THE CANADIAN HERPETOLOGIST/ L'HERPÉTOLOGISTE CANADIEN

A joint publication of
The Canadian Association of Herpetologists/Association Canadienne des Herpétologistes (ISSN 0847-1118)
and
The Canadian Amphibian and Reptile Conservation Network/Réseau Canadien de Conservation des Amphibiens et des Reptiles (ISSN 1206-7814)

Volume 3, Number 1 – Spring 2013

Table of Contents

THE CANADIAN HERPETOLOGIST (TCH) is a publication produced twice each year by the Canadian Association of Herpetologists and the Canadian Amphibian and Reptile Conservation Network. Correspondence should be addressed to the Editors (Litzgus (CAH) and Crowley (CARCNET)).
Opinions expressed by authors contributing to The Canadian Herpetologist are not necessarily shared by the publication, its editors, or the two societies.

L'HERPÉTOLOGISTE CANADIEN (LHC) est une publication biannuelle publiée par l'Association Canadienne des Herpétologistes et le Réseau Canadien de Conservation des Amphibiens et des Reptiles. Faites parvenir votre correspondance aux Éditeurs (Litzgus (ACH) et Crowley (RÉCCAR)).
Les opinions exprimées par les auteurs qui collaborent au L'Herpétologiste Canadien ne sont pas nécessairement partagées par la publication, ses éditeurs, ou les deux sociétés.

Instructions for Authors

We will print articles and news of interest to herpetologists in Canada. These may be in the form of short announcements or letters, or may be written as longer articles. We especially request news of your lab and current research activities, lists of your latest publications (up to one year old), travel plans, new students, grants, awards, fellowships, new books or book reviews, trivia or concerns. Please send your submissions as MS Word documents attached to an email to the Editors (Litzgus at jlitzgus@laurentian.ca or Crowley at crowleyjf@gmail.com).

EDITORIAL NOTES

Jackie Litzgus
Laurentian University, Sudbury, ON
jlitzgus@laurentian.ca

What a change from last year, at least here on the right side of the country in Ontario. One day it's spring, and the next it's winter again. Our Sudbury lakes were still completely iced-over at the end of April. It snowed on Mother's Day. The Spring Peepers must be very confused. Last year spring was early enough to break records, and affect frog calls, as David Seburn documents in this issue of TCH. Also in this issue you'll find two more reptile species accounts, focusing on turtles this time. In addition, you'll find our usual sections highlighting recent publications of our colleagues and successes of our graduate students.

There are some big and exciting changes on the horizon. After many years of considering and discussing the idea, the Executives of both the CAH and CARCNET have voted to support a merger of the two societies, resulting in one Canadian society whose mission includes the main foci that were the hallmarks of CAH and CARCNET. The process involved creating new Constitution, By-Laws, and Terms of Reference documents, and a proposal on how to make the transition. The two societies already share the joint publication of TCH and meet together annually for meetings, so it makes sense to combine our resources and expertise. The Execs have proposed a new name and logo:

Canadian Herpetological Society
Societé d'herpétologie du Canada

The next step to making the new unified society a reality is for the members of CARCNET and CAH to vote on the merger. The vote will take place at the annual meeting in Quebec in mid-September (see below for details). So please come to the meeting to learn more, view the revised documents, and cast your vote!

A Message from the CARCNET Chair

Steve Mockford
Acadia University, Wolfville, NS
stephen.mockford@acadiau.ca

This has been a productive year for CARCNET. The year started with the adoption of new governing documents and some changes to the board; as I reported last issue Scott Gillingwater, Yohann Dubois, and Jackie Litzgus joined the board and are now ensconced in the organization and working at advancing the organization and the conservation of amphibians and reptiles overall. Since that time there have been several long serving board members who have left the board. I would like to offer my sincere thanks to David Galbraith, David Cunnington, Sara Ashpole, and Tana McDaniel for their many contributions to CARCNET as an organization, and to conservation overall. Your experience and contributions will be missed.

This year has also seen the revitalization of the Important Amphibian and Reptile Area (IMPARA) program. We have recognized two new areas: Kejimkujik National Park and National Historical Site in Nova Scotia, and Spruce Woods Provincial Park in Manitoba. The IMPARA committee is currently reviewing several other nominations. We are interested in all areas that are important for amphibians and reptiles in Canada, so if you know of an area that you feel fits the criteria please go to our webpage and get the site nomination form.

The 2012 we did not have a distinct conference and Annual General Meeting. The AGM occurred during the World Congress of Herpetology in Vancouver. This year the conference and Annual General Meeting will take place in Orford Quebec in mid-September. Hopefully you are making plans to attend.

MEETINGS

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

Joint Canadian Herpetology Meetings
Orford, PQ

Daniel Pouliot
Quebec Ministère du Développement durable,
de l'Environnement, de la Faune et des Parcs
Quebec City, PQ
Daniel.Pouliot@mrn.gouv.qc.ca

Le 23e congrès annuel du RÉCCAR et ACH se tiendra du 13 au 16 septembre 2013, au Centre d'Arts Orford, Orford, Québec. Situé au pied du Mont-Orford, dans la belle région de l'Estrie, le Centre d'Arts Orford vous ouvre les portes d'un décor d'une grande beauté. Au cœur des habitats des salamandres de ruisseaux et des tortues, le 23e congrès annuel se veut un événement stimulant et rassembleur. La formule « pavillons », où les salles de conférence, la salle à manger, les résidences sont à proximité, favorisera l'échange, la discussion et le réseautage. Les trois premiers jours du congrès seront consacrés à des conférences scientifiques et des tables rondes. Un activité « Vins et fromages » sera proposé au participants le vendredi soir alors que le traditionnel banquet sera servi le samedi soir, en plus du quiz et de quelques surprises! Une sortie terrain terminera le congrès lundi le 16 septembre, alors que les participants découvrirons la riche diversité herpétologiques de la région. Le comité organisateur vous invite cordialement à cet événement! Au plaisir de vous y voir!

The 23rd annual meeting of CARCNET, joint with CAH, will be held at the Centre d'Arts Orford, Orford, Québec, from 13-16 September 2013. Located at the foot of Mount Orford, in the delightful region of the Eastern Township, the Centre d'Arts Orford overlooks spectacular landscapes. In the heart of stream salamander and turtle habitat, the annual meeting will be a stimulating event that brings people together. The "pavilions" style layout, which has the conference rooms, dining room and residences close to each other, should favour discussions and networking. The first three days of the meeting will be dedicated to scientific conferences and roundtables. A "Wine and Cheese" informal gathering will be offered the Friday evening and the traditional banquet will be served on Saturday night with the famous Herp Quiz and a few surprises! A field trip will conclude the meeting on Monday 16 September during which participants will have the chance to explore the rich herpetological diversity of the region. The organizing committee cordially invites everybody to attend this annual meeting. We are looking forward to seeing you in Orford!

The local organizers have created an email address dedicated to the annual meeting so that all questions and correspondence regarding the annual meetings can be directed to one location: carcnet2013@gmail.com

If you are interested in volunteering with the preparations, including French translation of the website and supporting materials, you can email info@carcnet.ca. We encourage our student members to apply for bursaries and scholarships. Last year, every CARCNET student who applied received funds to assist with travel to the World Congress of Herpetology in Vancouver, BC. CARCNET scholarship applications for research or outstanding volunteer contributions to the study and conservation of amphibians or reptiles are due 1 December 2013.

FEATURE ARTICLES

Northern Map Turtle - Tortue géographique (*Graptemys geographica*)

Bridget Schulte-Hostedde
(updated by Jackie Litzgus)
Sudbury, ON
bridget_s_h@hotmail.com

Status/Protection in Canada and Globally: The Northern Map Turtle is protected in Quebec under the Act Concerning the Conservation and Development of Wildlife. It is listed as Special Concern under the Ontario Endangered Species Act and is considered a specially protected species under the Ontario Fish and Wildlife Conservation Act. The species is also listed as Special Concern under the federal Species At Risk Act. The Northern Map Turtle is ranked S2 in Quebec, S3 in Ontario, N4 in Canada and N5 in the United States. Globally it is ranked G5.

Distribution: In Canada, the species is scattered throughout the Great Lakes-St. Lawrence basin from Lake Champlain and the Richelieu River (Quebec) west to Lake St. Clair (Ontario). There are several records from Georgian Bay and a few records from as far north as the Sudbury District (Ontario). Its United States distribution is extensive, ranging from the Susquehanna Drainage, Pennsylvania to its westernmost limit of Texas and Oklahoma, and south to coastal Virginia and Tennessee.

General Habitat Requirements: It is almost exclusively aquatic. It inhabits large bodies of water (both lakes and rivers), preferring slow moving currents, muddy bottoms and abundant aquatic vegetation. Adults prefer deeper areas and juveniles prefer shallow areas closer to shore.

Critical Habitat Characteristics: Suitable basking sites include rocks and logs that are separate from shore and stationary (apparent total disappearance of a population occurred in one site in Ontario upon removal of trees and logs used for basking), and rocky shorelines. Nesting occurs in soft sand and soil, and on rock outcrops along Georgian Bay. Hibernation takes place under water, in deeper hollows with patches of sand and gravel.

Reproduction: Size at sexual maturity for the Canadian population is about 17.5 cm for females and 7.5 cm for males. Mating begins while the turtles are still at the hibernaculum. Females at southern latitudes may lay up to 3 clutches per season, but females in Canada lay only one. Clutch size is 10-16 eggs. Delayed emergence of hatchlings has not been documented in Canadian populations, but has been documented in the northern U.S. Map Turtles exhibit temperature sex-determination, with females produced at higher egg incubation temperatures. It is generally agreed that Map Turtle populations are female-biased, but studies in Quebec found the sex ratio to be male-biased. This could be due to climatic differences between northern and southern populations, although different nesting behaviours are assumed to compensate for climatic differences.

Male (top) and female (bottom) Northern Map Turtles.
Photo by Scott Gillingwater

Phenology: Northern Map Turtles emerge from hibernation in April and move up or downstream to bask, feed, and nest. Nesting takes place in June or mid-July in Canadian populations. Hatching occurs in late August or early September. Turtles return to deeper aquatic areas in the early fall and as water temperatures drop to near 0°C, the turtles congregate in the hollows used for hibernating.

Feeding: Map Turtles are predominantly carnivores. Females specialize on molluscs and males feed mainly on smaller molluscs and insects, and aquatic plants. Zebra mussel invasions in the Great Lakes region have greatly altered the composition and structure of macroinvertebrate communities; the turtles will consume zebra mussels if native unionid prey are scarce.

Northern Map Turtle nesting.
Photo by Scott Gillingwater

Predators: Eggs and hatchlings are subject to predation by foxes, coyotes, raccoons, skunks and opossums, and predacious fish in their aquatic environment. Adult females are vulnerable to predators as they travel across land to nest. If attacked, they will retreat into their shells.

Motility: Northern Map Turtles make seasonal movements with females tending to disperse more than males. The turtles usually move in the late spring from the deep bays where they hibernated to upstream or downstream basking and nesting sites. Post-nesting dispersal by females may also occur to alleviate pressure on available food sources. Turtles return to the bays in August or September and eventually congregate in hibernacula. They may remain active under the ice throughout the winter.

Other Important Behaviours or Characteristics: This species is very wary, and unless captured soon after emergence from hibernation, they have to be observed from a distance or caught in traps.

