

THE CANADIAN HERPETOLOGIST / L'HERPÉTOLOGISTE CANADIEN



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- Field notes outlining the results of recent herpetological work
- News, announcements, job postings, collaboration opportunities or any other information that may be of interest to Canadian amphibian and reptile researchers and conservation practitioners
- Photographs and art
- Book reviews

Please e-mail your submissions as MS Word documents with photos attached separately as JPEGs to the Editors (jlitzgus@laurentian.ca or Joe.Crowley@ontario.ca).

EDITORIAL NOTES

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Another field season has come and gone, and I'm sure many of us are already starting to yearn for the coming spring. This past field season was especially exciting for me because I kicked it off with a three-week trip to Arizona and Utah, where I was overwhelmed by the diversity and abundance of herpetofauna, not to mention the incredible landscapes. Although we missed seeing a Gila Monster, we did find five species of rattlesnake, a juvenile desert tortoise, and countless other herps. Back in Ontario, there were a lot of exciting reptile and amphibian research and conservation projects on the go, ranging from a stewardship program for the critically endangered Windsor Massasauga population, an urgently-needed Small-mouthed Salamander project on Pelee Island, a Queensnake research collaborative involving partners from across southern Ontario and many other interesting and extremely beneficial projects. You can learn about all of these projects, and a few others, in the Field Notes section of this issue. This issue also includes a feature article about the ecology and conservation of the Carolinian population of the Five-lined Skink. Steve Hecnar and his team have been studying this species in Ontario for 26 years, and their data on population

INSTRUCTIONS FOR AUTHORS

All submissions should be relevant to Canadian herpetofauna or other topics related to Canadian herpetology. Submissions by Canadian herpetologists about research or programs they have been involved with outside of Canada are also considered for publication. Please submit:

- Citations of recent (within the last 2 years) publications relevant to Canadian herpetology that have not already been listed in TCH. If the publication was "in press" in the previous issue, we will re-list it in the upcoming issue with the full citation information

dynamics and long-term trends are critical to informing effective conservation strategies for this species. Scott Gillingwater's work with the Spiny Softshell in the Thames River, which is also discussed in the Field Notes section of the issue, is another great example of a long-term project that is yielding some very interesting insights about species trends and management solutions.



Speckled Rattlesnake (*Crotalus mitchellii*) near Phoenix, Arizona (photo by Joe Crowley)

I have also been keeping busy this year developing the content for our (still relatively new) CHS website. I'm happy to report that, with the help of several volunteers, over half of the species pages have been completed! Although it's taken longer than we originally anticipated, I'm hopeful that we'll be able to finish off most of the website content by the end of this winter. As I mentioned at the AGM, if anyone is interested in helping with the website content (especially with French translation), please let me know.

This year's CHS conference in Saint John, NB was a huge success thanks to Connie Browne, Rachel Rommel-Crump, Don McAlpine and the rest of the local organizing committee. As always, the presentations and posters were excellent and the field trip provided lots of excitement as participants explored several interesting sites and managed to find many of the province's reptiles and amphibians. For more detail, check out the excellent summary of the 2015 meeting in this issue of TCH. At this point, it's looking like next year's conference is going to be in Ontario, and we should be able to announce more details very soon.

MEETINGS

TCH will post announcements about upcoming herpetological meetings and provide reports of recently-held meetings.

Canadian Herpetological Society 2015 Conference and Annual General Meeting

**Connie Browne, Rachel Rommel-Crump, and
Donald McAlpine**

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The Canadian Herpetological Society (CHS) held their annual conference in Saint John, New Brunswick from September 18-21. The New Brunswick Museum (NBM) provided a stimulating atmosphere for the conference and even included a temporary display, set up especially for the CHS meeting that showcased the amphibians and reptiles of New Brunswick. A Friday night opening reception kicked-off the conference activities on September 18 with 52 people gathering at the Saint John Ale House, located across from the NBM.

Plenary speakers began the day on Saturday and Sunday and were followed by 27 platform presentations over the two days, with just under 70 people in attendance. Jeff Houlahan provided a thought-provoking presentation "What do we know about global amphibian declines?" on Saturday and Mike James began Sunday's talks with his plenary presentation "Bio-logging leatherbacks", in which we learnt about cutting-edge research on Canada's most charismatic turtle. Maria Forzán organized a workshop on Emerging Diseases that was held on Saturday in the late afternoon. She and Matt Allender, the latter attending from the University of Illinois courtesy of Environment Canada, gave a feature presentation on "Emerging diseases of amphibians and reptiles, practical notes for the field and laboratory". While most of us are at least somewhat familiar with the threat posed by chytrid and ranavirus, many were shocked with the details provided on the newest herpetological disease threat, snake fungal disease (SFD). Poster presentations began immediately after the workshop, with 14 herpetologists presenting their work. The posters were set-up in the main lobby of the NBM for the duration of the weekend, which provided more opportunities for conference participants (and museum visitors!) to review these projects. A special arrangement with the NBM also allowed museum visitors to attend presentations for the cost of museum admission, with several local naturalists taking advantage of the opportunity to hear first-rate speakers present on current Canadian herpetological research.

The conference banquet was held on Saturday night in the NBM's Hall of the Great Whales with 55 hungry herpetologists salivating under the dramatic articulated skeletons of Right Whale, Beluga Whale, Pygmy Sperm Whale, Minke Whale and others. Donald McAlpine



CHS membership at the 2015 AGM and conference in St. John, NB

provided a brief introduction to the gallery, noting that the trials of dealing with 50 tons of whale carcass rotting on a beach surpass the stinkiest of road-killed herps any day (why is it that the dinner-time conversations of biologists inevitably turn to tales of the unappetizing?). Thankfully, Jonathan Choquette, the banquet MC, kept everything rolling smoothly and perfectly on time. Leslie Anthony began the evening's entertainment over dessert with a travelogue intriguingly entitled "Snakebit Unplugged: Herpetologists and other ill-tempered creatures I have known", relating his travels in Armenia in search of the elusive Armenian Viper. As usual, the competition among the herp geeks during the Herp Quiz was intense (thanks for assembling this Steve Marks!). After sufficient time for croaking and hissing among the quiz participants, we moved on to the awards ceremony.

CHS's president, Scott Gillingwater, presented travel awards to four students: Megan Snetsinger, Damien Mullin, Kelsey Marchand and David O'Connor. Donald McAlpine presented two Silver Salamander Awards to organizations that have made a significant contribution to herpetological conservation in Canada: Deanna McCullum accepted an award for the Department of National Defence efforts (led by Deanna) to protect Wood Turtle populations at Base Gagetown, New Brunswick and Kathleen Martin, Executive Director of the Canadian Sea Turtle Network, accepted an award for the collaborative work of the CSTN with scientists, fishermen, and community members in protecting sea turtles in Canada and elsewhere. The Michael Rankin Distinguished Canadian Herpetologist Award and the Blue Racer Award recognize exceptional and consistent achievements in amphibian and reptile research and conservation in Canada, respectively. Pat Gregory, a professor in the Department of Biology at the University of Victoria, was honoured with the Michael Rankin Award for decades of studies devoted to the

population ecology and life history of snakes. Steve Hecnar, a professor in the Department of Biology at Lakehead University, received the Blue Racer Award (presented by his former grad student, Connie Browne!) for his life-long contributions to reptile and amphibian conservation, including long-term, landscape-level studies that are essential to understanding the big picture and applying effective conservation solutions.



