the carapace area (Figure 5) where notching would be done and hind leg (Figure 6)where PIT tag was inserted. A small amount of "New Skin" was applied to the PIT tag site 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 a modified Cagle 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.

Of note, the carapace has bone below the scutes that is continuous with the ribs and pelvic region. All areas of a turtle carapace and plastron have many nerves associated with it that can sense pain (Sladky K, Mans C, 2012). 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 were injected with HPT9 (9mm) tags. The larger tags are for larger snapping turtles.

Turtles were weighed (Figure 8), checked for marks, scars, damage, leeches were counted, plastron and carapace length(Figure 9) and width taken, depth measured and pre-cloacal length (Figure 10) was taken from the posterior most point of the plastron to the middle of the vent (cloaca) (this distance will be greater in males).

DNA sampling was taken by a University of Guelph Veterinary Medicine student in her final year of study. The tail was swabbed with rubbing alcohol 70%, and a small amount of blood was extracted from the dorsal coccygeal vein (Figure 11) which is located just dorsal to the vertebral column. The needle is advanced to the level of the vertebrae, then negative pressure is applied to the syringe and the needle moved dorsally by less than 1mm. To calculate blood volume the turtle weight is obtained first. For example if a turtle was 200g, their entire blood volume is 200g x 0.08 = 16 mL. You can obtain ~8% of this volume in your blood collection therefore the maximum volume you can obtain is 1.3 mL. Required blood for DNA testing is as little as 0.2mL of blood.

Each sample was placed on a Wet Blood Kit card (Figure 12 & 13) with corresponding PIT tag number, location and pertinent identification information, carefully air dried and placed in a desiccant pouch. All needles were disposed of in a biohazard container.

Figure 5 - Lidocaine applied at carapace notching site

Figure 6 - Lidocaine applied to PIT tag insertion site

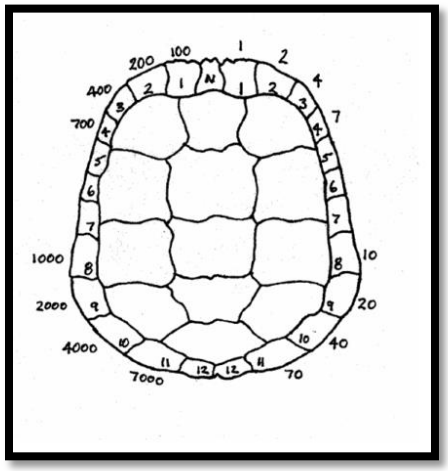

Figure 7 - Modified Cagle chart

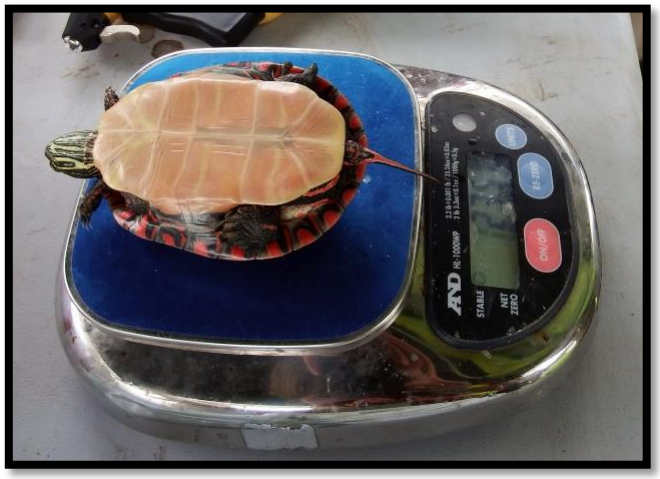

Figure 8 - Weighing turtle

Figure 9 - Measuring carapace length

Figure 10 - Measuring pre-cloacal length

Figure 11 - Blood sample from dorsal coccygeal vein

Figure 12 - Blood sample placed on Wet Blood Kit Card

Figure 13 - DNA sample and corresponding turtle

Figure 14 - General size image using metre stick

Photos were taken of all procedures and a photo of each turtle was taken adjacent to a meter stick to indicate general size (Figure 14). Camera(s) used: Nikon CoolPix P510 and Fuji FinePix S1.