Economic/Social Importance: The diet of Map Turtles may benefit humans in a small way as the snails that they consume are intermediate hosts for many species of trematode worms that cause ‘swimmer’s itch’. They are also known to feed on zebra mussels. It is not a popular species in the pet trade.

Known/Potential Vulnerabilities: The Northern Map Turtle is a habitat specialist and therefore could be greatly affected by urbanization, industrialization and recreational activities that alter or eliminate their habitat. Shoreline development causes decline in habitat quality, and increased human disturbance has caused population declines in southwestern Ontario. Populations along large waterways are susceptible to toxic spills and injuries from motor boats. These turtles are also affected by water level fluctuations that may drown eggs or over-wintering hatchlings. Increased water levels may also cover mid-stream basking sites, leaving these turtles more vulnerable at on-shore basking sites. There has been a decline in some mollusc populations (native unionids are a major food source) due to zebra mussel invasion. Turtles that eat zebra mussels may have increased exposure to contaminants as zebra mussels often have contaminant levels that are several times higher than those found in native unionid populations. Its resemblance to other popular pet and wildlife-food trade species may put it at risk from poaching.

Suggested References:

Bennett, A.M., M. Keevil, and J.D. Litzgus. 2010. Spatial ecology and population genetics of Northern Map Turtles (*Graptemys geographica*) in fragmented and continuous habitats in Canada. Chelonian Conservation and Biology 9(2): 185-195.

Bonin, J. 1998. Rapport sur la situation de la tortue géographique (*Graptemys geographica*) au Québec. Ministère de l'Environnement et de la Faune, Direction de la faune et des habitats. 35pp.

Bulté, G., M.A. Carrière and G. Blouin-Demers. 2010. Impact of recreational power boating on two populations of northern map turtles (*Graptemys geographica*). Aquatic Conservation: Marine and Freshwater Ecosystems 20: 31-38.

Carrière, M.A. and G. Blouin-Demers. 2010. Habitat selection at multiple spatial scales in northern map turtles (*Graptemys geographica*). Canadian Journal of Zoology 88: 846-854.

COSEWIC 2002. COSEWIC assessment and status report on the northern map turtle Graptemys geographica in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 34 pp.

Flaherty, N. and J.R. Bider. 1984. Physical structure and the social factor as determinants of habitat use by *Graptemys geographica* in southwestern Quebec. American Midland Naturalist 111(2): 259-266.

Gordon, D.M. and R.D. MacCulloch. 1980. An investigation of the ecology of the map turtle, *Graptemys geographica* (Le Sueur), in the northern part of its range. Canadian Journal of Zoology 58: 2210-2219.

Pluto, T.G. and E.D. Bellis. 1986. Habitat utilization by the turtle, *Graptemys geographica*, along a river. Journal of Herpetology 20(1): 22-31

White, D.- Jr. and D. Moll. 1991. Clutch size and annual reproductive potential of the turtle *Graptemys geographica* in a Missouri stream. Journal of Herpetology 25(4): 493-494.

Wood Turtle – Tortue des bois (*Glyptemys insculpta*)

Jackie Litzgus
Laurentian University, Sudbury, ON
jlitzgus@laurentian.ca

Status/Protection in Canada and Globally: The Wood Turtle is currently listed as Endangered under the Ontario Endangered Species Act and Threatened under the federal Species at Risk Act. The species has also been designated as a Specially Protected Reptile under the Ontario Fish and Wildlife Conservation Act. The species is designated S2 in Ontario, S3 in Quebec, Nova Scotia, and New Brunswick, N3 in Canada, and G4 globally. The Wood Turtle is designated Vulnerable by the IUCN, and is protected under Appendix II of CITES.

Distribution: The Canadian distribution of the Wood Turtle is limited to four provinces: Ontario, Quebec, Nova Scotia including Cape Breton Island, and New Brunswick. The species reaches its northern range limit in Ontario; however, there are few populations in southern Ontario. In the U.S.A., the species ranges from Maine in the northeast, south to Virginia, and westward through New York, to northeastern Iowa.

General Habitat Requirements: The Wood Turtle prefers clear, running waters of streams, creeks and rivers, but is also one of the most terrestrial species in the family Emydidae. The species occupies riparian habitat with alder and deciduous forests containing openings in the canopy that allow basking and feeding. Drainages with hard sand or gravel bottoms are preferred over those with soft clay or muck bottoms.

Critical Habitat Characteristics: Wood Turtles appear to require clear, slow-moving streams with sandy bottoms. Exposed sand banks along streams are used for oviposition. Wood Turtles often prefer streams passing through deciduous forest or alder thickets, but these may not be critical as the species occupies other forest and meadow habitats, and even cropland. Wood Turtles show selection for cold water with high dissolved oxygen for overwintering.

Wood Turtle in water.
Photo by Scott Gillingwater

Reproduction: Sexual maturity is attained when turtles are 14 to 18 years old. Clutch size ranges from 4 to 18 eggs, and many females do not oviposit every year. Males are aggressive to one another, and have a hierarchical social structure. Little is known about the longevity of wild Wood Turtles; however, captives have lived up to 58 years.

Phenology: Emergence from hibernation occurs in mid to late April. Breeding peaks in spring (April to June) and fall (September to November), but mating can occur throughout the active season. Nesting, which usually takes place in the afternoon or evening, occurs in late May to late June, and egg incubation is approximately 60 to 70 days. Wood Turtles enter hibernation in October or November.

Feeding: Wood Turtle adults are omnivorous, and hatchlings and juveniles may be more carnivorous. Feeding takes place both terrestrially and aquatically. Terrestrial food items include berries, young leaves of shrubs and ferns, flowers, mushrooms and invertebrates. Aquatic food items include fish carrion, snails, tadpoles, insect larvae, and algae.

Predators: Predators of adult Wood Turtles include “edge species” such as raccoons, coyotes and foxes. Cats and dogs also kill Wood Turtles. It is common to find Wood Turtles with missing limbs and tails and scratches on the carapace or plastron. Predators of eggs, hatchlings and juveniles include raccoons, red foxes and skunks.

Motility: Wood Turtles often remain within restricted home ranges, and have good homing ability when displaced from within their range. Home range size is variable among the populations studied in Ontario, ranging from 1-115 ha; however, home range sizes of 3-6 ha appear to be typical. Wood Turtles make occasional long movements up to at least 40 km. Individuals show fidelity to specific habitat structures, such as basking logs.

Close-up of head of Wood Turtle after eating some fresh greens.
Photo by Scott Gillingwater

Other Important Behaviours and Characteristics: Wood Turtles have been observed “worm stomping”, a behaviour that involves stomping or scratching with the forelimbs and banging the plastron on the ground. Supposedly this activity mimics the vibrations from rainfall and/or foraging moles, thereby causing worms to surface where they are eaten by the turtle. Wood Turtles appear to have a greater capacity to learn than most reptiles; they learn mazes with a similar ability to rats, and are readily trained to obtain food at particular locations and times.

Economic/Social Importance: Wood Turtles are highly sought for both the international and domestic commercial pet trade. From 1986-1990, approximately 300 Wood Turtles were legally imported into the United Kingdom; however, the numbers imported illegally are probably far greater. Sources close to the pet trade claim that hundreds to thousands of specimens are sold each year. Domestic sale of Wood Turtles in the United States is common, and prices can range up to $1,000 (U.S. dollars) for a breeding pair. Average prices for individual adults or subadults in the 1990s ranged from $75 to $150 (U.S. dollars). Ironically, the recent growing concern and protection for Wood Turtles has resulted in price increases such that animals no longer appear on price lists but are now often sold “under the table” or through personal contacts. In the past 20 years, Wood Turtles have been observed for sale in Quebec and Ontario pet stores.

Known/Potential Vulnerabilities: The Canadian distribution of Wood Turtles is probably limited by cool summer temperature in the north, and by a lack of required habitat in the south. Collection for the pet trade and habitat destruction are the primary causes of recent declines in Wood Turtle numbers and distribution. The species is particularly susceptible to exploitation by pet trade collectors in spring and fall when turtles are aggregated in and around the streams in which they overwinter. Wood Turtles occupying a watershed in southwestern Ontario have been the focus of a long-term study. In the late 1990s, it was discovered that 60 - 90% of the turtles from a stream in this watershed had apparently been collected. Such has also been the case in the United States where numerous formerly abundant populations have been essentially eliminated by collectors. Wood Turtles encountered on land make little or no attempt to escape and this "tameness" makes them especially attractive to collectors, or indeed anyone of any age looking for a toy or a pet.

Suggested References:

Brooks, R.J., C.M. Shilton, G.P. Brown and N.W.S. Quinn. 1992. Body size, distribution and reproduction in a northern population of wood turtles (*Clemmys insculpta*). Canadian Journal of Zoology 70: 462-469.

Daigle, C. 1997. Size characteristics of a wood turtle, *Clemmys insculpta*, population in southern Quebec. Canadian Field-Naturalist 111: 440-444.

Dubois, Y., G. Blouin-Demers, B. Shipley and D. Thomas. 2009. Thermoregulation and habitat selection in wood turtles *Glyptemys insculpta*: chasing the sun slowly. Journal of Animal Ecology 5: 1023-1032.

Garber, S.D. and J. Burger. 1995. A 20-year study documenting the relationship between turtle decline and human recreation. Ecological Applications 5(4): 1151-1162.

Greaves, W.F. and J.D. Litzgus. 2009. Variation in life history characteristics among North American populations of wood turtles: A view from the north. Journal of Zoology 279: 298-309.

Greaves, W.F. and J.D. Litzgus. 2008. Chemical, thermal, and physical properties of sites selected for overwintering by northern wood turtles (*Glyptemys insculpta*). Canadian Journal of Zoology 86: 659-667.

Kaufman, J.H. 1992. The social behavior of wood turtles, *Clemmys insculpta*, in central Pennsylvania. Herpetological Monographs 6: 1-25.

Litzgus, J.D. and R.J. Brooks. 1996. Status report on the wood turtle, *Clemmys insculpta*, in Canada. Report for the Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario.

Paterson, J.E., B.D. Steinberg and J.D. Litzgus. 2012. Revealing a cryptic life-history stage: differences in habitat selection and survivorship between hatchlings of two turtle species at risk (*Glyptemys insculpta* and *Emydoidea blandingii*). Wildlife Research 39: 408-418.

Quinn, N.W.S. and D.P. Tate. 1991. Seasonal movements and habitat of wood turtles (*Clemmys insculpta*) in Algonquin Park, Canada. Journal of Herpetology 25: 217-220.

Saumure, R.A. and J.R. Bider. 1998. Impact of agricultural development on a population of wood turtles (*Clemmys insculpta*) in southern Quebec, Canada. Chelonian Conservation and Biology 3: 37-45.

FIELD NOTES

How did the record hot spring of 2012 affect amphibian calling?

David Seburn
Ottawa, ON
davidseburn@sympatico.ca

The spring of 2012 was one for the record books. Ottawa set record maximum temperatures for a number of days in March. Usually when a new maximum daily temperature is set the previous record is broken by a few tenths of a degree, or maybe by half a degree. In 2012, Ottawa shattered previous records, sometimes by as much as 10°C. The carbon-stained fingerprints of global climate change are all over the March heat wave of 2012.