Steve Hecnar received a Blue Racer Award; presented by Connie Browne (photo by Joe Crowley)

Following two days of conference presentations, 34 field trip participants got to stretch their legs at some reptile and amphibian "hot spots" in the southern New Brunswick Saint John River Valley organized by our field trip coordinator Rachel Rommel-Crump. Our first stop took us to the Nerepis River on Base Gagetown, where we were greeted by Deanna McCullum, DND Range Biologist. Deanna gave an informative overview of the DND management and conservation activities for

the threatened Wood turtle (*Glyptemys insculpta*). After about one and a half hours of productive field time, the group had found a Wood Turtle (thanks Damien!) and five amphibian species!



Wood Turtle habitat at Base Gagetown, New Brunswick (top; photo by Joe Crowley) and Wood Turtle observed on CHS field trip (bottom; photo by Cowan Belanger)

Our second stop was also on Base Gagetown military lands, and home to the experimental wetlands project established by Jeff Houlahan’s lab at the University of New Brunswick Saint John. One of Jeff’s current doctoral students, Paul Crump, gave a brief overview of the historical and current research uses of these whole-system experimental ponds. Still with us, Deanna showed us some newly created wetland sites at the same property and surprised participants with free copies of the National Defence publication *Identification and Information Guide to the Species at Risk in Atlantic Canada*. Another highlight from this stop included the observation of 75% of New Brunswick’s snake diversity (3 species)! Consistent with the important information shared at the disease workshop, field trip leaders took the opportunity to make sure participants disinfected their boots via foot baths before heading off to our next location.

Our final scheduled stop was at Hyla Park Nature Preserve in Fredericton. This 8-hectare park was

established via a lease agreement between the City of Fredericton and the Nature Trust of New Brunswick in 1995 “for the purpose of protecting and preserving the Gray Treefrog (*Hyla versicolor*) and its habitat for future generations” – the first reserve established specifically for an amphibian in Canada. In the years since Hyla Park was established, Gray Treefrog populations in New Brunswick have expanded their range considerably and this species, once rare in the province, is now considered secure. The Trust’s Stewardship Coordinator, Richelle Martin, generously gave us an introduction and tour of the park’s trail system. Although we didn’t spot or hear any Gray Treefrogs, we did add Blue-spotted Salamander and Eastern Painted Turtle to our list (Table 1).

Although Hyla Park was the proposed grand finale for the field excursion, many participants continued on with an impromptu trip to nearby Odell Park in the heart of downtown Fredericton to look for Northern Dusky Salamanders. This visit, led by Scott Gillingwater, definitely paid off and the group was rewarded with sightings of not only dusky salamanders but also Northern Two-lined and Eastern Red-backed Salamanders. A perfect end to a great day filled with friends and herps!



Northern Dusky Salamander observed on CHS the field trip (top; photo by Cowan Belanger) and group photo of some of our field trip participants at Odell Park (bottom; photo by Joe Crowley)

Table 1. List of amphibian and reptile species native to New Brunswick and species observed on September 21, 2015 at four sites: 1) the Nerepis River on Base Gagetown, 2) UNB’s Experimental Wetlands on Base Gagetown, 3) Hyla Park, and 4) Odell Park. Observations are indicated with an “X”.

Common Name	Scientific Name	Site			
		1	2	3	4
American Bullfrog	<i>Lithobates catesbeianus</i>	X			
Green Frog	<i>Lithobates clamitans</i>	X	X	X	
Mink Frog	<i>Lithobates septentrionalis</i>				
Northern Leopard Frog	<i>Lithobates pipiens</i>	X		X	
Pickerel Frog	<i>Lithobates palustris</i>	X			
Wood Frog	<i>Lithobates sylvaticus</i>				
Spring Peeper	<i>Pseudacris crucifer</i>			X	
American Toad	<i>Anaxyrus americanus</i>				
Gray Treefrog	<i>Hyla versicolor</i>				
Red-spotted Newt	<i>Notophthalmus viridescens viridescens</i>				
Blue-spotted Salamander	<i>Ambystoma laterale</i>			X	
Spotted Salamander	<i>Ambystoma maculatum</i>				
Four-toed Salamander	<i>Hemidactylium scutatum</i>				
Eastern Red-backed Salamander	<i>Plethodon cinereus</i>				X
Northern Dusky Salamander	<i>Desmognathus fuscus</i>				X
Northern Two-Lined Salamander	<i>Eurycea bislineata</i>	X			X
Snapping Turtle	<i>Chelydra serpentina</i>				
Eastern Painted Turtle	<i>Chrysemys picta picta</i>			X	
Wood Turtle	<i>Glyptemys insculpta</i>	X			
Maritime Garter Snake	<i>Thamnophis sirtalis pallidulus</i>		X	X	
Northern Red-bellied Snake	<i>Storeria occipitomaculata</i>		X		
Smooth Greensnake	<i>Opheodrys vernalis</i>		X		
Ring-necked Snake	<i>Diadophis punctatus</i>				

FEATURE ARTICLES

Tales of Blue Tails: Over 25 Years of Five-Lined Skink Research in Southwestern Ontario

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In a constantly changing world it comes as no surprise that we can continue learning new things about our model organisms regardless of how long they are

studied. Fieldwork in 2015 marked our 26th consecutive year of research on the Field-lined Skink (*Plestiodon [Eumeces] fasciatus*) in the Carolinian zone of Southwestern Ontario. Skinks in the Carolinian Population are designated as endangered by COSEWIC and COSSARO because of population losses over time and because the remaining populations are few and highly isolated. Until recently, we had good knowledge of primarily just one population (Point Pelee National Park) but we are now also studying the skinks at other locations.

We conducted most of our work in three main locations. At Point Pelee National Park on Lake Erie near Leamington, ON, Heidi Brown, Christina Lawrence, Tammy Dobbie and other park staff took over fieldwork for the first time in our 26 year long skink monitoring project. Abundance remained near record highs as in recent years, a testament to the efforts of continuing active management and habitat restoration. While 207 skinks were observed on the west side of the peninsula during the annual peak activity period (nesting season), no skinks were observed on the east side. In our studies we have consistently found higher skink abundance on the west beach (dune – savanna system) and fewer skinks on the east beach (Hecnar and Hecnar 2013). Historically, more skinks occurred on the east than west beach until 1972, when a century storm eroded virtually all beach habitat up into the mature forest (Rivard and Smith 1973a,b). Since 1990 we have tracked the gradual recolonization of the east beach via a trail that crosses the marsh and interdune trough ponds. As time has progressed, we have noted smaller storm-related erosion events that removed small areas of habitat on the east beach (Figure 1). During an unexpected storm in 2007, Canada’s mainland shrunk over a kilometer northward as the park lost its tip overnight. The unforested portion of the tip that was lost has not been redeposited since. On 6 June, 2010, a tornado just missed the park but still caused considerable blowdown of trees. By 2013, skinks had regained their former occupancy of the entire east beach reaching the north dyke boundary and the tip of the peninsula – a total distance of 8 km.