The above protocol was repeated for each turtle captured over the four day period of the study. 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 loaded into a truck and placed in a secure storage area of HLCA office at the end of each day. All equipment including PFD's, waders and boat equipment were disinfected after the study was completed on Friday August 8, 2014 in a solution of bleach and water.

4.0 Results

A casual count of basking turtles was taken on different dates prior to the population study in order to obtain an idea of how many turtles might be in the wetlands within the SA. This visual survey was conducted from the shore using 8x42 binoculars.

Date Observation Taken and Wetland Site

- June 12 - East 22 (Midland Painted) - West 0 turtles
- July 15 - East 20 (Midland Painted) - West 0 turtles

Although a significant effort was made to trap the turtles in the east wetland, total capture resulted in 9 turtles and 1 re-captured. The trapping effort was substantial using hoop traps (5), basking traps (3) and half submerged shore traps (5). Prior data collection and sightings of live turtles in this area indicated the potential of a larger quantity of turtles being captured. Due to the low yield, trapping efforts were focused to four consecutive days in the east wetland. Consequently, the west wetland was not surveyed as efforts were concentrated where turtles had been sighted on previous occasions.

Species	Total Captured	Adult Males	Females	Juveniles
Midland Painted	9	5	0	4
Snapping	0	0	0	0
Other	0	0	0	0

Figure 15 - Chart of captured turtles

No turtles were caught in the basking traps, or metal raccoon-style shore traps. All captures were from hoop nets or by hand net. One by-catch (muskrat) was caught in a shore trap and released without incident (Figure 12). Notably, no female turtles were captured. Because of the low capture yield, no reliable population estimate can be calculated, as a minimum of 20 turtles is necessary for statistical significance. However, a back of the envelope Lincoln-Petersen Index split along the middle of the capture days yields:

LPI = (5x4)/1 or 20 turtles present in the East pond
(Coincidentally, a number similar to the casual observation of basking turtles in June and July).

Figure 16 - Muskrat by-catch in metal trap along wetland shoreline

5.0 Discussion

5.1 Trapping Considerations

Although the trapping exercise can be viewed as a success on many levels (see Management Considerations below), the yield of turtles was disappointing. At this time, it is unclear what caused the lack of trapping success.

Possible explanations discussed amongst the group of biologists and volunteers included the following:

- weather: cloudy, hazy - weather might have discouraged basking;
- water temperature: water was warm enough (+20°C or higher) that turtles did not require basking to raise body temperatures;
- turtles were not observed on basking traps, possibly due to abundance of emergent and partially emerged logs within the SA;
- time of year: heat, higher water temperature and the thick vegetation might have discouraged activity;
- abundant food source within wetland discouraged turtles seeking bait in traps;
- in August, turtles are well settled in their feeding grounds, there is no natural migratory movement or breeding impetus to encourage movement;

- bait selection: traps were baited with sardines, tuna, liver and/or cat food (on day 3, shrimp was added to the bait mix), general consensus was that bait choice was not an issue; (future suggestions: red meat or chicken as bait (Mali I, et al, 2012));
- trapping activity: traps were set in the evening and checked approximately 12 hours later, this may not have allowed sufficient time for the turtles to detect and zero-in on the bait; and
  traps were rechecked every 3 hours throughout the day, human activity in the wetlands may have kept the turtles in a hyper-cautious state of awareness and discouraged them from actively feeding.

5.2 Male bias in the results:

Although insufficient numbers of turtles were captured to have a significant statistical sample, it is noteworthy that no female turtles were captured. This could be the result of chance or may suggest a skewed sex ratio in the wetlands. Dramatically biased sex ratios in favor of males have been found in wetlands that are heavily affected by road kill (Brown C.L., Hecnar S.J., 2007, DeCatanzaro R., Chow-Fraser P., 2010, Georges A., et. Al., 2006, Steen D.A., et. al., 2006).

6.0 Management Consideration

6.1 Volunteer effort:

The value of retaining volunteers lies in raising awareness of the turtle mortality issues, partner collaboration, training various partners in surveying methodology and community outreach.

This study received excellent support from various people in the conservation community. Over the course of the week, the volunteers exhibited enthusiasm for the study and included well-trained TRCA staff, a veterinary student (University of Guelph), a post-doctoral biologist (University of Toronto), two college professors (Sir Sandford Fleming College), staff from OREG and ROM and the members of City of Brampton.