Green Frog.
Photo by Nick Cairns

The first record was set on 7 March, when Ottawa hit 12°C, breaking the previous record of 11.1°C. On the previous day, the low had been -20°C – a jump of 32°C from one day to the next. On 17 March, Ottawa hit 13.5°C. A warm day, but not even close to the record of 16.3°C (Figure 1). The next day, summer arrived with a maximum temperature of 24.1°C, shattering the previous record by 8°C. The next four days also saw maximum temperatures above 20°C. The heat wave peaked on 21 March, with a temperature of 27.4°C. This is the hottest March temperature ever recorded in Ottawa. By 24 March, maximum temperatures had dropped down to 10.5°C, ending the heat wave, but still above normal.

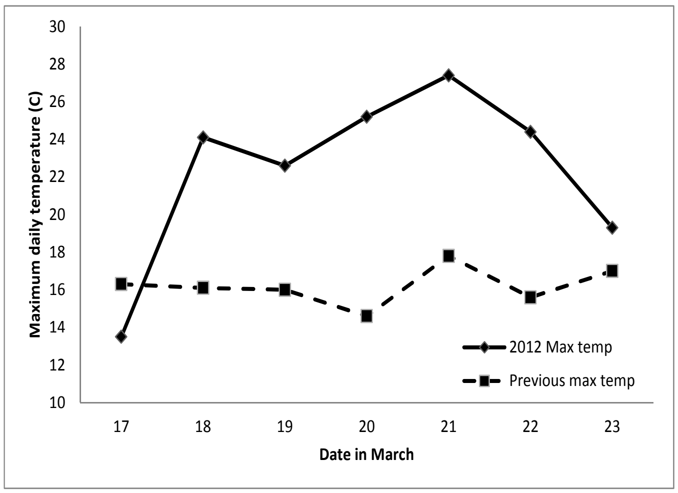


Fig 1. Daily maximum air temperatures in Ottawa in 2012 compared with previous record daily maximum temperatures. Data from Environment Canada daily weather records.

These record maximum temperatures were not just confined to the Ottawa area. According to Environment Canada (2012) it affected all of eastern Canada, from Manitoba to Nova Scotia. Windsor experienced 10 consecutive days of at least 20°C. And a new record maximum temperature for March was set for the province of Ontario: on 21 March (the day Ottawa set a new March record for the city) Petawawa hit 28.8°C.

Late March and early April are typically when many of our frogs begin calling. How did these record temperatures affect calling? I can offer some anecdotal observations from my own notes and from observations submitted to the online NatureList run by the Bishops Mills Natural History Centre[1].

The first report of frog calling in the Ottawa area was on 16 March. Valerie Kirkwood reported hearing a Spring Peeper calling as well as the "scattered calling" of Western Chorus Frogs from Acton's Corners (near Kemptville).

On 17 March I visited a known site with Western Chorus Frogs in western Ottawa, near Moodie Drive. At 12:45 PM at approximately 10°C there was no calling. I did not check this site on 18 March, but on 19 March at 3:15 PM (~23°C) Western Chorus Frogs were heard calling at the site. I also heard Western Chorus Frogs calling at 3 other locations in the area on that day. At two of those sites the calling was so loud it formed a wall of sound.

Also on 17 March, Francis Cook checked a known Western Chorus Frog site near Snowdons Corners. He did not hear any calling at 11:45 AM or 4:40 PM. On the next day, 18 March, he heard "small but vigorous choruses of Chorus Frogs from ditch and marsh both sides of the road" at 11:15 AM.

Grey Treefrog calling.
Photo by Nick Cairns

On 18 March, Fred Schueler reported hearing Western Chorus Frogs at several locations when he drove from Brockville to Bishops Mills. He also reported "a chorus of [Spring] Peepers at one place with them [Western Chorus Frogs], but otherwise just a few Peepers calling." He also heard a few calls from a Wood Frog along Cooper Road. In addition to calling frogs, Fred also observed several frogs on roads, likely moving from over-wintering locations to breeding sites. Fred wrote: "There were Leopard Frogs crossing the roads at several places. At 1km N of Forthton, these were accompanied by veritable swarms of juvenile Green Frogs, while at Diamond Road there were two big Bull Frogs (1 AOR [alive on road], 1 DOR [dead on road]) up on the road. All along the Branch Road there were scattered Leopards on the road (a large percentage of them alive, but not moving fast enough to do much to maintain that condition, in our opinion), and many of the ones we saw were large females. On the Limerick Road Iron Bridge, however, there was a half a dozen juvenile Leopards, which contradicts my theory that these come out only

[1] http://groups.google.com/group/naturelist/about?hl=en

after the adult breeding migration is over." Also on 18 March, Valerie Kirkwood reported hearing her first Northern Leopard Frog calling that morning near Acton's Corners.

On 19 March, Fred Schueler reported hearing American Toads calling from a few sites around Bishops Mills.

On 20 March I conducted my first evening survey to listen for calling amphibians in western Ottawa. Western Chorus Frogs were calling and I heard my first Spring Peepers and Wood Frogs of the year. These last two species likely started calling in Ottawa before the 20th, but I cannot say when the calling began.

Table 1. First calling dates of amphibians in spring 2012 compared with 1971-1991.

Species	First Ottawa area date in 2012	Previous earliest date(Cook 1992)
Spring Peeper	16 March	30 March 1977
Western Chorus Frog	16 March	15 March 1973
Wood Frog	18 March	25 March 1979
Northern Leopard Frog	18 March	4 April 1989
American Toads	19 March	6 April 1988

How do these calling dates compare with previous years? Francis Cook, the retired curator of amphibians and reptiles of the Canadian Museum of Nature, lives south of Ottawa and recorded the first calling date of amphibians near his home from 1971-1991 (Cook 1992). The onset of calling in a particular species naturally varies from one year to the next depending upon whether it is an early or late spring. During his 20 year monitoring period, the date of first calling by each species varied by over a month. Four of the five spring breeding frogs and toads began calling earlier in 2012 compared with his 1971-1991 data (Table 1). The first calling of these species is roughly 2 weeks earlier than the previous earliest calling date. Only the Western Chorus Frog failed to set a new early calling date record. The 2012 calling data (collected by many people at many locations) may give a more precise first calling date in our region than the 1971-1991 data, but likely by only a day or two. As the data summarized in this article shows, once a species begins calling it tends to call from many locations in the next few days if the conditions continue to be conducive for it.

Another question is did the record heat wave shorten the calling season for species. This is harder to measure without lots of repeat visits to a site. I visited one site with Western Chorus Frogs in western Ottawa a number of times in 2011 and 2012. In 2011, Chorus Frogs were first heard calling on 10 April and last heard on 27 April. I did not visit the site after 27 April, but on that date calling was very low intensity and I would guess it would have ended in a few days. All we can say for certain is that the calling period spanned at least 18 days. In 2012, the first and last days I heard calling at that site were 19 March and 18 April, a calling period of at least 30 days. Complicating things is that calling is not always continuous. After the heat wave in March 2012 the high temperatures went back to low single digits, which caused calling to stop for a few days. Nonetheless there is no evidence that the 2012 heat wave resulted in a shorter calling season, at least for the Western Chorus Frog.

Fowler's Toad.
Photo by Joe Crowley

Ultimately, it is hard to say what effect the hot weather had on these species. Early calling likely led to early breeding and laying of eggs in these species. On 26 March, after the heat wave, Ottawa had a low temperature of -5°C, followed by a low of -7°C the next day. Such frosts have the potential to kill a large number of amphibian eggs which are often laid close to the surface of the water. So summer in March may have allowed these species to breed early, but possibly not to their benefit. And of course the hot spring of 2012 was followed by the drought of summer 2012. The spring heat wave of 2012 is likely a taste of the weather we can expect as a result of global climate change: hotter, drier and more extreme weather events. It may provide some inconvenience to humans but may be extremely challenging for many other species.

Literature Cited

Cook, F.R. 1992. Pitfalls in quantifying amphibian populations in Canada. In Bishop, C.A. and Pettit, K.E. Declines in Canadian Amphibian Populations: Designing a national monitoring strategy.

Proceedings of a workshop, Burlington, Ontario, 5-6 October, 1991. Occasional Paper 76, Canadian Wildlife Service. Pp. 83-86.

Environment Canada. 2012. New release. Ontario Weather Review: March 2012. Available at http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=1B566320-3346-46D9-A1E9-B422CB614ED6. Accessed 12 January 2013.

Bringing Back Childhood Memories

David O'Connor
Graduate student – Green Lab
Redpath Museum, McGill University
david.oconnor@mail.mcgill.ca

It's one in the morning and the rain has just stopped. Through the trees large heavy drops are sliding off of leaves and tumbling to the leaves below. I'm standing in chest deep water, in waders that aren't quite waterproof anymore, and in my hand a bullfrog is screaming. This is rapidly becoming a moment of Zen. Even the tail slaps of the beaver whose home I'm wading through can't distract me from this large, angry slippery frog as I put her back in the water and watch her give a single large kick, and pop up a foot away, confident in the darkness to hide her.

American Bullfrog
Photo by Joe Crowley

The bullfrog isn't even the goal of my search tonight, it was simply a chance encounter as we both wake from our dormant seasons, and begin our field seasons. While I did find eggs that night, it is the encounter with the bullfrog that stands out. Neither of us were expecting to meet the other, but finding the frog has brought back a wave of nostalgia of catching frogs and toads when I was a child. It is this moment, in a way, that makes the trip out tonight worth it. It has been a difficult year for finances, and a recent cold snap pushed back the breeding season, complicated captures and travels. In this moment however, I am brought back to being a child, running barefoot through marshes and along the edges of a lake, catching anything that hopped, slithered or even just sat there and looked at me.

My road has taken me along an interesting path to get to this point, bringing me full circle to this point. The road has been more than worth it. Taking the moment to appreciate how phenomenally lucky I've been. I see friends and acquaintances who slough away at 9-5 jobs, working in a windowless box. My office has become a mountain, albeit a small one, with no walls and no limits. My hours are my own to control, and I'm doing something I really quite enjoy. In science we're often pushed to ask specific questions and drill down to a very narrow point. However sometimes you need to step back, take a look at the bigger picture, and really appreciate the moment, even if it takes a screaming bullfrog to remind you of that.

Book Reviews

This section of TCH includes reviews of not just books but other vehicles for the dissemination of information that might interest Canadian herpetologists.