In 2013 and 2014 we found 40 and 47 skinks respectively on the east beach during our annual survey. However, on 27 June, 2015, a violent storm removed virtually all beach and dune habitat that reformed since the 1972 event. There was so much blowdown that it took the park three days to clean up, restore utilities, and clear the main road. In portions of the park’s east side, debris marking the storm surge line penetrated 30 m into mature Carolinian forest. The loss of skinks and their habitat in this single event reminds us of how dynamic

coastal environments can be and makes us wonder about the increasing severity and frequency of such events occurring in the future as a result of climate change.



Figure 1. Storm erosion in Five-lined Skink habitat at Point Pelee (photo by Steve Hecnar)

At Pinery Provincial Park on the shores of Lake Huron near Grand Bend ON, our partners Jackie Prisciak, Alistair MacKenzie, Barb Ferris, other park staff, and volunteers of the Friends of Pinery conducted a second full season of skink surveys and stewardship work under a MNRF SARSF grant. With two years of data, we are now confident that a sizeable skink population also occurs at Pinery. Phenology and habitat use seem to be very similar to Point Pelee with the exception of less dune use, likely because of the lack of cover objects and heavy human recreational use. Outreach activities resulted in more information about skinks in the park and outside the park's boundaries, and generated much public interest (Prisciak 2015). While analyses are just beginning, it is clear that Five-lined Skinks at the Pinery dominate the reptile community in abundance, similarly to the communities at Point Pelee and Rondeau Provincial Park.

At Rondeau Provincial Park on Lake Erie near Morpeth, ON, we finished our third year of intensive field research on the skink. Although several aspects of reptile and amphibian ecology have been investigated at Rondeau historically (e.g. Judd 1955, 1962; Gillingwater and Piraino 2002), the status of the skink population on this sand peninsula east of Point Pelee has remained largely unknown. In 2015, Dan Brazeau and Tamara Eyre, with assistance from Dr. Christina Davy and her snake ecology team, continued a third consecutive year of skink surveys throughout the season under a MNRF SARRFO grant. Early results indicate that Rondeau also has a very large skink population with similar habitat selection and phenology as in the neighbouring isolated populations at Point Pelee and

Pinery (Hecnar and Brazeau 2015). Dan was able to gather additional data for his M.Sc. research, which supported previous findings of strong habitat selection for stabilized dune, followed by savanna, with high seasonal use of anthropogenic structures. Dan also refined his estimates of a threshold effect of forest canopy on skink habitat use and associated thermal microenvironments. The novel part of the 2015 field season was conducting radio telemetry on skinks to begin learning about their movements and more details of habitat use. Because of recent improvements in transmitter technology and the recent success of radio-tracking the closely-related Northern Prairie Skink (*Plestiodon septentrionalis*) in Manitoba by Dr. Pamela Rutherford and her students, we began the first ever radio-telemetry study on the Five-lined Skink. After a short pilot study developing external attachment techniques with surgical tape, we fitted 30 skinks with transmitters (Figure 2). Skinks retained transmitters from 1–16 days; some individuals didn't move at all, others moved more than 150 m over a few days. Our preliminary impression is that some individuals may move greater distances over shorter periods of time than previously documented in the literature (Fitch and von Aachen 1977, Seburn 1993). Many of the individuals with transmitters were infrequently observed on the surface; they were inside hollow trees or logs or they were active underground in the sand dune. Further, we found that several individuals occupied areas lacking any woody debris for days at a time. These individuals were found moving within and between the dense Bluejoint grass (*Calamagrostis canadensis*) tussocks, and this suggests that these tussocks are capable of providing adequate cover for daily activities.



Figure 2. Five-lined Skink with a radio-transmitter (photo by Dan Brazeau)

Perhaps the most amazing observations of movements were of a male who was found at the base of a live Black Oak (*Quercus velutina*) 25 m away from the cover board where he was found the previous day. Over the next five days this male was detected inside this partially hollowed oak tree at heights of >10 m. In

the next week this male travelled back to the board where he was first found, then returned to the same oak tree and finally back down the tree to a large decayed and hollowed log where the transmitter died. The pattern of skinks remaining unseen after initial capture under cover objects provides us with some insight as to what proportion of time individuals actually spend underground or in trees. Estimating population size has always remained a “black box” given the semi-fossorial nature of the skink and low recapture rates in mark-recapture studies (Fitch 1954, Seburn 1993).

Another goal of our SARRFO fieldwork was to revisit historic skink locations in the Carolinian Zone to coarsely evaluate habitat availability, check on other extant populations, and to examine nearby potential areas of skink habitat. Guided by the MNRF’s Natural Heritage Information Centre (NHIC) element occurrences for the skink, museum records, and records provided by Ontario Nature’s Ontario Reptile and Amphibian Atlas, we visited nearly 50 locations from the Windsor area to the Niagara Peninsula. Some of the earliest historic sites are now well within the urban core of major cities. At most other historic sites we found that forest succession resulted in canopy cover too thick for skink use, much the same as Fitch (2006a,b) reported for the decline of the species in Kansas. In some sites that are now maintained as parks, manicured lawns lacking sufficient woody debris for cover objects prevailed. Other sites still had some potential habitat or would require little effort to restore for skink use. We did not find any skinks at the Point Edward site where a new population was found in 2009 (Choquette et al. 2010). The site has been subsequently heavily developed – so much for critical habitat protection! However, fresh skink scat was found immediately adjacent on forest edge.

We talked to many people in government and retired residents who had been avid naturalists all their lives, and we canvassed farms and residential properties carrying photos and information cards. This resulted in several credible new historic sites being identified, as well as a recent sighting adjacent to a historic protected area (Kopegaron Woods Conservation Authority) where the last record was from the 1980s. At some other areas near historic sites we discovered promising habitat but no skinks were observed. We investigated Camp Cedarwin, a scout camp near Arner, ON, where the late Dr. Mike Petras (Professor of Biology, University of Windsor) noted skinks up until the 1980s in woodpiles and near buildings. This vast area of mature Carolinian Forest was amazing to see with its high diversity of oaks and hickories. Although no skinks were evident, amphibians and reptiles were in abundance. The

highlight was discovering Eastern Red-backed Salamanders (*Plethodon cinereus*), making this a new locality for the species in Essex County where it is very rare. The biggest highlight of following leads was documenting a new extant skink population near Coatsworth, Ontario. The local resident’s property has been a haven for skinks and other reptiles since they purchased the property over a decade ago. Skinks and other reptiles and amphibians use the infrastructure of their house, outbuildings, pool, and rock gardens. This demonstrates once again how herpetofauna and humans can co-exist quite well and the value of talking to observant residents and amateur naturalists when conducting field surveys.