6.2 The Protocol:

Another highlight of the survey was how smoothly the protocol was implemented. Everything from the procurement of the equipment, to the sourcing of volunteers and the safe keeping of equipment and data was well executed. The capture, measure, notch, PIT tag, photography and blood sampling DNA protocols were all completed with minimal stress on the turtles and in remarkable stress-free fashion. Volunteer feedback indicated each member walked away with additional knowledge and a very positive experience.

6.3 Recommendations

For future trapping and additional capture/recapture surveying, the following suggestions have been recommended:

- conduct the survey in late spring or early summer during emergence and higher movement, (may alleviate issues associated with higher water temperature and the abundance of food);
- vary the bait in different traps (i.e. some traps should have meat and others should have fish); and
- reduce the survey group to two trained TRCA staff people plus one daily volunteer (volume of turtles captured did not require a large group of volunteers).

7.0 Conclusion

TRCA and partners plan to continue with long term monitoring and data collection at this PSW. Mitigation plans are ongoing with TRCA and CoB for a dedicated wildlife passage and directional wildlife fencing to be installed at this pilot site along with future mitigation for the south wetlands closer to Sandalwood Parkway.

Despite the low number of turtles captured and tagged, partners and volunteers gained valuable experience and contributed effective methods to ensure success of this project.

Ongoing plans are in place to continue this study in spring 2015 which will include additional species emergence data and tagging of turtles.

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Appendix A

Ministry of
Natural Resources
Aurora District Office
50 Bloomington Road
Aurora, Ontario L4G 0L8

Ministère des
Richesses naturelles

Telephone: (905) 713-7403
Facsimile: (905) 713-7361

Ontario

March 11, 2014

Vince D'Elia
Toronto Region Conservation
5 Shoreham Drive
Toronto, Ontario
M3N 1S4

Dear Mr. D'Elia:

Please find enclosed your Wildlife Scientific Collectors Authorization #1076288. Please print off two copies of the licence and conditions, sign both copies and return one signed copy to me via email. Your signature is acknowledgement that you understand and agree to the terms and conditions of the licence. You and your assistants are required to carry a copy of this licence with you at all times while collecting specimens.

Please contact me if you have any questions.

Yours truly,

K. Golby

Karen Golby
Business Services Clerk
karen.golby@ontario.ca

Ontario

Ministry of Natural Resources

Ministère des Richesses naturelles

Wildlife Scientific Collector's Authorization

Autorisation pour faire la collecte scientifique d'animaux sauvages

AuthorizationNo.. / N° d'autorisation	1076288
Local Reference No. / N° de référence local	
Issuer Account No. / N° de compte du délivreur de permis	7491147

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		
Mailing address of Authorization holder / *Adresse postale du titulaire de l'autorisation*	5 Shoreham Drive		
	City/Town/Municipality / Ville/village/municipalité	Province/State / Province/Etat	Postal Code/Zip Code / Code Postal/Zip
	Toronto	ON	M3N 1S4

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

☒ **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

☒ **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 capturés ne doivent pas être enlevés de cette zone

OR / OU

☐ **Capture and kill wildlife 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 / Espeçés	Sex / Sexe	Numbers / Nombre	Location / Endroit
Spring Peeper			Heart Lake Road - See Schedule A
Leopard Frog			Heart Lake Road - See Schedule A
Wood Frog			Heart Lake Road- See Schedule A
Painted Turtle			Heart Lake Road- See 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)
	2014-04-01	2014-10-30

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 ☐ 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	2014-03-11

Signature of Authorization holder / Signature du titulaire de l'autorisation	Date (YYYY-MM-DD)
	2014-03-11

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 conformément à la Loi sur la protection du poisson de la faune, 1997 , et ils seront utilisés aux fins de délivrance de permis, d'identification, d'application des règlements, de gestion des ressources et de sondage sur les services à la clientèle. Veuillez communiquer avec le chef du district du MRN qui délivré le permis si vous avez des questions.

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. 1076288

This authorization is subject to the conditions listed below.

1. This authorization is valid at Heart Lake Road, between Sandalwood Parkway and Mayfield Road, 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)(c) 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. Gloves and containers may be used.

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, B. Casey Cook, Dell Tune, Paul Prior.