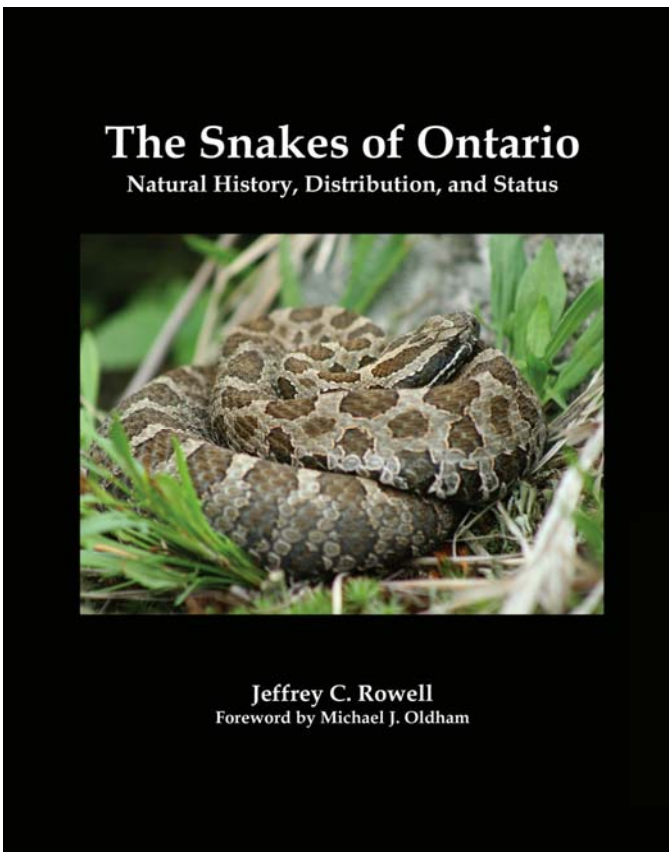
The Snakes of Ontario: Natural History, Distribution, and Status

By Jeffrey C. Rowell. 2012. Printed and bound by Art Bookbindery. 8.5" x 11" Hardcover vi + 411 Pages. $55.00 + Shipping ($15.00 in Canada, $22.00 to U.S.) Payment by Money Order, Personal Cheque, or PayPal. Contact jeffrey.rowell@sympatico.ca

Book Review by Francis Cook
Researcher/Curator Emeritus
Canadian Museum of Nature, Ottawa
frcook@ripnet.com

Nearly a decade in writing, this book was well worth the time and effort spent on it. It is a through, original, and comprehensive and meticulously documented reference to the 16 distinct species of snakes recorded for Ontario. The author's total of 18 snakes includes two distinctive subspecies of watersnake and gartersnake, the first of which is given a separate account. As well, Canadian populations of the Brown Snake in Ontario and Quebec appear to be composite hybrids between two subspecies, Red-bellied Snakes in northwestern Ontario may be hybrids between two subspecies and Ontario Rideau Lakes Ratsnakes may be hybrids between two taxa generally regarded as distinct species elsewhere.

Although snakes are simply one of several evolutionary lines of legless lizards, they have uniquely long dominated public attention throughout the world. Other lizards vastly outnumber them in species some 38 thousand against 26 to 29 thousand, respectively, and new species in both groups continue to be defined, particularly from the increasingly accessible tropics. But unlike warmer regions, in Canada snakes outnumber other lizard groups with only 6 species of lizards in contrast to 25 species of snakes. In Ontario, the contrast is even greater, 16 snakes but only a single irregularly distributed lizard.



Earlier authoritative lists of Ontario snakes include physician-naturalist J. Garnier's in 1881, but more casual observations go back further, to the accounts of the first explorers in the 1600s and subsequent resident naturalists. A listing by Normal School museum curator C.W. Nash in 1905 was followed by the first detailed modern treatment published in 1939 as Royal Ontario Museum Handbook Number 4, *The Reptiles of Ontario,* by curator E.B.S Logier. The first lists of all Canadian species were published by Logier and G.C. Toner in 1942 and independently by R.C. Mills of Hamilton while a student at the University of Michigan in 1948. Spot distribution maps for Canada were introduced by Logier and Toner (1955, revised in 1961) as part of a presentation for all Canadian amphibians and reptiles. Logier followed with *Snakes of Ontario* in 1958. That year the eastern edge of the province was included in Bleakney's PhD analysis of the herpetogeography of eastern Canada. Barbara Froom with the Ontario Department Lands and Forests (now the Ministry of Natural Resources) produced a pamphlet on Ontario snakes and in 1974 followed with a book on all Canadian species. Detailed documentation of Ontario snake distribution has been provided by the Ontario Herpetological Survey since it was initiated in 1984 with a network of naturalist contributors. Its first results were published between 1986 and 1989 in print with maps and subsequently online. In 2009, the new Ontario Reptile and Amphibian Atlas was initiated by Ontario Nature and updated maps are posted on the online atlas website annually. Other summaries of species have appeared, highlighted by *Familiar Amphibians and Reptiles of Ontario* by Bob Johnson in 1989 and the *Royal Ontario Museum Field Guide to Amphibians and Reptiles of Ontario* in 2002 by Ross MacCulloch. Publications for Canada including Ontario were my *Introduction to Canadian Amphibians and Reptiles* in 1984, *Canadian Skin and Scales: A Complete Encyclopedia of Canadian Amphibians and Reptiles* by Pat E. Bumstead in 2004 and *Reptiles and Amphibians of Canada* by Chris Fisher, Amanda Joynt, and Ronald J. Brooks in 2007. Species at risk have been subjected to the individual reports of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) which have included snakes since the 1980s. As well, many regional surveys of amphibians and reptiles such as those in the Ottawa district, Hamilton area and Prince Edward County have appeared. With this past arsenal of coverage, was yet another book on Ontario snakes really needed? Absolutely. New information is accumulating in widely scattered scientific publications and unpublished reports at an ever increasing rate and a great deal of old information has only recently been rediscovered or clarified though Rowell's efforts.

Jeffrey Rowell, even within his native province, has been known mostly only to snake specialists. This book will dispel this lack of general recognition. Since boyhood an amateur herpetologist, he has scientific training in geology from Queens University and skill as an amateur photographer. Eight years ago he started with a simple objective: to photograph each snake species recorded in Ontario, but quickly included compiling their variations and their natural history, urged by his wife Gunjan, into a book. He contacted many of the most active field workers studying Ontario snakes and went out with them in their field studies. Increasingly, he was drawn into an intensive search for clarification of records and discovery of long overlooked references. In turn this led to visits to both major museums in the province, the Royal Ontario Museum in Toronto and the Canadian Museum of Nature (formerly the National Museum of Canada) in Ottawa, to examine their specimen holdings and libraries. The result is the most comprehensive treatment of Ontario snakes to date.

Smooth Greensnake.
Photo by Nick Cairns

After a table of contents there is a list of the 67 figures (including photographs of species pattern variations and characteristic behaviours) and 21 tables. The book opens with a forward by Michael J. Oldham whose perceptive early and continual encouragement deserves recognition as the godfather of the project. This is followed by a preface by the author and a page of acknowledgements to the many who responded to requests for information and/or permission to accompany them in the field. A 74-page introductory section covers such general topics as the classification of snakes, their evolution and zoogeography, history of Ontario observations and research, status, and regulation and permit requirements from the Ministry of Natural Resources for any activities involving handling native snakes. Detailed accounts of each species in Ontario form the bulk of the text, under headings on physical appearance, nomenclature, taxonomy, status and distribution, habitat, behaviour and pattern of activity, diet and feeding, reproduction and growth and for the two rattlesnakes, venom and bites. The book concludes with a 4-page glossary of terms, a 35-page bibliography, a page listing personal communications, and another resources (including websites for societies and governmental projects), and a 5-page index.

The information presented is based on a thorough review of published scientific literature, historical accounts, and a large volume of "gray literature"(i.e., unpublished reports, master's and doctoral theses, and society newsletters). Range maps are based on locality data from the Natural Heritage Information Centre, the Ontario Herpetofaunal Survey updated from Ontario Nature’s Reptile and Amphibian Atlas, with the possible total provincial range indicated. Inset maps give the total North American range.

This book will be an indispensable reference for both the serious academic student planning additional research, casual naturalists curious about snakes, and all those in between these poles in Ontario and beyond. It is especially remarkable in that the research, writing and even the publication, have been done without institutional employment or external funding though grants or contracts that are generally deemed so essential now. It is readable by the beginner yet it meets professional standards and quality. In this, it may signal a larger return to independent, pure curiosity-driven, research more typical of the 1800s, rather than the present often narrow emphasis on applied research (orientated primarily to employment in studies on conservation of biodiversity and endangered or harvested species). In our era of shrinking support of broader and pure research for its own sake, self-financed initiatives like Rowell's could make a larger share of contributions in the future.

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.

Banger, N. M.Sc. 2012. University of Ottawa. Ottawa, ON. (Supervisor: Gabriel Blouin-Demers)

Consequences of multiple paternity for female fitness in an Ontario population of northern map turtles, *Graptemys geographica*.

Although sexual stereotypes paint males as being promiscuous and females as being choosy in order to increase their reproductive success, multiple mating by females is widespread and females of many taxa often produce progeny sired by multiple males – but why? In species in which there are no direct benefits associated with mating, females may adopt promiscuous mating

strategies to increase their fitness through the acquisition of genetic benefits. Here, I examine the genetic mating system of map turtles, *Graptemys geographica* in Lake Opinicon. Based on the most conservative estimate, at least 71% of clutches in this population are sired by multiple males. There did not appear to be any relationship between female body size and frequency of multiple paternity. There was a marginally significant effect of multiple paternity on hatching success and survival of clutches, but there was no effect on hatchling morphology or locomotor performance.

Cuthbertson, R.S.R. Ph.D. 2012. University of Calgary. Calgary, AB. (Co-supervisors: Jason Anderson and Anthony Russell)

Early to Middle Triassic Ichthyopterygians from the Sulphur Mountain Formation of east-central British Columbia, Canada: phylogenetic and evolutionary implications.

Ichthyopterygia is a diverse clade of Mesozoic marine reptiles that first appears in the Early Triassic, already exhibiting a highly-derived skeleton modified for an aquatic lifestyle. However, fossil evidence for informative early forms is incomplete and only a few locations worldwide have produced material. As a result, we have a poor understanding of the early evolution of this interesting clade. Recent exploration of Sulphur Mountain Formation (Early-Middle Triassic) outcrop in the alpine of east-central British Columbia has resulted in an abundance of new ichthyopterygian fossil material, increasing our knowledge of early group members. Based on cranial and postcranial data, TMP 89.127.3 is identified as a new taxon retrieved within Grippidia, a clade formerly restricted to Lower Triassic deposits in Norway and China. The second specimen (PRPRC 2007.08.81) comprises a complete skull roof preserved in dorsal aspect and is referred to *Utatsusaurus*, representing the second occurrence of this genus from the Sulphur Mountain Formation. The third examined specimen (PRPRC 2004.05.08), referred to Mixosauria, is represented by a partial skull bearing a premaxilla with a pointed posterior margin and an enlarged supratemporal terrace. Due to material being collected from talus debris, a major challenge concerning the study of Sulphur Mountain Formation material is the loss of stratigraphic context. In order to identify the original strata from which specimens were weathered, geologic details were described for each specimen matrix sample and matched to the most similar sedimentary features that were identified for the Vega-Phroso Siltstone, Whistler, and Llama Members of the Sulphur Mountain Formation. The resulting hypothesis of stratigraphic placement indicates that taxa separate out stratigraphically, with *Utatsusaurus*, *Chaohusaurus*, and *Grippia* cf. *longirostris* (*Gulosaurus*) restricted to the Vega-Phroso Siltstone Member, and *Phalarodon* to the Llama Member.

On thin ice: Blue-spotted Salamander in Algonquin Park. Photo by Patrick Moldowan

El Balaa, R. M.Sc. 2012. University of Ottawa. Ottawa, ON. (Supervisor: Gabriel Blouin-Demers)

Effect of predator diet on predator-induced changes in life history and performance of anuran larvae.

Phenotypic plasticity allows some animals to change their behavioural, morphological, performance, and life history traits in response to changes in environmental conditions such as the presence of predators. These changes can enhance survival, but come at a cost. Some of these phenotypic changes are predator and diet specific. I examined the effects of predator diet on the performance, life-history, and morphology of developing Northern Leopard Frog (*Lithobates pipiens*) tadpoles.