In recent years, habitat restoration efforts through prescribed burns or hand/mechanical clearing at several locations have restored open area and are clearly benefiting Five-lined Skinks and other reptiles. One particular highlight was joining Jen McCarter and her Nature Conservancy Canada staff at the historic Oxley Poison Sumac Swamp near Harrow, Ontario where we were entertained by five skink hatchlings jockeying for best positions while basking on a large tree stump (Figure 3). We were all quite excited that the purchase and restoration of the site has been so effective – an example of sharing information and working towards common goals among agencies. We all left with greater optimism for the future plight of our species at risk.



Figure 3. Five-lined skink hatchlings basking on a stump (photo by Darlene Hecnar)

Overall, 2015 was a very productive and exciting field season. We have learned much more about this elusive but locally abundant endangered species. Knowledge of the similarities in critical habitat, general ecology and phenology in the region brings us another step closer to large-scale recovery efforts such as habitat

restoration followed by reintroductions. The few widely spaced extant populations in protected areas appear to be doing well and responding to habitat restoration efforts and active management in general. However, the lack of connectivity among these sites means that they are functionally ‘islands’ or non-equilibrium metapopulations that are no longer interconnected and risk extinction without our help (Hanski 1999). The work effectively added a third year to Dan’s Masters project and has provided him with a wealth of data to make countless contributions in future papers. Dan has now submitted his Masters and will soon defend. Although it is only mid-semester, all of us in the lab are already yearning for the next field season.

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FIELD NOTES

2015 Spiny Softshell Turtle Recovery along the Thames River

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The Spiny Softshell Turtle (*Apalone spinifera*) is listed as Threatened both federally and provincially. It occurs in Ontario and Quebec, though the majority of the population is limited to a handful of rivers and lake areas in the Carolinian Zone of southwestern Ontario. Over the past few decades, a considerable increase in threats along the Thames River in London, Ontario, and throughout Canada in general, has led to significant declines of this species. Threats include, but are not limited to, habitat loss, flooding, invasive exotic plants, cattle, subsidized predators, recreational activities, poaching and persecution. Due to number and severity of threats to the Spiny Softshell population in the Thames River, ongoing threat mitigation and habitat stewardship is necessary to prevent further population declines. One of the primary issues facing Spiny Softshell turtles in Canada is a lack of recruitment. Our data suggest that there would be zero, or close to zero, natural recruitment along the Thames River, and that this aging population would eventually die out without intensive recovery efforts to increase recruitment.



Scott Gillingwater and his field assistants with adult Spiny Softshell Turtles (top, photo by Alissa Fraser) and a hatchling Spiny Softshell Turtle emerging from an artificially incubated egg (bottom; photo by Scott Gillingwater)

Our Spiny Softshell research and recovery efforts began in 1994, and have included a number of activities, including: identifying and mitigating human-related threats; implementing recovery strategies to protect and recover reptiles at risk and their habitats; filling knowledge gaps through long-term surveys and research; improving and creating habitat; and increasing recruitment by protecting turtle nests and incubating eggs. When we started our work, one of the primary causes of recruitment failure in the Thames River Spiny Softshell population was mammalian egg predators (Raccoon, Striped Skunk, Red Fox, Coyote, Virginia Opossum and even Domestic Dogs). Predators took 98 to 100% of all softshell turtle eggs. Unfortunately, even with our protective caging to keep mammals away from eggs, nests were still lost due to annual flooding and increasing illegal collection. Over the past 15 years we have almost entirely transitioned to artificial incubation of eggs, which has allowed our hatching success rates to reach 89 to 95%, which is far greater than we were able to achieve in the field with nest protection! Of course, not all eggs are salvageable because of environmental conditions and predators that reach the nests before us, but we are increasing our success each year.

In 2015 alone, no Spiny Softshell hatchlings would have emerged from eggs without human intervention. Luckily, through our recovery work, we have instead ensured that 4110 Spiny Softshell hatchlings were able to successfully enter the Thames River!! This is a significant number when you consider that it is approximately double that of the estimated adult population in Canada. The egg incubation efforts are only part of the answer, and we continue to mark and study adults, protect and create habitat, educate local communities and work with landowners to safeguard this population. We are now seeing the results of our hard work over the past two decades, and recent surveys now show various age classes within the population, as well as some of the first small adult females coming up to lay eggs on the nesting beaches. The road to recovery is a long one, but with dedication and persistence, we can see a glimmer of hope.



Recovering Massasaugas in Canada's Carolinian Zone

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The Ojibway Prairie population of Massasaugas (*Sistrurus catenatus*) is one of only two populations of this species remaining in Canada's Carolinian Zone. It is geographically isolated from its Canadian counterparts by over 300 km, is genetically unique, and is the only representative of a tallgrass prairie population of Massasaugas in Canada. Despite the protection of hundreds of hectares of habitat, the population has declined to the point where it occupies only 50 ha and contains a mere dozen mature individuals.

Since 2013, our goal has been to implement strategic recovery and monitoring actions recommended in the Recovery Strategy for the Massasauga in Canada. This includes assessment and mitigation of major threats (e.g., small population size, habitat degradation, road mortality and persecution), and long-term monitoring to assess effectiveness of recovery actions. I wanted to take this opportunity to highlight an important result from the 2015 field season regarding our work to address habitat degradation within Massasauga Critical Habitat.

In the summer of 2014 we began by identifying ideal gestation habitat based on recent or historical use, canopy cover, presence of woody debris, woody vegetation cover and vegetation height. Then from late fall 2014 to winter 2015, our staff and volunteers conducted targeted habitat enhancement activities in order to improve gestation habitat. We enhanced four gestation areas (each ~1000 m² in size) by manually removing woody vegetation and then creating woody debris piles as sites for shelter and gestation (for a total of ~ 15 structures created). This work added to the ~ 10 structures that were created in the area by volunteers over the previous three years. We experimented with a few different approaches and materials during the creation of these features, including brush piles, log piles and combination brush and log piles (Figure 1).



Figure 1. Brush pile (top), log pile (middle) and brush and log pile (bottom) created to enhance Massasauga gestation habitat (photos by Jonathan Choquette)

We included visual checks of these structures during our standard site occupancy surveys in 2015. And this is what we observed:

- Three individual Massasaugas used the features we created. One of these snakes used a brush pile created in 2011, one used a brush pile created in 2015, and one used a log pile created in 2014.
- One of the individuals using our structures was a gravid female who was gestating in early August! This female later gave birth to at least 10 neonates at a nearby animal burrow.
- One third of the Massasauga observations we made in 2015 were of individuals using our structures (excluding neonates).
- One Eastern Foxsnake was observed using a brush pile created 2011.
- No snakes were observed using the 'combination brush and log pile' structures.