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

Vince D'Elia — March 24/2014

Ontario Ministry of Natural Resources / Ministère des Richesses naturelles

Authorization Amendment

Modification d'autorisation

Amendment No. / N° de modification	1077787
Local Reference No. / N° de référence local	
Issuer Account No. / N° de compte du délivreur de permis	7491147

Name of Authorization holder / Nom du titulaire de l'autorisation

Last Name / Nom de famille	First Name / Prénom	Middle Name / Second Prénom
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

Mailing address of Authorization holder / *Adresse postale du titulaire de l'autorisation*

Street Name & No./PO Box/RR#/Gen. Del./ N° rue/C.P./R.R./poste restante

5 Shoreham Drive

City/Town/Municipality / Ville/village/municipalité	Province/State / Province/État	Postal Code/Zip Code / Code postal/Zip
Toronto	ON	M3N 1S4

Name of Authorization / *Nom d'autorisation*: Wildlife Scientific Collectors Authorization

Authorization No. / *N° d'autorisation*: 1076288

The above named authorization is amended as follows:
L'autorisation nommé ci-dessus est modifié comme suit:

to include the following species: Snapping Turtle, Green frog and Milk Snake.

Issued by / Délivré par	Signature of issuer / Signature du délivreur	Date of Issue/Date de délivrance (YYYY-MM-DD)
John Almond	John Almond	2014-07-22

Signature of Authorization holder / Signature du titulaire de l'autorisation	Date (YYYY-MM-DD)
Vince D'Elia	2014/07/22

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 conformément à la Loi sur la protection du poisson de la faune, 1997 , et ils seront utilisés aux fins de délivrance de permis, d'identification, d'application des règlements, de gestion des ressources et de sondage sur les services à la clientèle. Veuillez communiquer avec le chef du district du MRN qui délivré le permis si vous avez des questions.

FLOWER CITY
BRAMPTON.CA

ROAD OCCUPANCY & ACCESS PERMIT

THE CORPORATION OF THE CITY OF BRAMPTON

PLANNING & INFRASTRUCTURE SERVICES DEPT - ROADS MAINTENANCE & OPERATIONS
8850 McLaughlin Road, Unit 2, Brampton, Ontario L6Y 5T1
Phone: (905) 874-2500 Fax: (905) 874-2599

PERMIT NO: USE14-17309

NAME / COMPANY NAME	Vincent D'Elia / Toronto and Region Conservation Authority
ADDRESS	5 Shoreham Dr Brampton On M3N 1S4
BUSINESS TELEPHONE NUMBER	Day: (416)661-6600 Cell: (416)661-6600
BUSINESS FAX NUMBER / COMPANY WEBSITE / e-MAIL ADDRESS	
CONTRACTOR / CONSULTANT	
AFTER HOURS / EMERGENCY CONTACT PERSON	Vincent D'Elia
AFTER HOURS / EMERGENCY TELEPHONE NUMBER	Cell: (416)661-6600

	YY	MM	DD
DATE OF APPLICATION:	14	07	25
COMMENCEMENT:	14	08	04
COMPLETION:	14	08	08

PERMIT COST:	$250.00
RESTORATION/ SECURITY DEPOSIT:	$0.00
TOTAL:	$250.00

ASSOCIATED PERMIT(S)
SITE PLAN ASSOCIATED SP-
INSURANCE CERTIFICATE
PUC APPLICATION #

WORK DESCRIPTION DETAILS:
Occupying Road or Blvd, Trucks Equipment or Material. Toronto Region and Conservation Authority turtle population study

LOCATION OF WORK: From: Intersection of HEART LAKE RD and SANDALWOOD PKY E To: Intersection of HEART LAKE RD and COUNTRYSIDE DR

1.) HEART LAKE RD From: 2,011.35 meters To: 3,338.95 meters

OPEN CUTTING OF THE ROAD AND/OR REMOVAL OF SIDEWALK IS NOT PERMITTED WITHOUT PRIOR WRITTEN APPROVAL

CONDITIONS FOR ISSUANCE (SPECIAL PROVISIONS)
Traffic Controls as per Book 7. Personal protection equipment to be worn at all times. Signage to be posted daily, prior to activity. Inspection work to be conducted on the roadway shoulders.