Tadpoles were either exposed to cues from fish free water, cues from Brown Bullhead (*Ameiurus nebulosus*) fed a diet of trout pellets, or cues from *A. nebulosus* fed a *L. pipiens* tadpoles diet. Tadpoles exposed to predatory fish cues had smaller bodies, deeper tail fins, slower growth and development rates, and better rotational performance than tadpoles that were not exposed to predatory fish cues. Moreover, tadpoles appeared to differentiate between predatory fish diet and produced diet-specific responses in tail morphology and activity, although the latter effect was only marginally significant. Hatching, metamorphosis rates, and linear performance were not affected by the treatments. These results suggest that *A. nebulosus* can induce phenotypic changes in *L. pipiens* tadpoles, with some of these changes being diet specific.

Fortin, G. M.Sc. 2012. University of Ottawa. Ottawa, ON. (Supervisor: Gabriel Blouin-Demers)

Can landscape composition predict movement patterns and site occupancy by Blanding's turtles? A multiple scale study in Québec, Canada.

As habitat loss and fragmentation are major causes of decline in animal species, studying habitat requirements in these species is a key component of their recovery. I investigated the relationship between landscape composition and habitat use of Blanding's turtles, *Emydoidea blandingii*, a freshwater turtle threatened by habitat loss and road mortality in most of its Canadian range. In 2010, I conducted a radio-telemetry survey of 44 Blanding's turtles in southern Québec, Canada, and modelled their home range size from land cover proportions measured at many spatial scales. I also used data from a visual survey conducted in 2008 and 2009 to model wetland occupancy of the species at the landscape scale. Home range size of the Blanding's turtle was significantly correlated to landscape composition, and the proportions of agriculture, open water and anthropogenic lands had the strongest relationships with home range size. However, those relationships were weak and the models were unable to predict home range size accurately. At the landscape scale, land cover and road density poorly predicted probability of occurrence, and Blanding's turtles occupied wetlands in both disturbed and natural sites. Management of the species should focus on protecting sites of occurrence with high wetland density, low road density, and sufficient suitable habitat to cover their seasonal movement patterns.

Hynes, S.E. M.Sc. 2012. University of Calgary. Calgary, AB. (Supervisor: Anthony Russell)

Resource partitioning in caudal autotomy and regeneration: Assessing the impact of dietary intake on tail and body growth in the Leopard Gecko (*Eublepharis macularius*).

Various impacts and costs are associated with caudal autotomy (voluntary tail loss) and subsequent regeneration. Few studies, however, have explored the effects of tail regeneration on body growth, and even fewer have investigated the trade-offs associated with limited dietary resources. These impacts are investigated by: 1) observing the outcome of tail loss on juvenile leopard geckos experiencing conflicting demands of body growth and tail regeneration, when food is constrained; and 2) assessing how metabolic rate varies with tail loss. Results reveal that the regenerating tail receives priority over somatic growth when resources are limiting. Furthermore, animals undergoing caudal regeneration suppress their metabolic rate at the point in caudal regeneration when volumetric increase is greatest, diverting resource allocation to the tail and maintaining linear growth of the tail.

Kent, J. B.Sc. 2013. Laurentian University. Sudbury, ON. (Supervisor: David Lesbarrères)

Behavioural analysis: An innovative approach to examining multiple stressor effects in amphibians.

In recent decades, the incidences of amphibian population declines have been on the rise, causing great concern within the scientific community. The causes of these declines have been attributed to a suite of factors including emerging infectious diseases, disturbed ecosystems and increasing temperatures, among others. Although these threats have been studied separately, little is known about the negative effects of these sources combined. The aim of my study was to explore the potential use of behavioural analysis as a technique to examine multiple stressor effects on amphibians. Under various treatments including the presence of ranavirus, exposure to copper and different temperatures, the behavioural responses of Northern Leopard Frog tadpoles (*Lithobates [Rana] pipiens*) were video recorded, and traits including lethargy, balance, colouration and erratic swimming were analyzed. I hypothesized that when presented with trace metal, pathogen stressors and temperature increase or decrease, *L. pipiens* will exhibit measurable stress responses that can be determined via behavioural observations. In accordance with these predictions I observed that temperature affected tadpole behaviour. Tadpoles exposed to 14°C were significantly more lethargic, unbalanced, and erratic as well as exhibiting a greater loss of colour in comparison to tadpoles at 20°C. I also discovered that copper had a significant effect on tadpole's lethargic, balanced and erratic behaviour as well as colouration in comparison to tadpoles in the control group. Additionally, tadpoles exposed to the ranavirus were significantly more lethargic, erratic as well as displaying a higher loss of pigmentation in comparison to tadpoles in the control group. Finally, the interaction between metal, virus and temperature displayed measurable effects on lethargy, balance and colouration with various responses depending on the trait. In conclusion, my work showed that the environmental stressors analyzed here had a significant impact on tadpole behaviour, suggesting that behavioural analyses are relevant to assess stress on amphibian populations.

Klaus, S. M.Sc. 2012. Queen's University. Kingston, ON. (Supervisor: Stephen Lougheed)

Correlates and temporal variation in call phenology of eastern Ontario frogs.

Climate change has been predicted to have long-term consequences for North American ecosystems. Amphibians in particular are considered indicators of ecosystem health because of their sensitivity to environmental change – due in part to their semi-permeable skin and aquatic developmental requirements. Amphibians have been experiencing population declines on a global scale, suggested in part to be due to changes in reproductive behaviour and timing. My thesis examines the abiotic correlates of timing of calling in southeastern Ontario anurans, as well as the extent to which the timing of calling events vary within and among species. I focused on eight species of frogs using both a 40-year historical dataset and a 5-year field-collected dataset of environmental variation and anuran activity. From analysis of the historical dataset, *Lithobates pipiens* was the only species out of eight to emerge significantly earlier, by an estimated 22 days over four decades. Both *L. pipiens* and *Anaxyrus americanus* have advanced initiation of calling over a four-decade span significantly earlier by an estimated 37.2 and 19.2 days, respectively, correlating with significant regional increases in spring air temperatures (2.8°C over four decades). Global frog declines or range shifts relate ultimately to changes in reproductive behaviour and timing mediated by shifting climate. From my analysis of the field-collected dataset, I concluded that species varied in the environmental predictors that best predicted this variation may be a consequence of varying reproductive strategies between early spring "explosive" breeders versus late prolonged breeders. There was also significant among-location variation in calling activity for four prolonged breeding species, which may be an effect of significant microclimatic variation between locations surveyed. My study suggests that local temperature increases have affected the timing of emergence and the onset of calling activity in some frogs and that microclimatic differences among breeding habitats may be influencing the timing of breeding in some prolonged breeding species. My research aids future conservation and management strategies for North America's dwindling amphibian populations by quantifying how abiotic factors influence breeding behaviour on both a fine and extended temporal scale, as well as by developing and testing standardized methods for long-term species monitoring.

Blanding's and Painted Turtles basking together.
Photo by Joe Crowley

Lacroix, M. B.Sc. 2012. University of Ottawa. Ottawa, ON. (Supervisor: Gabriel Blouin-Demers)

Do Blanding's turtles in poor quality habitats experience reduced immunocompetence and increased parasitaemia?

Human activities play an important role in the loss of biodiversity and habitat loss is the greatest known threat to the survival of most species at risk, such as Blanding's turtles (*Emydoidea blandingii*). I tested the hypothesis that individuals in poor habitats are in poor condition. I assessed habitat quality by the land use in the home range and I assessed condition by heterophil:lymphocyte (H:L) ratios and levels of parasitaemia. I expected to see an increase in H:L ratios and parasite counts as the proportion of anthropogenic lands and agricultural fields in the home range increased.

This study was conducted at five study sites in southwestern Québec. A total of 42 turtles were monitored by radio-telemetry and location data were used to determine the home range size (MCP) of each turtle. Blood samples were drawn from each turtle and leukocyte counts were done. I found that immunological response varied negatively with the density of roads whereas parasitaemia increased as a function of proportion of wetlands.

Maddin, H.C. Ph.D. 2011. University of Calgary. Calgary, AB. (Co-supervisors: Anthony Russell and Jason Anderson)

Phylogenetic implications of the morphology and development of the braincase of caecilian amphibians (Gymnophiona).

Caecilians, one of three living groups that comprise Lissamphibia (frogs, salamanders and caecilians), are considered the least well understood for many aspects of their biology. The current study set out to develop a framework, within which aspects such as morphology and evolution could be explored, by attempting to resolve the poorly understood phylogeny of caecilians by examining the morphology of the braincase and stapes. The braincases and stampedes of twenty-seven species of caecilian were examined using micro-computed tomography and histologically-prepared specimens. The braincases were first examined for their potential to yield phylogenetic information by deciphering variation in the antotic region. Deriving from assessments of homology based on transmitted structures, eight different patterns of antotic foramina are identified and the distribution of these patterns is congruent with hypotheses of relationship based on molecular data. It is demonstrated that heterochrony was likely a driver of morphological variation; however, causes of such modifications failed to be correlated with the patterns observed. Description of the entire braincase and stapes permitted the identification of thirty-two new morphological characters. These characters are shown to be sufficient for resolving genus-level relationships in the context of previously developed matrices, in a way that is congruent with hypotheses based on molecular data. A combined phylogenetic analysis of morphological and molecular data provides a test of congruence between morphological characters in a total evidence context, permitting ancestral character state reconstructions to be conducted and the plesiomorphic condition of the braincase and stapes of Gymnophiona to be inferred. The ability for the braincase to reveal phylogenetic information in the broader context of lissamphibian phylogeny was explored by considering the auditory apparatus. New observations, combined with those made previously, are used to infer the presence of the lissamphibian-type ear in caecilians, suggesting the secondary loss of the tympanic and *opercularis* hearing pathways in caecilians. The evolution of the lissamphibian-type ear is most parsimoniously explained under the monophyletic temnospondyl hypothesis of lissamphibian phylogeny. The data presented here, and the new phylogenetic framework incorporating morphology, provide a means to further explore evolution in a group with diverse factors influencing the evolution of morphology.

Ngar-Yung Leung, M. M.Sc. 2012. University of Calgary. Calgary, AB. (Supervisor: Anthony Russell)

Phylogeography of the Greater Short-Horned Lizard (*Phrynosoma hernandesi*) in Alberta.

The distribution pattern of a species reflects a mixture of historic and present-day influences. The Greater Short-horned Lizard is range-marginal in Alberta and exhibits a patchy distribution pattern. Many sites where it occurs appear to be isolated. Phylogenetic inference and population genetics were employed to investigate the historical source(s) of the Alberta representatives and to determine whether Alberta “populations” are subject to gene flow between them. Two mitochondrial and one nuclear DNA genes were sequenced from 94 lizard tail-tips collected from twelve localities in Alberta. Overall, Alberta lizard sequences displayed very little variability, and genetic analyses revealed that the most parsimonious explanation is that this species in Alberta is descended from one source population. All localities are inferred to be historically genetically interconnected. The correlation of horned lizard localities with selected landscape features revealed that they occupy only small portions of seemingly suitable habitat. Overall, the historic genetic information investigated and particular features of the landscape features failed to explain the species present-day distribution patterns in southeastern Alberta.