A volunteer installing an experimental artificial gestation site in November 2014 (top; photo by Jonathan Choquette), and a gravid female Massasauga observed using the site for gestation in August 2015 (bottom; photo by Derek Dunlop)

In Summary:

- Massasaugas and Foxsnakes were confirmed using our habitat enhancement structures.
- Massasaugas used habitat enhancement structures within a very short time frame after they were constructed.

- Our observations provide preliminary evidence for the effectiveness of our habitat enhancement techniques for both shelter and gestation.



WPC's 2015 lead field technician, Louis Gagnon, with a brood of neonate Massasaugas born in August 2015 to the same female that used our experimental gestation site (photo by Jonathan Choquette)

In order to prevent extirpation of the Ojibway Prairie population and the ensuing collapse in distribution and genetic variation of Canadian Massasaugas, intensive recovery work continues to be of great necessity in both the short and long term. We extend a generous Thank You to our major supporters: Wildlife Preservation Canada, MNRF and Environment Canada.



Scales Nature Park and Georgian Bay Turtle Hospital Field Projects Update

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It has been a very productive field season for the staff and volunteers of Scales Nature Park and the Georgian Bay Turtle Hospital. Our Saving Turtles at Risk Today (START) project in Muskoka continued with great success, and the Reptiles at Risk on the Road project continues to educate lots of people. We launched a new salamander research project on Pelee Island in the spring, in partnership with Trent University, and we also played a minor role in a collaborative Queensnake

survey effort across southwestern Ontario. Our biology student-focused trips have continued to destinations like Cuba, the Florida Everglades, and the Exuma Cays in 2015, providing field experience and learning opportunities in a variety of ecological communities.

With continued funding from the Rogers Foundation via the Canadian Wildlife Federation, and another year's support from the OMNRF Species at Risk Stewardship Fund, the START project continued to survey for turtles across southern Muskoka. We marked 851 turtles this season for a cumulative total of 1827 marked turtles - a solid beginning for a long-term mark-recapture effort. Overall, 1772 observations of herpetofauna species at risk have been recorded as part of the START project over the past 3 years. GIS mapping of observations has been completed, and observations of threatened and endangered species have resulted in over 1000 km² of habitat protection under the Ontario Endangered Species Act. Laurentian University graduate student Hannah McCurdy-Adams wrapped up her field work, collecting data on turtle nest predation and chronic stress hormones in turtles in relation to human influence on the landscape. We look forward to seeing the results of her studies. Field technician Matt MacPherson is also completing a 4th year thesis project at Guelph on mesopredator abundance. Community engagement remains a major focus of the START project, with many volunteers joining in wetland and road surveys, calling sightings in to our hotline, or coming out to our first annual Muskoka Turtle Blitz.

The Reptiles at Risk on the Road project has been reduced in scope over the last two years, but continues to function in target regions of Ontario. Although we have delivered fewer programs overall, our advanced workshop format for stakeholder groups has been very well received. In the near future, we hope to secure funding for another cross-Canada tour in 2017.

The Small-mouthed Salamander (*Ambystoma texanum*), which is an endangered species in Canada that is only found on Pelee Island, has been largely ignored for the last 20 years. It is difficult to survey for this species because identification between sympatric blue-spotted salamanders (*A. laterale*) and the unisexual polyploids requires genetic analyses. With a three year Species at Risk Stewardship Fund grant to Trent University, a collaborative project was launched in May 2015 to determine the distribution and abundance of this species in Canada, identify habitat requirements, evaluate predation by wild turkey, and undertake population genetics studies. While we missed the breeding season this year, extensive surveys of several sites yielded over 100 adult salamanders and many larvae from breeding ponds. We are happy to report that

preliminary results have confirmed the presence of pure Small-mouthed Salamanders. We look forward to getting back to the island next spring during the breeding season!

We welcome volunteers to these projects and there are also potential opportunities for staff positions and graduate students. Please forward any inquiries to scalesnaturepark@gmail.com.



One of the START turtle sites in Muskoka (top) and a START volunteer processing a turtle (photos by START team)



Shaping the Future of Queensnake Conservation in Canada: A Collaborative Approach

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In Canada, the Queensnake is only found in southwestern Ontario in Essex, Lambton, Middlesex, Norfolk, Brant, Waterloo, Huron and Bruce counties. Over half of the reported sightings of this species are over 20 years old, leaving uncertainty regarding this species' current distribution and status. The Queensnake is a semi-aquatic snake that is highly elusive and apparently preys exclusively on native crayfish species found in its river and wetland habitats (Figure 1). Very little is known about Queensnake habitat requirements, and this information is crucial to inform conservation efforts. Even less is known about the sizes of extant populations or the level of gene-flow between populations and sub-populations, and these data are necessary to identify populations that may be at risk of inbreeding depression or extirpation.



Figure 1. A Queensnake from the Lower Maitland River, Huron County, with the crayfish claw which the snake regurgitated upon capture (photo by Allan Edelsparre)

Several groups have been working on Queensnakes in the Thames River and Maitland River populations for several years. These studies have yielded information about Queensnake habitat use, abundance and range sizes within these two populations (Figure 2). We recently launched a large-scale collaborative effort to gather more information about Queensnakes across their entire Ontario range. Partners in this collaboration include the Huron Stewardship Council, Ontario Nature, the Nature Conservancy of Canada, Blazing Star Environmental, Natural Resource Solutions Inc., SCC Ecological, Long Point Basin Land Trust, rare Charitable Research Reserve, Upper Thames River Conservation Authority, Dr. Premek Hamr, and researchers at the University of Toronto, Scarborough. The goal of this study is to use standardized methods throughout the Queensnake's range in Ontario to gather high quality data on their habitat use, prey interactions and population genetics, as well as to document the current distribution of this species in Ontario. This

information will help to address several recovery actions identified in the Queensnake recovery strategy and Government Response Statement (GRS; OMNRF 2011).

We carried out surveys across the Queensnake's Ontario range, which included sites in the Thames, Grand, Maitland and Ausable Rivers, as well as sites on Long Point, in Essex County, and on the northern Bruce Peninsula. The surveys were conducted in a subset of randomly selected sites in each of the locations, and included at least one site with a recent observation. Survey efforts were standardized such that the data can be used for population estimates and area of occupancy estimates.

Seven research teams, consisting of 53 partners and volunteers, conducted a total of 139 standardized surveys at 20 sites between July 13 and October 6, 2015. Fifty-five Queensnakes were captured (34 during standardized surveys, 21 captured incidentally or outside the survey) across all the study locations except for Long Point. An additional 26 Queensnakes were observed during the study but were not captured. Blood samples were taken from 40 of the captured snakes for the genetic study and, whenever possible, fecal and regurgitated stomach samples were stored to yield information on prey preference.