TRAFFIC CONTROL:

TRAFFIC SIGNING WILL BE IN ACCORDANCE WITH BOOK 7 OF THE ONTARIO TRAFFIC MANUAL - TEMPORARY CONDITIONS.
ACCESS FOR EMERGENCY VEHICLES MUST BE MAINTAINED AT ALL TIMES.
ROAD CLOSURE(S) IS NOT PERMITTED WITHOUT PRIOR WRITTEN APPROVAL.

2 LANES TO BE MAINTAINED DURING WORK HOURS 2 LANES TO BE MAINTAINED AFTER WORK HOURS

OPERATING HOURS: FROM 8:00 TO 20:00

I, THE UNDERSIGNED HAVE READ AND UNDERSTOOD THE INFORMATION PROVIDED AND AGREE TO ABIDE BY ALL GENERAL CONDITIONS, SPECIAL PROVISIONS AND ALL CONDITIONS LISTED ON THE FACE AND BACK OF THIS PERMIT. ALL IN ACCORDANCE WITH BYLAW 93-93 (AS AMENDED)

AUTHORIZED REPRESENTATIVE PRINT: B. Casey Cook SIGNATURE: B Casey Cook

FOR OFFICE USE ONLY

PHONE NO.: (905) 874-2517

APPROVAL K Surkan

PERMIT FILE DATE _____ INITIALS _____

Appendix B

DATE: **Tuesday August 5th to Friday August 8th, 2014**

TO: **Participants of Toronto and Region Conservation Authority (TRCA) Turtle Population Study**

RE: **Turtle Population Study: Capture-Recapture Protocol and Schedule**

TRCA, Ontario Road Ecology Group (OREG) and the City of Brampton (CoB) have been conducting a Road Ecology Volunteer Monitoring Study at a designated Provincially Significant Wetland along Heart Lake Road between Sandalwood Parkway and Mayfield Road in Brampton Ontario. This study has taken place over the past four years. Data collected to date have shown high wildlife vehicle collisions (WVCs) and mortality of wildlife. CoB has agreed to a mitigation strategy in order to protect this sensitive area and wildlife within. You have graciously volunteered to assist with a turtle population study (TPS) to obtain a baseline number of turtles at this site. After mitigation has been installed, long-term monitoring will continue to track movement.

Our Base Camp will be at Heart Lake Conservation Area located at 10818 Heart Lake Road.
Google Map Coordinates are: 43.740977, -79.787484 (copy these coordinates into the search prompt in Google Maps and it will take you to the entrance of (HLCA)
Parking will be available at HLCA for all participants.

Participants are asked to bring the following:

NOTE:

- if/when applying sunscreen, we ask that you do not apply to your hands if you will be handling the turtles (or other wildlife)
- Please bring a lunch (we will have snacks and water) – there are restaurants close to study site
- Rain gear
- Appropriate safety foot wear if possible (i.e. steel toed boots/shoes) or closed toed shoes (PLEASE: NO SANDALS or FLIP FLOPS on the road or along the wetlands)
- Hat or head covering and sunscreen if UV index is high
- Water Bottle

TRCA will Provide:

- Water and snacks
- Additional sun screen and bug spray
- Nitrile gloves
- First Aid equipment
- All equipment and gear related to the capture and data recording of the turtles

We would like to take this opportunity to thank all of you for contributing your time and expertise to this study. We look forward to seeing all of you throughout the week and if you have any questions prior to Tuesday, please do not hesitate to contact either Marc Dupuis-Desormeaux (marcd2@me.com) or Casey Cook at (ccook@trca.on.ca)

The following pages outline study protocols.
Study Protocols and Outline of Activities

1. Rationale

TRCA has committed to a multi-year survey of the turtle population at Heart Lake Conservation Area (HLCA).

A detailed and repeated population survey could yield reliable estimates of the population and help understand the demographics and ecological impact of the WVCs.

In turn, understanding the local population characteristics and threats will lead to more informed decision models as well as frame, in a more general and transferable ecological framework, the results of future WVC mitigation projects undertaken in other locations.

2. Protocol

The survey protocol will involve capture, mark, release and re-capture (CMRR) of turtles in the East and West wetlands immediately north of the HLCA entrance.

TRCA will use hoop traps, specialized traps (for Snapping turtles) as well as basking traps (for Map and Midland turtles) to capture the different turtle species in the area.