Proulx, C. B.Sc. 2012. University of Ottawa. Ottawa, ON. (Supervisor: Gabriel Blouin-Demers)

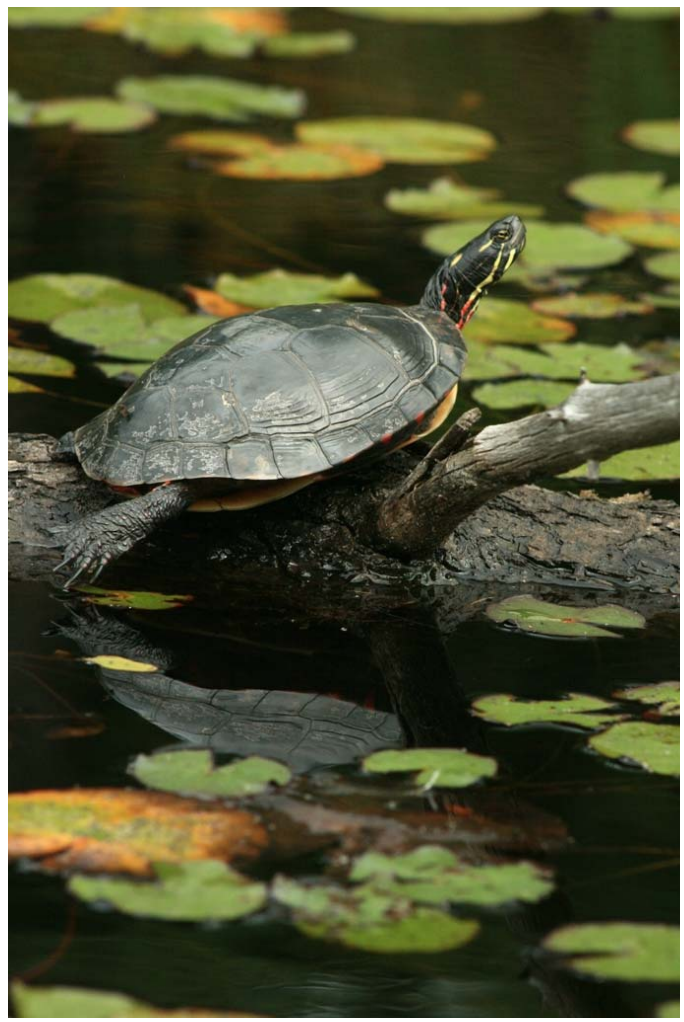
Are roads a barrier to movement in Blanding's turtles (*Emydoidea blandingii*)?

Studies in road ecology are becoming increasingly important to determine the effects of roads on ecological processes and on wildlife populations. The fragmentation of natural landscapes by linear anthropogenic features has several negative consequences, such as decreasing connectivity between habitats, inhibiting animal movement, and isolating populations. The barrier effect limits animal movement through behavioural avoidance and mortality during crossing attempts. I investigated the impact of road networks on the movement patterns of Blanding's turtles (*Emydoidae blandingii*) from 6 wetland sites in Ontario and Québec, Canada. A total of 63 Blanding's turtles (30 females, 27 males, and 6 juveniles) were monitored via radio-telemetry during their active season from April-September 2010 and 2011. Road avoidance was quantified, for each individual, by comparing the number of observed crossings with the number of expected road crossings predicted by 1000 movement path randomizations. The results of this study demonstrated that the Blanding's turtle population in Québec significantly avoids crossing roads, but the Ontario population does not. Roads were a significant barrier to movement of 7 of the 63 turtles and the barrier effect was not influenced by either sex or road surface. Preserving demographic and genetic connectivity of animal populations separated by roads is a major conservation challenge for species at risk such as the Blanding`s turtle.

Sanders, S. B.Sc. 2013. Laurentian University. Sudbury, ON. (Supervisor: Jacqueline Litzgus)

The effects of population density on juvenile growth of the painted turtle, *Chrysemys picta.*

Freshwater turtles often grow to large body sizes and occur in high density populations due to the lack of predation they experience at large sizes. This suggests that other factors may limit population density to levels that permit turtle growth and development. Previous studies have revealed that turtle abundance is often driven by primary productivity of the habitat. Open water nitrogen, phosphorous and euphotic depth, were measured at five lakes in Algonquin Provincial Park, Ontario, Canada, in order to determine the effect of habitat productivity on the population densities of the resident Painted Turtles (*Chrysemys picta*), and to in turn examine the effects of population density on juvenile growth rates. Primary productivity may be responsible for variation in turtle abundance because more productive environments have been shown to support higher densities of individuals. Studies have also shown that high densities may decrease individual growth rates due to competition for limited resources. Thus, I predicted that as habitat productivity increased I would observe greater Painted Turtle population densities and decreased individual growth rates. Nitrogen had no effect on density; however, greater phosphorous levels were found at sites with high turtle densities. Secchi disk readings revealed that lakes with thin, but dense, layers of primary producing organisms at their surfaces may support higher densities. Density appeared to have no effect on juvenile growth rate except at extremely high densities at which growth rates decreased, possibly as a result of density-dependent effects such as competition for limited food. The high density site was also identified as one of the most productive habitats, suggesting that despite elevated productivity and therefore presumably abundant food resources, the stress of high population density had a negative effect on growth rate in this northern population of Painted Turtles.



Midland Painted Turtle basking.
Photo by Patrick Moldowan

Stewart, K.A. Ph.D. 2013. Queen's University. Kingston, ON. (Supervisor: Stephen Lougheed)

Contact zone dynamics and the evolution of reproductive isolation in a North American treefrog, the spring peeper (*Pseudacris crucifer*).

Despite over seven decades of speciation research and 25 years of phylogeographic studies, a comprehensive understanding of mechanisms that generate biological species remains elusive. In temperate zones, the pervasiveness of range fragmentation, and subsequent range expansions suggests that secondary contact between diverging lineages may be important in the evolution of species. Thus, such contact zones provide compelling opportunities to investigate evolutionary processes, particularly the roles of geographical isolation in initiating, and indirect selection against hybrids in completing (reinforcement), the evolution of reproductive isolation and speciation. The spring peeper (*Pseudacris crucifer*) has six well-supported mitochondrial lineages, many of which are now in secondary contact. Here I investigate the evolutionary consequences of secondary contact of two such lineages in Southwestern Ontario (Eastern and Interior) using genetic, morphological, acoustical, experimental, and behavioural evidence to show accentuated divergence of the mate recognition system in sympatry. Mitochondrial and microsatellite data distinguish these two lineages but also show ongoing hybridization. Bayesian assignment tests and cline analysis imply asymmetrical introgression of Eastern lineage nuclear markers into Interior populations. Male calls are divergent between Eastern and Interior allopatric populations and show asymmetrical reproductive character displacement in sympatry. Female preference of pure lineage individuals is also exaggerated in sympatry, with hybrids showing intermediate traits and preference. I suggest that these patterns are most consistent with secondary reinforcement. I assessed levels of post-zygotic isolation between the Eastern and Interior lineages using a laboratory hybridization experiment. Hybrid tadpoles showed equal to or greater fitness than their pure lineage counterparts, but this may be countered through competition. More deformities and developmental anomalies in hybrid tadpoles further suggest post-zygotic isolation. Despite evidence for pre-mating isolation between the two lineages, isolation appears incomplete (i.e. hybridization is ongoing). I hypothesize that potentially less attractive hybrids may circumvent female choice by adopting satellite behaviour. Although mating tactics are related to body size, genetic status may play a role. I show that pure Eastern males almost always engage in calling, while hybrids adopt a satellite tactic. An absence of assortative mating, despite evidence of female preference, suggests successful satellite interception possibly facilitating introgression.

Thomasson, V. M.Sc. 2012. University of Ottawa. Ottawa, ON. (Supervisor: Gabriel Blouin-Demers)

Habitat suitability modeling for the eastern hog-nosed snake, *Heterodon platirhinos*, in Ontario.

With exploding human populations and landscapes that are changing, an increasing number of wildlife species are brought to the brink of extinction. In Canada, the eastern hog-nosed snake, *Heterodon platirhinos*, is found in a limited portion of southern Ontario. Designated as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), this reptile has been losing its habitat at an alarming rate. Due to the increase in development of southern Ontario, it is crucial to document what limits the snake's habitat to direct conservation efforts better, for the long-term survival of this species. The goals of this study were: 1) to examine what environmental parameters are linked to the presence of the species at a landscape scale; 2) to predict where the snakes can be found in Ontario through GIS-based habitat suitability models (HSMs); and 3) to assess the role of biotic interactions in HSMs. Three models with high predictive power were employed: Maxent, Boosted Regression Trees (BRTs), and the Genetic Algorithm for Rule-set Production (GARP). Habitat suitability maps were constructed for the eastern hog-nosed snake for its entire Canadian distribution and models were validated with both threshold dependent and independent metrics. Maxent and BRT performed better than GARP and all models predict fewer areas of high suitability when landscape variables are used with current occurrences. Forest density and maximum temperature during the active season were the two variables that contributed the most to models predicting the current distribution of the species. Biotic variables increased the performance of models not by representing a limiting resource, but by representing the inequality of sampling and areas where forest remains. Although habitat suitability models rely on many assumptions, they remain useful in the fields of conservation and landscape management. In addition to help identify critical habitat, HSMs may be used as a tool to better manage land to allow for the survival of species at risk.

Woolley, J. B.Sc. 2012. Laurentian University. Sudbury, ON. (Supervisor: Jacqueline Litzgus)

Increase in biodiversity of reptiles along a latitudinal gradient.

Species diversity and abundance increase with decreasing latitude and this is true for many animal taxa. In this study I tested if biodiversity and abundance of reptiles increased along a narrow latitudinal gradient. My prediction was that the more southerly site would have higher temperatures that would result in a higher abundance of reptiles. Road and foot surveys were done at two sites from 1 May to 31 August 2012, during which reptiles were observed and temperatures were taken daily. The north site is located 30 km south of Sudbury, Ontario along Highway 69 in the Sheppard Lake area. The south site is located 100 km south of Sudbury, Ontario along Highway 69 in the Magnetawan First Nation area. My hypothesis was supported in that reptile diversity and abundance increased from the north to the south site; however, I did not find that temperature was the main influence for this. Further studies examining other factors that may affect reptile abundance and diversity in both the north and south sites should be carried out.

Xuereb, A.T.J. M.Sc. 2012. Queen's University. Kingston, ON. (Supervisor: Stephen Lougheed)

Characterizing population genetic structure and inferring the influence of landscape features on gene flow in a temperate snake species.

Patterns of genetic diversity in natural systems are influenced by landscape heterogeneity over spatial and temporal scales. Certain natural or anthropogenic landscape features may facilitate or impede organism dispersal and subsequent gene flow. Characterizing the geographical distribution of genetic diversity and identifying the factors contributing to population genetic structure is imperative for maintaining functional connectivity between isolated populations across a fragmented landscape. In this study, I combined genetic data and high-resolution land cover information to investigate patterns of population genetic structure in the threatened eastern hog-nosed snake (*Heterodon platirhinos*) at its northern range limit in Ontario, Canada. First, using putatively neutral microsatellite markers, I found evidence of genetic differentiation between two geographically disjunct regional populations: in the Carolinian region of southwestern Ontario, and along the eastern shoreline of Georgian Bay. Spatial and non-spatial Bayesian clustering algorithms also detected population genetic structure within each regional population. I found evidence of weak structure within Georgian Bay, roughly corresponding to regions north and south of Parry Sound. A genetic cluster at Wasaga Beach, located at the southern terminus of Georgian Bay, was highly differentiated from other populations, despite its geographic proximity to Georgian Bay. Excess homozygosity and reduced allelic diversity in Wasaga Beach compared to other sampled populations imply a population bottleneck event. Secondly, I inferred the role of landscape features on eastern hog-nosed snake dispersal and subsequent gene flow in the Georgian Bay regional population. Using techniques derived from electrical circuit theory, I estimated pairwise resistance distances between individuals by assigning costs to landscape features that are predicted to impede hog-nosed snake movement: open water, wetland, settlement and agriculture, and roads. Landscape features did not influence genetic structure within Wasaga Beach. However, I found weak evidence for an effect of landscape features, particularly open water and roads, on gene flow in eastern Georgian Bay. This study is the first to examine potential factors driving population genetic structure of eastern hog-nosed snakes and provides an empirical foundation for future tests of demographic models and spatially explicit simulations of gene flow.