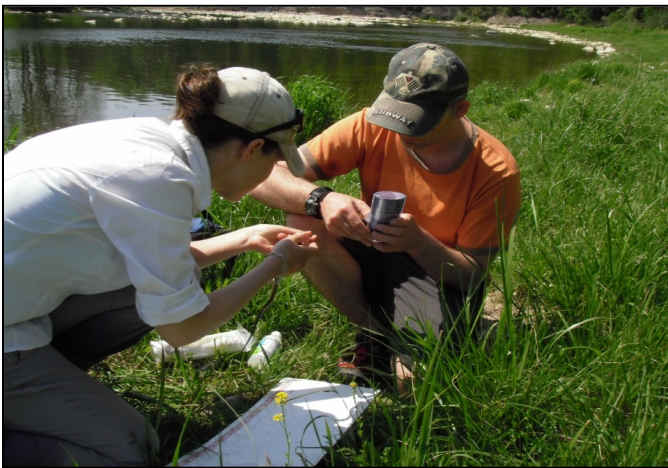


Figure 2. The authors preparing to mark an adult Queensnake in the Lower Maitland River population (photo by Tanya Pulfer)

This research will continue in 2016, with new sites being targeted in each of the locations and with a focus on surveying in the early spring when Queensnakes are most likely to be detected. This collaborative framework will make a major contribution to the recovery of the Queensnake in Canada, and may serve as an example to others working towards conservation and recovery of species at risk in Canada.

We wish to thank the Canadian Wildlife Federation, TD Friends of the Environment Fund, and the Ontario

Ministry of Natural Resources and Forestry Species at Risk Stewardship Fund for financial support.

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THESIS ABSTRACTS IN CANADIAN HERPETOLOGY

TCH publishes abstracts of recently completed Honours, M.Sc., and Ph.D. theses from Canadian universities and professors. Students or their supervisors are invited to send abstracts to the Editor.

Basaraba, N.R.C. M.Sc. (Env. Sci.) 2014 Thompson Rivers University (Supervisor K.W. Larsen)

The ecology of western painted turtles (*Chrysemys picta belli*) in a northern Canadian reservoir.

The impoundment of water by hydroelectric reservoirs and resulting fluctuations in water levels (drawdown zone) may have significant impacts on the surrounding ecosystems. For herpetofauna that live in cold climates, such human-induced alterations may amplify the difficulties in coping with the environment. My study explored the ecology of an extreme northern population (Revelstoke, British Columbia, Canada) of western painted turtles (WPT; *Chrysemys picta belli*) inhabiting a reservoir that constantly fluctuates due to hydroelectric operations. The potential challenges this environment poses include inundation of nesting sites, increased winter mortality due to water level changes, and changes in the availability of aquatic habitat. I used radio telemetry and mark-recapture to identify where turtles were nesting and overwintering, and to assess demographics and turtle behaviour in relation to the changing water levels. My data suggest that adults and juveniles of both sexes used and overwintered in the drawdown zone. Nest inundation as a result of reservoir operations did not appear to be a significant threat to the animals as all detected nests lay above the high-water mark. Similarly, no incidents of turtle mortality were directly attributable to reservoir operations. Changes in water levels did affect habitat availability: areas in which turtles were located during early spring were subsequently lost as water levels rose, while flooding in other areas created seasonal, suitable habitat for turtles

that otherwise was not accessible. Modelling turtle response to water levels, water temperature, and season suggested that changes in water levels did not significantly impact behaviour as measured. Appropriate management for this species and other semi-aquatic species that reside within drawdown zones is complex, given the reliance on both terrestrial and aquatic habitat, the life cycles of the species, movement, changing water levels, and sub-zero winter temperatures. This research provides a baseline for understanding the ecology of turtles in dynamic northern environments.

Bennett, A.M. Ph.D. 2014. Trent University
(Supervisor: Dr. Dennis Murray)

Constraints on phenotypic plasticity in response to predation risk: carryover effects, maternal investment, and the starvation-predation risk trade-off.

Inducible defenses are plastic responses by an organism to the perception of predation risk. This dissertation focuses on three experiments designed to test the hypothesis that plastic ability is limited by energetic constraints. Chapter 1 provides a general introduction to phenotypic plasticity research and provides an argument for the use of amphibian larvae as model organisms. In Chapter 2, I tested the hypothesis that costs of early plasticity may be manifested by a lack of response to risk in later life stages. I found that amphibian embryos are able to detect and respond to larval predators, but that the energetic cost of those plastic responses are not equivalent between behaviour, growth, and morphology, and their expression differs between closely-related species. Chapter 3 examines the influence of maternal investment into propagule size on the magnitude of the plastic responses to predation risk in resulting offspring. I found that females in better body condition laid larger eggs and that these eggs, in turn, hatched into larvae that showed greater morphological plasticity in response to predation risk. Maternal investment can therefore affect the ability of offspring to mount morphological defenses to predation risk. Chapter 4 explicitly examines the relationship between food resource availability and plasticity in response to perceived predation risk during larval development. Food restricted tadpoles showed limited responses to predation risk; larvae at food saturation altered behaviour, development, and growth in response to predation risk. Responses to risk varied through time, suggesting ontogeny may affect the deployment of particular defensive traits. Lastly, Chapter 5 provides a synthesis of my research findings, identifying specific

factors constraining the plastic responses of prey to perceived predation risk. Overall, I found constraints on plastic responses imposed by the current environment experienced by the organism (resource availability), the prior experience of the organism (predator cues in the embryonic environment), and even in the condition of the previous generation (maternal body condition and reproductive investment). Together, these findings both provide new knowledge and create novel research questions regarding constraints limiting phenotypic variation in natural populations.

Colley, M. M.Sc. 2015, Laurentian University
(Co-supervisors J. Litzgus and S. Lougheed)

Eastern Massasauga Rattlesnake: Evaluating the effectiveness of mitigation structures at the population level.

As reptile populations worldwide decline, construction and monitoring of road mortality mitigation measures is becoming common. I studied the effectiveness of barrier fencing at preventing Eastern Massasauga rattlesnakes (*Sistrurus catenatus*) from gaining access to the road. I also tested whether ecopassages were effective at allowing Massasaugas to access habitat on both sides of the road. I determined that there was a reduction of Massasaugas on the road post-installation of barrier fencing. Data from various monitoring approaches showed that Massasaugas do indeed use the ecopassages to cross the road. I quantified the long-term effect of mitigation structures on the population viability of Massasaugas. A Population Viability Analysis revealed that post-mitigation construction, the study population has a low probability of extinction, suggesting that mitigation is effective at promoting a sustainable population. Analyzing the effects of road mortality at the population level is crucial to ensure that decision makers are adequately informed of the status of species-at-risk.



Massasauga Rattlesnake (photo by Joe Crowley)

Garner, J.L. M.Sc. (Env. Sci.) 2013. Thompson Rivers University (Supervisor K.W. Larsen)

Movement and habitat use of the Great Basin Spadefoot (*Spea intermontana*) at its northern range limit.