TRCA has secured Ministry of Natural Resources Wildlife Scientific Collector's Authorization permit, approval from Wildlife Animal Care Committee and appropriate road permits.

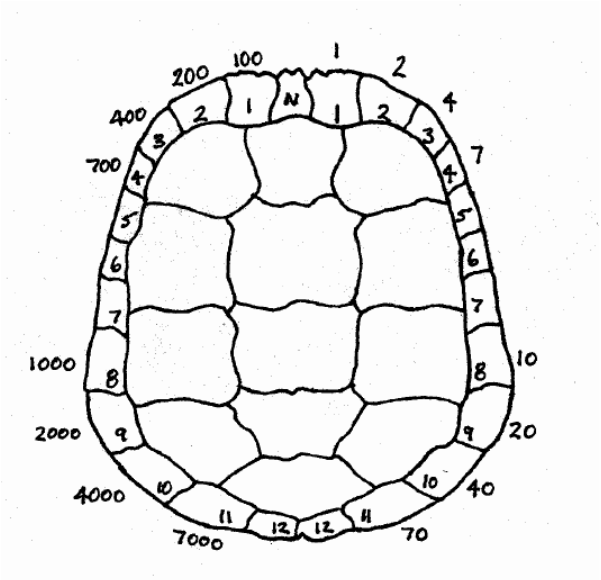
The survey protocol has been designed with input from the Monitoring section of TRCA.

Estimating the turtle population size will require a two-visit method to derive a Lincoln-Petersen Index for a closed population.

Researchers will take body measurement (weight and carapace length) as well as sexing the adults in order to inform the demographics of the population.

The researchers will notch the shell of each captured turtle with a number following a modified Cagle chart (Figure 1)

Passive Integrated Transponders (PIT) tags will be injected into each turtle above the minimum size (70mm of carapace length).



Modified numbering system based on Cagle (1939)

TRCA researchers will release the turtles in the same general location as they were captured. GPS or other location markers will be used to mark the location of each trap.

Within one week of the first capture and mark session, researchers will repeat the exercise noting the proportion of re-captured turtles. The Lincoln-Petersen method can derive a statistically robust and unbiased population estimate in a two-visit protocol.

3. Sample Day:

The turtle population study at HLCA will be surveying the two wetland areas slightly north of the Heart Lake Conservation Area entrance (Figure 2).

Monday August 4th: **Two-person trapping team (TRCA staff Marc and Casey)-** WETLAND A (East Wetland),

- 3:00 PM (1500 hrs) start, estimated time of completion - 6:00 PM (1800 hrs)

- Set and secure hoop and snapper traps to the side of the wetland.
- Tie traps to a secure tree, branch or bush to prevent slipping back into the water.
- Identify each trap with a number and note location on map and with GPS.
- Bait and set hoop and snapping turtle traps overnight. Punch holes in cans of sardines, salmon, and chicken for bait. Hang or place bait deep inside trap. Cans of cat food also acceptable. Thawed chicken breast are also a good choice for bait.
- With a canoe or Jon boat, place the basking traps near the basking logs.
- This two-person team should set traps and extract.
- All live traps and hoop nets must be only partially submerged to prevent drowning overnight.

See Trap location figure below:

Proposed locations for traps at HLR

<u>Tuesday August 5</u>: 8-person team- EAST WETLAND: 9:00 am start

MANDATORY SAFETY BRIEFING - Casey Cook to introduce everyone to the safety protocols.

4-person extraction team. Suggest MDD or CC + two TRCA staff (including one of the two trap-setters from the previous evening) + one volunteer to check, empty and re-bait the hoop and snapping turtle traps. Should be finished extracting and re-baiting by 10:30am. Re-bait at same location.
Captured turtles should be placed in Rubbermaid Roughneck containers individually identified based on trap location.
Take turtles (in containers) to processing site.

Six-person processing team: 10:00 start - Processing team to be located at Heart Lake Conservation Area. Process and hold captured turtles until second round. Process turtles by species and trap number.