Playing dead.
Photo by Nick Cairns

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.

Baxter-Gilbert, J., J.L. Riley, and J.D. Litzgus. 2013. *Sistrurus catenatus catenatus* (Eastern Massasauga). Diet. Herpetological Review (accepted for publication 20 February 2013).

Bennett, A.M. and J.D. Litzgus. 2013. Injury rates of species at risk turtles on a recreational waterway in Ontario, Canada. Journal of Herpetology (accepted for publication 4 February 2013).

Boyle, S.P. and P.D. Moldowan. 2013. *AMBYSTOMA MACULATUM* (Spotted Salamander). Terrestrial oviposition. Herpetological Review 44: 113-114.

Brown, C.M., C.A. Boyd, and A.P. Russell. 2011. A new basal ornithopod dinosaur (Frenchman Formation, Saskatchewan, Canada), and implications for Late *Maastrichtian ornithischian* diversity in North America. Zoological Journal of the Linnean Society 163: 1157-1198.

Brown, C.M. and A.P. Russell. 2012. Homology and architecture of the caudal basket of Pachycephalosauria (Dinosauria : Ornithischia): the first occurrence of myorhabdoi in Tetrapoda. PLoS One 7: e30212. doi: 10.1371/journal.pone.0030212.

Bulté, G., R.R. Germain, C.M. O'Connor, and G. Blouin-Demers. 2013. Sexual dichromatism in the northern map turtle. Chelonian Conservation and Biology (in press).

Close, M. and D. Cundall. 2012. Mammals as prey: Estimating ingestible size. Journal of Morphology 273: 1042-1049.

Colotelo, A.H., G.D. Raby, C.T. Hasler, T.J. Haxton, K.E. Smokorowski, G. Blouin-Demers, and S.J. Cooke. 2013. Northern pike bycatch in an inland commercial hoop net fishery: effects of water temperature and net tending frequency on injury, physiology, and survival. Fisheries Research 137: 41-49.

El Balaa, R. and G. Blouin-Demers. 2013. Does exposure to cues of fish predators fed different diets affect morphology and performance of northern leopard frog (*Lithobates pipiens*) larvae? Canadian Journal of Zoology 91: 203-211.

Elmer, K.R., R.M. Bonett, D.B. Wake, and S.C. Lougheed. 2013. Early Miocene origin and cryptic diversification of South American salamanders. BMC Evolutionary Biology (in press).

Fortin, G., G. Blouin-Demers, and Y. Dubois. 2012. Landscape composition weakly affects home range size in Blanding's turtles (*Emydoidea blandingii*). Écoscience 19: 191-197.

Gamble, T., E. Greenbaum, T.R. Jackman, A.P. Russell, and A.M. Bauer. 2012. Repeated origin and loss of adhesive toepads in geckos. PLoS One 7: e39429. doi: 10.1371/journal.pone.0039429.

Higham, T.E. and A.P. Russell. 2012. Time-varying motor control of autotomized leopard gecko tails: multiple inputs and behavioral modulation. Journal of Experimental Biology 215: 435-441.

Isaac, L.A. and P.T. Gregory. 2013. Can snakes hide in plain view? Chromatic and achromatic crypsis of two colour forms of the Western Terrestrial Garter Snake (*Thamnophis elegans*). Biological Journal of the Linnean Society 108: 756-772.

Jonasson, K.A., A.P. Russell, and M.K. Vickaryous. 2012. Histology and histochemistry of the gekkotan notochord and their bearing on the development of notochordal cartilage. Journal of Morphology 273: 596-603.

Klaus, S.P. and S.C. Lougheed. 2013. Changes in breeding phenology of Eastern Ontario frogs over four decades. Ecology and Evolution 3: 835-845. DOI: 10.1002/ece3.501.

Larocque, S.M., S.J. Cooke, and G. Blouin-Demers. 2012. A breath of fresh air: avoiding anoxia and mortality of freshwater turtles in fyke nets by the use of floats. Aquatic Conservation: Marine and Freshwater Ecosystems 22: 198-205.

Larocque, S.M., S.J. Cooke, and G. Blouin-Demers. 2012. Mitigating bycatch of freshwater turtles in passively fished fyke nets through the use of exclusion and escape modifications. Fisheries Research 125-126: 149-155.

Larocque, S.M., P. Watson, S.J. Cooke, and G. Blouin-Demers. 2012. Accidental bait: do deceased fish increase freshwater turtle bycatch in commercial fyke nets? Environmental Management 50: 31-38.

Larocque, S.M., A.H. Colotelo, S.J. Cooke, G. Blouin-Demers, T. Haxton, and K.E. Smokorowski. 2012. Seasonal patterns in bycatch composition and mortality associated with a freshwater hoop net fishery. Animal Conservation 15: 53-60.

LeDain, M.R.K., S.M. Larocque, L. Stoot, N. Cairns, G. Blouin-Demers, and S.J. Cooke. 2013. Assisted recovery following prolonged submergence in fishing nets can be beneficial to turtles: an assessment with blood physiology and reflex impairment. Chelonian Conservation and Biology (in press).

Lelièvre, H., C. Moreau, G. Blouin-Demers, X. Bonnet, and O. Lourdais. 2012. Two syntopic colubrid snakes differ in their energetic requirements and in their use of space. Herpetologica 68: 358-364.

Lelièvre, H., P. Legagneux, G. Blouin-Demers, X. Bonnet, and O. Lourdais. 2012. Trophic niche overlap in two syntopic colubrid snakes (*Hierophis* *viridiflavus* and *Zamenis longissimus*) with contrasted lifestyles. Amphibia-Reptilia 33: 37-44.

Lelièvre, H., P. Rivalan, V. Delmas, J.M. Ballouard, X. Bonnet, G. Blouin-Demers, and O. Lourdais. 2013. The thermoregulatory strategy of two sympatric colubrid snakes affects their demography. Population Ecology (in press).

Millar, C.S. and G. Blouin-Demers. 2012. Habitat suitability modelling for species at risk is sensitive to algorithm and scale: a case study of Blanding's turtle, *Emydoidea blandingii*, in Ontario, Canada. Journal for Nature Conservation 20: 18-29.

Millar, C.S., J.P. Graham, and G. Blouin-Demers. 2012. The effects of sex and season on patterns of thermoregulation in Blanding's turtles (*Emydoidea blandingii*) in Ontario, Canada. Chelonian Conservation and Biology 11: 24-32.

Paterson, J.E., B.D. Steinberg, and J.D. Litzgus. 2013. Not just any old pile of dirt: Evaluating the use of artificial nesting mounds as conservation tools for freshwater turtles. Oryx (in press).

Peet-Paré, C.A. and G. Blouin-Demers. 2012. Female eastern hog-nosed snakes (*Heterodon platirhinos*) choose nest sites that produce offspring with phenotypes likely to improve fitness. Canadian Journal of Zoology 90: 1215-1220.

Proulx, C.L., G. Fortin, and G. Blouin-Demers. 2013. Blanding's Turtles (*Emydoidea blandingii*) avoid crossing unpaved and paved roads. Journal of Herpetology (in press).

Robson, L.E. and G. Blouin-Demers. 2013. Does the eastern hognose snake (*Heterodon platirhinos*) avoid crossing roads? Copeia (in press).

Row, J.R., G. Blouin-Demers, and S.C. Lougheed. 2012. Movements and habitat use of eastern foxsnakes (*Pantherophis gloydi*) in two areas varying in size and fragmentation. Journal of Herpetology 46: 94-99.

Russell, A.P., T.M. Chrbet, and H.C. Maddin. 2011. Restorative regeneration of digital tips in the African clawed frog (*Xenopus laevis* Daudin). Anatomical Record 294: 253-262.

Seburn. D.C. 2012. Why didn't the Spotted Turtle (*Clemmys guttata*) cross the road? Herpetology Notes 5: 527-530.

Stoot, L., N. Cairns, G. Blouin-Demers, and S.J. Cooke. 2013. Physiological disturbances and behavioural impairment associated with the incidental capture of freshwater turtles in a commercial fyke-net fishery. Endangered Species Research (in press).

Weatherhead, P.J., G. Blouin-Demers, and J.H. Sperry. 2012. Mortality patterns and the cost of reproduction in a northern population of ratsnakes, *Elaphe obsoleta*. Journal of Herpetology 46: 100-103.

Weatherhead, P.J., J.H. Sperry, G.L.F. Carfagno, and G. Blouin-Demers. 2012. Latitudinal variation in thermal ecology of North American ratsnakes and its implications for the effect of climate warming on snakes. Journal of Thermal Biology 37: 273-281.

Weerawardhena, S.R. and A.P. Russell. 2012. Cover-dependency of anurans in the Riverstone, Knuckles Mountain Forest Range, Sri Lanka. Taprobanica 4: 12-19.

Xuereb, A., J.R. Row, R.J. Brooks, C. MacKinnon, and S.C. Lougheed. 2012. Relation between parasitism, stress, and fitness correlates of the Eastern Foxsnake (*Pantherophis gloydi*) in Ontario. Journal of Herpetology 40: 555-561.

Yagi, K.T. and J.D. Litzgus. 2013. Thermal ecology of Spotted Turtles (*Clemmys guttata*) in a beaver flooded bog in Southern Ontario, Canada. Journal of Thermal Biology 38(5): 205–213.

Nest invader.
Photo by Nick Cairns

NEWS AND ANNOUNCEMENTS

Call for Nominations for the CARCNET Blue Racer Award

CARCNET welcomes nominations for this year's Blue Racer Award to be presented at the upcoming annual conference in Orford, Quebec, September 2013. The Blue Racer Award is presented to an individual in recognition of cumulative contributions to research and conservation of amphibians and/or reptiles in Canada. If you wish to nominate an individual, please email the Chair of the Awards Committee, Scott Gillingwater, for a copy of the nomination form (gillingwaters@thamesriver.on.ca) by July 1st. For more details and information please visit:

http://www.carcnet.ca/english/awards_scholarships/awards.php

Past Blue Racer Award winners include:
2012 Jim Bogart
2011 Wayne Weller
2010 John Gilhen
2007 David Green
2006 Pat Gregory
2005 Ron Brooks
2003 Bob Johnson
2002 Bill Preston
2001 Francis Cook

In Memory of J. Roger Bider (1932-2013)

Francis R. Cook
Researcher/Curator Emeritus
Canadian Museum of Nature, Ottawa
frcook@ripnet.com

One Canada's most senior herpetologists died 29 April 2013 after a long battle with Parkinson's Disease. Bider was a student and field assistant to J.E. Mossimann at University of Montreal and subsequently Professor for 35 years at Macdonald College, McGill University, and founder/director of the Ecomuseum in Montreal for over 20 years. His and his students' herpetological publications included papers on Snapping, Painted. Map, and Wood turtles, use of sand tracks for studying salamander and toad movements, and surveys of Quebec adjacent to James Bay. He and Sylvie Matte initiated the Atlas of amphibians and reptiles of Quebec, now a continuing project of the Ecomuseum directed by David Rodrique. He will be missed by the Canadian herpetological community.