The Great Basin Spadefoot (*Spea intermontana*) ranges from Arizona to British Columbia (BC) in western North America, being typically associated with arid environments. However, at the northern limit of the species (south-central BC), the ecosystem contains only small patches of grassland interspersed within a forested landscape, and the climate is cool and wet compared to the core of the spadefoot range. Due to the threatened status of spadefoots in BC, breeding ponds have been identified, but effective management requires data on habitat use away from these bodies of water. Using telemetry, I examined movement patterns and determined habitat associations of diurnal retreat sites (shallow self-made or pre-existing burrows) for these animals. I was able to track 19 spadefoots for varying lengths of time over two active seasons in 2009 and 2010. In general, telemetered spadefoots showed periodic, eruptive movements, where single (used one time only) or core (used multiple times) retreat sites were utilized for a period of time, prior to larger movements that took the animal to another area (with another set of retreat sites). Often retreat sites were used repeatedly; individuals would emerge to forage, travel to breeding ponds, and/or utilize other sites, sometimes retracing their movement patterns over large distances. The majority of terrestrial habitat used was within 112 m from breeding ponds and 136 m was the average maximum displacement, although telemetered spadefoots ventured up to 370 m from aquatic habitat. Grassland and forest path habitat-types types were selected by spadefoots at a higher proportion than in random locations. At a smaller scale within these macro-habitats, spadefoots selected retreat sites containing higher proportions of bare ground and rock compared to random locations. This study provides much-needed background information on the behaviour and terrestrial habitat preferences of Great Basin spadefoots, and can be used to inform management strategies for this species at the northern extent of their geographic range.

Gosline, J.A. M.Sc. (Env. Sci.) 2015 Thompson Rivers University (Supervisor K.W. Larsen)

Thermal influences on summer habitat use by western rattlesnakes (*Crotalus oreganus*) in British Columbia.



Western Rattlesnakes at a den site (photo by Joe Crowley)

The importance of thermal features to habitat selection by terrestrial ectotherms such as reptiles has been well documented, but rarely has it been considered in larger-scale analyses of habitat use and selection, such as those routinely conducted using more-standard habitat features such as vegetation types and physical structure. Selection of habitat based on thermal attributes may be of particular importance for ectothermic species, especially in colder climates. In British Columbia, Canada, Western Rattlesnakes (*Crotalus oreganus*) reach their northern limits. While commonly associated with low-elevation grasslands and open Ponderosa pine habitats, recent work indicates that some populations of these animals may use higher-elevation Douglas-fir forests. The reasons and implications for this striking contrast of habitat use patterns by these animals was the subject of this thesis. I investigated the reason(s) for this phenomenon by monitoring the migratory movements of 35 snakes away from 10 different den sites, and comparing it to thermal landscape GIS maps generated for different periods of the active season. My work confirmed that dichotomous habitat use by denning populations of these snakes occurs throughout much of their range, and rattlesnakes in this region can no longer be strictly associated with grassland habitat. I also found that snakes utilizing the higher-elevation forests not only moved relatively further during the course of their annual migrations, two-thirds of snakes used warmer areas of the landscape during their annual migration, and this phenomenon was more likely to occur with snakes travelling up into forest habitat. In addition to thermal benefits, prey availability and/or outbreeding also may be at least partially responsible for these patterns, but at this time there are limited data to test these alternative hypotheses. Regardless, snakes utilizing the higher-elevation forests had better body condition, indicating a definite advantage to this strategy. On a smaller scale,

microhabitat use and thermoregulatory behaviours appear to be less constrained by thermal factors in forest habitats, potentially allowing forest snakes increased time for hunting and travelling. Insight into these and other behavioural differences between neighbouring rattlesnake populations will allow managers to tailor management strategies to specific dens. Finally, the local and landscape scale patterns I detected have obvious repercussions for snakes in the event climate change produces shifting ecosystem boundaries and thermal regimes.

Lomas, E. M.Sc. 2013. Thompson Rivers University (Supervisor K.W. Larsen)

Effects of disturbance on the Northern Pacific Rattlesnake (*Crotalus oregonus oregonus*) in British Columbia.

The indirect effects of anthropogenic disturbances on wildlife are relatively difficult to detect, much less study, yet understanding these more subtle influences are particularly critical for the conservation of species-at-risk. In this study, I used radio-telemetry and mark-recapture methods to investigate the indirect effects of human disturbance and habitat development on the body characteristics, behaviour, and spatial ecology of a population of rattlesnakes (a threatened species) in Osoyoos, British Columbia. I collected data in 2010 and 2011 to augment a data set spanning 2002 to 2012. Individuals in highly disturbed landscapes had lower body condition than snakes in other areas, and lost body weight over the foraging season. Strong trends in spatial ecology parameters across disturbance gradients were not apparent, although snakes in disturbed sites tended to have smaller core areas, shorter range lengths, and took a greater number of days to travel a given distance than snakes in less-disturbed habitat. No major differences were observed in snake behaviour, exposure risk, or other spatial ecology parameters among habitats under different disturbance pressures. Wildlife managers can apply the results of this study to put recovery goals into action for the Northern Pacific Rattlesnake. The findings also contribute to our understanding of how wildlife may be impacted in discrete ways within disturbed habitat, and highlight the importance of using multiple indicators to assess stability of animal populations.

RECENT PUBLICATIONS IN CANADIAN HERPETOLOGY

TCH lists recent publications by Canadian herpetologists working in Canada and abroad. Please send to the Editor a list of your recent papers, and send citation information for new papers as they come hot off the presses.

Beale, M., S. Poulin, C. Ivanyi, and G. Blouin-Demers. Anthropogenic disturbance affects movement and increases concealment in western diamondback rattlesnakes (*Crotalus atrox*). *Journal of Herpetology* (in press).

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Eastern Musk (Stinkpot) Turtle (photo by Joe Crowley)

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Eastern Red-backed Salamander (photo by Joe Crowley)

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NEWS AND ANNOUNCEMENTS

2015 CHS/SHC Student Awards

Joe Crowley

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Each year, CHS presents awards for the best student platform presentation and best student poster presentation at the CHS conference. This year, Brandon Varela from Laurentian University received an award for his presentation on “Inter-site variation in the skin microbiome of Northern Leopard Frogs (*Lithobates pipiens*)”, and Geoff Hughes from Laurentian University received an award for his poster on “The thermal landscape as a predictor of Wood Turtle (*Glyptemys insculpta*) nest-site selection”. The award winners receive a prize of \$250! Congratulations Brandon and Geoff, and thanks to everyone who contributed posters and presentations to the 2015 CHS meeting!



Call for Applications for the Ontario Species at Risk Research Fund

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The annual call for applications for the Ontario Species at Risk Research Fund (SARRF) was announced in early November. Many of Ontario’s herpetofauna are species at-risk, and the fund has supported a number of great projects over the past few years, including the collaborative Queensnake research and Steve Hecnar’s Five-linked Skink research that were both highlighted in this issue of TCH.