There are <u>six distinct</u> stations involved in the processing:

1. Sorting Station: As turtles are brought in Rubbermaid bins to the Station area, turtles are sorted by trap and species. Turtles are returned to the sorting area when they have done the circuit of next five stations.
2. Notching Station: Turtle carapace is notched with a unique identifier number

3. Measurement Station: Turtles are weighed, measured, sexed and aged (if possible).
4. DNA Station: Blood samples are taken and recorded on DNA cards.
5. PIT Tag Station: Turtles are injected with a PIT tag and returned to the sorting station.
6. Photo Station: Turtles are photographed, top and bottom over a plain background with a yard stick as reference.

In order to be most efficient with our time and efforts, I would suggest that we adopt the following workflow pattern:

- Sorting Station: Handler selects turtle and notifies scribe of trap number and turtle species.
- Handler passes turtle to Notching person.
- Notching person applies Xylocaine (topical anesthetic) notches turtle according to Cagle chart (see Fig 2.) with help from Handler and calls out turtle number and species to scribe.
- Notcher hands turtle over to Measurements person.
- Measurements person to measure, weigh, sex, with help from handler if need be. Also notes any additional anomalies to carpace, plastron, limbs, head, etc. (Please see NOTES Section below for additional information) Calls out information to scribe.
- The DNA station: Vet may draw blood samples from the tail and keeps the DNA card organized. Passes turtle to PIT station.
- PIT tag person disinfects injection site, applies Xylocaine (topical anesthetic), loads PIT injector gun and injects turtle, cleans and closes wound with Nu-Skin.
- Handler receives turtle from PIT tag station and reads PIT code to scribe.
- Handler either passes turtle to photographer or takes photo of carapace and plastron. Notes Photo number and calls out to scriber to record on field data sheet.
- Turtles go back to handler to be placed either in a temporary "processed" bin while all the turtles from the same trap are finished processing. All turtles from same traps are then returned to original bin and will later be re-introduced to the wetland where they were captured.

12:30 Lunch Break (30 minutes)

Two to four-person trap team: 1PM trap check, clean and reset

- Return turtles near original trap location while checking the traps and emptying the second batch. Rinse containers with wetland water and re-use same containers for second batch at same trap.
- Check basking traps, empty using Jon Boat and bring to Sorting Station.
- Check and empty all traps as processing team finishes with each cohort. Remove traps from water by 3pm. Wash traps and containers with fresh water.
- Move and Set-traps on West side according to Figure 1. (3pm-5pm)
- Repeat trap setting protocol.

Processing team: 1:00 PM-5:00 PM

- Process second round captured turtles.
- Return second round captured turtles after processing to trap team for safe return.

Volunteer driver

Deal with captured invasive species. Red-eared sliders will be collected and moved to LittleResQ (Markham) at the end of the day. One container with damp towel at bottom.

Wednesday August 6: WEST WETLAND
Thursday August 7: EAST WETLAND
Friday August 8: WEST WETLAND

Notes:

Turtle Population Study - Handling Protocol - "Extras"

- Although hatchlings probably won't appear in this population survey at this time - there should be protocol to mark them (and note if the egg tooth is present/absent). - notes on this in Standard Turtle Handling Protocol.
- Right middle foreclaw length - relevant for sexing Painted Turtles - mature males will have a length equal to or > 1cm
- look for little white scabs/marks on PT necks - this results from courtship activities interesting to document
- Pre-cloacal length - helps sex the individual - distance is greater in males than females (base of tail to middle of cloacal opening)
- When disturbed, male snappers may extrude their penis - this is a sure way to sex the individual - include this activity in comment box if it happens
- if there are leaches - include a leach/parasite count/estimate (e.g. can draw size/measure leech cluster on turtle diagram)
- an image of a 'normal' turtle carapace and plastron to draw in any abnormalities in scute pattern in data sheet - and/or take a photo top and bottom of each turtle
- count annuli - but not all that effective at determining age and very prone to humane error - still good data to collect.
- Depending on when this occurs - gravid - not gravid (this can be done easily and non-invasive by poking the hind leg pockets and feeling for eggs in female turtles
- Injuries - comment box

Veterinary Clinic
Derrydale Animal Hospital - Dr. Tim Zaharchuk (Dr. "Zee")
188 Main Street S. Brampton, 905-454-1600 – Sherri (receptionist)

Emergency Veterinary Clinic (after hours): 1 Wexford Rd. (5.5 Km, Hwy 10 & Bovaird) 905-495-9907