Call for Nominations and Book Authors - IMPARA

Steve Hecnar
Lakehead University, Thunder Bay, ON
shecnar@lakeheadu.ca

The Important Amphibian and Reptile Areas (IMPARA) designation program is a major conservation initiative of CARCNET. There are three kinds of IMPARA sites: 1) Sites containing species of conservation concern, 2) Sites containing a high diversity of species, and 3) Sites that fulfill important life history functions for herpetofauna. Patterned upon, and complementing the Important Bird Areas of Canada criteria, the objective of site designation as an IMPARA is to raise awareness, and hopefully stewardship, for these sites.

At present, there are five IMPARA sites designated in Canada: 1) Okanagan-Similkameen Valley, BC, 2) the Creston Wildlife Management Area, BC, 3) the Narcisse Wildlife Management Area in Manitoba, 4) Cootes Paradise, Carroll's Bay, Grindstone Creek Valley Nature Sanctuaries in Ontario, and 5) Pelee Island, Ontario. A sixth site, Kejimkujik National Park in Nova Scotia, was just recently designated and there will be an announcement celebrating the designation this year at the park. Within the next year, CARCNET would like to extend this program to include at least one IMPARA site in every province of Canada.

The Important Amphibian and Reptile Areas Program (IMPARA) Site Criteria are intended to be guidelines for identifying the importance of a site, and are somewhat flexible, depending on the specifics of the site. These criteria are intended to be the first step in a dialogue between the nomination compiler and CARCNET.

Anyone can nominate a site and we are seeking nominations now. To nominate a site as an IMPARA, you simply complete a Site Nomination Form available on the web site. Before doing this, it is useful to read the IMPARA Site Criteria. There are two ways to complete the Site Nomination form: you may print a copy of the form using your browser's print function and complete it by hand, or download a rich text format version of the form and complete it on a word processor. Then you can send finished forms and all accompanying information to info@carcnet.ca.

CARCNET also plans to publish a full-sized coffee table book highlighting the IMPARA program and drawing attention to individual sites. This is an ideal opportunity for CARCNET or CAH members to fast-track the nomination of important Canadian herpetological areas with which they are familiar or interested. The goal is to produce an edited multi-authored book of well researched, informative, and concise site accounts with representative photographs and site maps. The plan is to have at least 20 sites covered across Canada with each province represented.

If you are interested in suggesting or nominating an area, and/or interested in researching and writing a particular account, there is a simple template available on the website, you can also contact Dr. Stephen Hecnar (shecnar@lakeheadu.ca) with questions. Once receiving ideas and offers from prospective authors, the IMPARA Committee and CARCNET Board will proceed further with selecting sites for inclusion in the book and
Contact: Dr. Steve Hecnar, Department of Biology, Lakehead University, 955 Oliver Road, Thunder Bay, ON, P7B 5E1. Email: shecnar@lakeheadu.ca. Telephone: 1-807-343-8250; http://www.carcnet.ca/english/important_areas/intro.php

2013 CARCNET/RÉCCAR Scholarship

The Canadian Amphibian and Reptile Conservation Network/Réseau Canadien de Conservation des Amphibiens et des Reptiles (CARCNET/RÉCCAR) is offering a scholarship programme consisting of one or more **$500.00** scholarships awarded annually to Canadian students conducting research to support amphibian and reptile conservation in Canada.

Applicants must submit a complete application form (available online: www.carcnet.ca) and one electronic copy of an academic transcript. Questions can be directed to Joe Crowley (crowleyjf@gmail.com).

Scholarship Application Deadline: 1 December 2013, by email to info@carcnet.ca.

TURTLE S.H.E.L.L. / TORTUE S.H.E.L.L.

Michele Andre-St. Cyr
President
motherturtle@turtleshelltortue.org
www.turtleshelltortue.org

Turtle SHELL has CDs available for purchase. One CD is an educational video called "The Wonderful Turtle/La Tortue Merveilleuse". The other CD is a PowerPoint presentation with about 84 slides, bilingual in English and French, animated and not animated. Turtle SHELL has an ISBN number for each CD. Francis Cook reviewed the CDs and has this to say: "The CDs are beautiful. The design is great. The CDs will serve their purpose well without change. What a lot of work and care has gone into their production!"

For more information, visit the website: http://www.turtleshelltortue.org/

Save The Salamanders

Matt Ellerbeck
Salamander Conservationist
mattellerbeck@savethesalamanders.com
www.savethesalamanders.com

Salamanders are among the world's most endangered animal groups, with around half of all of the world's species being listed as Threatened by the International Union for Conservation of Nature (IUCN). These species are all facing a high risk of extinction. Unfortunately, salamanders often get far less attention from conservationist than other endangered species. It is because of this high level of decline and lack of attention that I have decided to focus my conservation efforts on salamanders.

I focus mainly on outreach and education, visiting class rooms, kids' clubs, national parks, and conservation areas. I have educated students at every academic level, giving presentations or talks to pre-schools, elementary schools, high schools, and colleges/universities. It has been said that in the end we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught. This is why I aim to teach - to help foster a concern for the preservation of salamanders. I believe that all ages and all walks of life need to be taught an appreciation for salamanders. During my educational lectures and presentations I highlight the threats that salamanders face and ways in which individuals can aid in their recovery. I strongly promote land stewardship/habitat management activities as one way to help salamanders. I also inform rural landowners about the useful roles that salamanders play in eco-systems (i.e., natural pest controllers as they prey heavily on various arthropods and invertebrates). I hope that when people learn about the benefits that salamanders provide, they will be more inclined to protect them. My presentations also allow for people to get an up close look at live salamanders, as captive-bred and adopted specimens are brought with me. This connection with live salamanders helps people further develop a sense of empathy and concern for these amphibians.

Matt Ellerbeck presenting a salamander program to students at Bayridge Secondary School

To further bring my message of conservation to the public, I often appear in the media, giving radio and newspaper interviews. Many of my presentations also draw attention from the local media, allowing for more people to be reached and educated on conservation. Alongside these activities, I am also an avid salamander observer. During the spring, summer, and autumn months I spend much time out in the field gathering observational records of salamanders. These are sent to the Natural Heritage Information Centre to help gain a better understanding of salamander populations, habitats, ranges, and behaviours across the province of Ontario. Over the past summer I have viewed hundreds of salamanders in their natural habitats.

One of the efforts I am most proud of, though, is creating a salamander sanctuary. This came about after a visit to the Mazinaw Lakeside Resort Campground. I was set to do a presentation as part of their grand opening. After the presentation I went to explore the grounds and was pleased to find an area on the property rich in salamanders, both in terms of species and in the numbers seen. I was intrigued about the numerous sightings of salamanders that occurred within a short time. I was also filled with a sense of concern about the prospect that their habitat would be under threat from the development of the campground. There had been talks about expanding and developing certain areas of the grounds that were still in their natural state. I sat down with the owners and discussed why I felt it was important to leave these (salamander) areas untouched and undeveloped - not always an easy pitch to new business owners! However, my enthusiasm for preserving the salamanders' habitat must have worked, as they agreed. I returned to the area the following weekend. My assistant and I marked off the area which would be designated as the sanctuary, and put up signs to inform visitors to stay off to prevent habitat degradation. I regularly do presentations at the campground and continually monitor the sanctuary.

The internet is another place in which I aim to have a large presence for salamanders. I run a website called Save The Salamanders (www.savethesalamanders.com). The site has been designed as a hub of information where individuals can learn about the threats that salamanders face, and more importantly, things they can do to help. This is extremely important to me, and why I focus on outreach education and raising awareness; to encourage others to get active and involved with helping salamanders! Again, I feel conservation will be most effective when all ages and walks of life have a passion for the issue and a desire to make change!

Matt Ellerbeck holding a Tiger Salamander

I sincerely hope my efforts to educate and raise awareness will have a positive impact on salamanders and their populations, and that is why I am committed to continuing with my endeavors to help them. Scientist Stephen Jay Gould once said "We cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well - for we will not fight to save what we do not love." I am going to make sure I am doing my part to spread that love.

Canadian Association of Herpetologists / Association Canadienne des Herpétologistes

Membership in the CAH/ACH

The Canadian Association of Herpetologists is a scientific organization of professionals, students and interested amateurs. Its goals are to foster herpetological research and to aid communication among researchers in Canada. Membership in CAH is open to all whose work in concerned with the biology of amphibians and reptiles, particularly those who are located in Canada, who are working with Canadian populations, or who are interested in herpetology in Canada.

L'Association Canadienne des Herpétologistes est une organisation scientifique regroupant des professionnels, des étudiants et des amateurs intéressés par l'herpétologie. Les buts de l'association sont de promouvoir la recherche en herpétologie et de favoriser la communication entre les chercheurs canadiens. L'adhésion à l'ACH est ouverte à tous ceux dont le travail est relié à la biologie des amphibiens et des reptiles, particulièrement à ceux qui exercent leur travail au Canada, à ceux qui s'intéressent aux populations canadiennes, ou à ceux qui, de façon générale, sont intéressés par l'herpétologie au Canada.

Membership Form

Name: ____

Address: ____

____

____

Email: ____

Telephone: ______________________ office cell home

Annual Dues

_____ Regular Member ($20.00) _____ Renewal _____ New Member (welcome!)

_____ Student Member ($10.00) Please indicate membership year: _________

(Supervisor signature to confirm student status ________________________________)

Please check appropriate items.

Please mail this form with correct dues (payable to the Canadian Association of Herpetologists) to:
Dr. Patrick Gregory – President and Treasurer CAH/ACH, Department of Biology,
University of Victoria, Victoria, B.C., V8W 2Y2.

CARCNET - RÉCCAR

Canadian Amphibian and Reptile Conservation Network/ Réseau Canadien de Conservation des Amphibiens et des Reptiles

For the first time we are pleased to offer multi-year memberships. This allows you to avoid the hassle of re-registering every year and protects you from increases in membership fees. Membership is from January 31 of each given year.

Student Membership: $10/ year CDN ☐ **or $30/ 3 years** ☐

Non-Student Membership: $20/ year CDN ☐ **or $100/ 5 years** ☐

Yes, I wish to donate to the on-going work of the CARCNET/ RÉCCAR including the IUCN/SSC Task Force on Declining Amphibian Populations in Canada (DAPCAN) in the amount of:

$25 ☐ **$50** ☐ **$100** ☐ **Other (Please specify):______________________**

Total Amount Paid:____

Please make cheques or money orders payable to: ***CARCNET/ RÉCCAR Please fill out and mail, along with your membership fee, to:***

Jose Lefebvre Acadia University, Biology Dept. 33 Westwood Ave, Wolfville, NS, B4P 2R6.

Title:_______ First Name:_____________________ Last:__________________________

Institution:____

Department:____

PO box / Unit / Building:____

Street:______________________________ City:___________________________________

Province / State:______ Postal / Zip code:_____________ Country:________________

Email:____

Phone:_______________________________ Fax:__________________________________