Individuals and organizations can apply for funding for research projects that address recovery actions for species at risk. Applications must be e-mailed to SAR.stewardship@ontario.ca by December 15th. For more information, please contact Kim Jaxa-Debicki at 705-755-5506 or SAR.stewardship@ontario.ca, or feel

free to contact me with specific questions about reptile and amphibian project ideas.



Canadian IUCN Amphibian Specialist Group



Sara Ashpole* and Kristiina Ovaska

IUCN Canadian ASG Co-Chairs

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The goal of the IUCN Amphibian Specialist Group (ASG) is to support a global strategic plan for amphibian conservation, research, and education. The Canadian ASG can facilitate the dissemination of information and is a strong asset in the existing network of Canadian herpetologists. Through collaboration with the Canadian Herpetological Society (CHS) and the COSEWIC Amphibian and Reptile Species Specialist Subcommittee, the ASG can provide additional support to coordinate national-level amphibian conservation initiatives that contribute to IUCN's strategic plan.

At the recent CHS meeting in Saint John, we met with the CHS President and Vice President to discuss potential collaboration opportunities, and several potential priorities emerged. At the forefront is the threat of emergent diseases such as Bsal and the need to strengthen partnerships with the Canadian Wildlife Health Cooperative, and develop and promote strategies to prevent the introduction and spread of these pathogens. There is also a need to develop and circulate protocols and educational information, establish an emergency response, and ensure that monitoring efforts are sufficient to detect new diseases. It would also be beneficial to coordinate Canadian monitoring efforts with existing global monitoring programs and make climate trend data more readily accessible for regional assessments and decision-making. We also discussed the importance of long-term monitoring of common species. We might be able to address this priority by renewing monitoring efforts at historic project sites, such as the Ecological Monitoring and Assessment Network (EMAN) sites. Also discussed was the idea to initiate an Ontario Terrestrial Monitoring Program to fill data gaps.

The value of stimulating citizen science and atlas efforts was discussed and we identified the need to support the development of provincial-level atlas programs, including developing standardized protocols, implementing a national Smartphone application, identifying and enabling provincial coordinators, engaging local naturalist groups, and addressing data storage and access issues within each province and territory.

Achieving a coordinated Canadian effort will have challenges and will require ongoing discussion, and it is our hope to engage as many people and organizations as possible in those discussions. We are looking for individuals and groups that are interested in collaborating with us on these priorities. We hope to connect organizations and individuals with relevant expertise to increase Canadian partnerships and accessibility to information. The ASG membership is two-tiered, with regular members that are passionate about amphibians and associate members whom have at least six years of amphibian expertise and are willing to serve as a Canadian expert on a four-year cycle. Involvement is wide-ranging, from grassroots project collaboration to being part of a network that provides expert consultation. Our current membership consists of 12 people, and we hope to increase that to 30 by the New Year.

If you would like to become a member and get involved, please email the co-chairs for an application.



MSc, PhD, and PDF positions available: Amphibian Occupancy Patterns, Population Genetics, and Disease Dynamics

Funded by a Strategic NSERC grant (2014), we are building a team of 4 PhD students, 2 MSc students, and 2 post-doctoral fellows, to work on research related to the detection and monitoring of amphibians and their pathogens (chytrid fungus, ranavirus) in Canada. Using environmental DNA as a basis for the research, the team will conduct: 1) Habitat occupancy modeling for amphibians and their pathogens; 2) Analysis of the evolutionary dynamics of pathogens and amphibian hosts; 3) Assessment of potential synergistic interactions between pathogens and aquatic contaminants; and 4) Modeling the drivers of amphibian population decline. Students will develop research projects that fit within

the context of the broader program, such as: Validation of eDNA for detecting amphibians; Assessment of ranavirus pathogenicity; Chytrid fungus evolutionary dynamics; and Modeling drivers of amphibian occupancy. We are seeking students to initiate their research in Spring or Fall 2015, with the research to be conducted across southern Ontario. Interested applicants should submit a letter of interest, CV, unofficial transcripts and names of 3 references to Dennis Murray, Trent University (dennismurray@trentu.ca) or to individual research team members:

- Craig Brunetti, Trent University (craigbrunetti@trentu.ca);
- Chris Kyle, Trent University (christopherkyte@trentu.ca);
- David Green, McGill University (david.m.green@mcgill.ca)
- David Lesbarreres, Laurentian University (dlesbarreres@laurentian.ca)
- Marie-Josée Fortin, University of Toronto (mariejosee.fortin@utoronto.ca)
- Chris Wilson, Ontario Ministry of Natural Resources and Forestry (chris.wilson@ontario.ca)
- Christine Bishop, Environment Canada (cab.bishop@ec.gc.ca)



PhD Opportunity: Spatial Ecology of Blanding's Turtles near Ottawa, Ontario

Dennis Murray* and Gabriel Blouin-Demers

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We have money to fund a PhD project for 4 years on the spatial ecology of Blanding's turtles in South March, which is within the city limits of Ottawa, Ontario. The funding package includes a competitive salary for the PhD student as well as all field expenses (vehicle rental, field accommodations, field assistant, equipment, etc.). There is an applied conservation component that is mandated by the research contract, which is to document the spatial ecology and the habitat use patterns of this population of Blanding's turtles within this urban setting that is undergoing rapid residential development. There is also the opportunity to

test the effectiveness of road underpasses and of road mortality mitigation strategies more generally. The applied conservation component would entail deploying GPS and VHF transmitters on a sample of turtles. To satisfy the academic requirements of a PhD, there would also be a need to develop more fundamental research goals, such as the energetic consequences of habitat selection or the link between habitat selection and fitness. The more fundamental goals will be developed by the PhD candidate and supervisors to best fit the candidate's interests within the broader objectives of the project.



Blanding's Turtle (photo by Joe Crowley)

To apply : send a cover letter explaining why you are the ideal candidate for this project, an up to date *curriculum vitae*, an unofficial academic transcript, and contact information for 3 references to Dennis Murray (dennismurray@trentu.ca). We will accept applications until a suitable candidate is found. We aim to have the project underway in early May 2016.



Canadian Herpetological Society
Soci t  d'Herp tologie du Canada

CHS/SHC MEMBERSHIP FORM

Membership begins and ends on January 1 of each year. Multi-year membership allows you to avoid the hassle of re-registering every year and protects you from increases in membership fees.

Student Membership: \$20 / year or \$90 / 5 years

Regular Membership: \$30 / year or \$135 / 5 years

Yes, I wish to donate to the on-going work of the Canadian Herpetological Society in the amount of: \$25 \$50 \$100 Other (Please specify): _____

Total Amount Paid: _____

Please make cheques or money orders payable to Jose Lefebvre

Please mail this form, along with your membership fee, to:
Jose Lefebvre, Acadia University, Biology Dept., 33 Westwood Ave, Wolfville, NS, B4P 2R6.

Your Information:

Title: _____ First Name: _____ Last: _____

Institution/Affiliation: _____

Department/Section: _____

PO box / Unit / Building: _____

Street Address: _____

City: _____

Province / State: _____

Country: _____

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