

Volume 9 Number 1 Fall 2019

THE CANADIAN HERPETOLOGIST / L'HERPÉTOLOGISTE CANADIEN



A publication of the
Canadian Herpetological Society / Société d'herpétologie du Canada
www.canadianherpetology.ca

THE CANADIAN HERPETOLOGIST / L'HERPÉTOLOGISTE CANADIEN

The Canadian Herpetologist (TCH) is a publication produced twice each year by the Canadian Herpetological Society. Correspondence should be addressed to the Editors. *Opinions expressed by authors contributing to The Canadian Herpetologist are not necessarily shared by the publication, its editors, or the Canadian Herpetological Society.*

L'Herpétologiste Canadien (LHC) est une publication biannuelle publiée par Société d'herpétologie du Canada. Faites parvenir votre correspondance aux Éditeurs. *Les opinions exprimées par les auteurs qui collaborent au L'Herpétologiste Canadien ne sont pas nécessairement partagées par la publication, ses éditeurs, ou les Société d'herpétologie du Canada.*

ISSN 2369-9108

Volume 9, Number 1. Fall 2019

Table of Contents

Canadian Herpetological Society / Société d'herpétologie du Canada Executive	2
Instructions for Authors	2
Editorial Notes	2
Meetings.....	3
Canadian Herpetological Society	3
2019 Conference and Annual General Meeting	3
Symposium to Honour Pat Gregory at the Joint Meeting of Ichthyologists and Herpetologists (JMIH)	5
Feature Articles	5
A Tribute to Barbara Ellen Froom, 1926-2018	5
A Tribute to Craig Arthur Campbell, 1939-2018.....	8
ERRATUM: A Summary of Ten Years of the Marsh Monitoring Program for Breeding Amphibians at the Atikokan Generating Station – Table 1	15
Field Notes	16
A Review of our Knowledge of Chorus Frogs (<i>Pseudacris</i>) in the District of Parry Sound, ON.....	16
Update from the Herpetological Ecology Lab at Lakehead University	19
Thesis Abstracts in Canadian Herpetology	19
Recent Publications in Canadian Herpetology	22
News and Announcements.....	24
2019 CHS Award Recipients	24
2020 CHS Conference in Sudbury, ON	26
Ontario Reptile and Amphibian Atlas data in action: Identifying records that represent genotypes of Ontario's <i>Ambystoma</i> complex salamanders.....	26
Assembly and Dissolution of an Ontario Herpetological Bibliography.....	27
CHS/SHC Membership Form	29

Cover photograph of an American Toad taken by Joe Crowley during the 2019 CHS conference field trip at the Parc de la Rivière-des-Mille-Îles, QC.



**CANADIAN HERPETOLOGICAL SOCIETY /
SOCIÉTÉ D'HERPÉTOLOGIE DU CANADA
EXECUTIVE**

President – Jackie Litzgus
Laurentian University, Sudbury, ON

Vice President – Pamela Rutherford
Brandon University, Brandon, MB

Past President - Joe Crowley
Ministry of Environment, Conservation and Parks
Peterborough, ON

Treasurer – Jose Lefebvre
Acadia University, Wolfville, NS

Secretary – Amanda Bennett
Council of Canadian Academies, Ottawa, ON

Directors – Leslie Anthony, Christina Davy,
Yohann Dubois, Scott Gillingwater, Steve Hecnar,
Patrick Moldowan

TCH Co-editors – Jackie Litzgus and Joe Crowley
TCH Assistant Editor – Nicholas Cairns

INSTRUCTIONS FOR AUTHORS

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

- Citations of recent (within the last 2 years) publications relevant to Canadian herpetology that have not already been listed in TCH. If the publication was "in press" in the previous issue, we

will re-list it in the upcoming issue with the full citation information

- Abstracts of student theses (4th year, M.Sc., Ph.D.) that have not already been listed in a previous issue of TCH
- Feature articles on topics such as ecology, genetics, taxonomy, conservation issues, field techniques, recovery programs, etc.
- Field notes outlining the results of recent herpetological work
- News, announcements, job postings, collaboration opportunities or any other information that may be of interest to Canadian amphibian and reptile researchers and conservation practitioners
- Photographs and art
- Book reviews

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

EDITORIAL NOTES

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

Well, here we are again. Bidding farewell to another active season and hunkering down for the inactive season. As I write this message, snow flies outside my office window. That means it's time to organize data, write some papers, and get those student projects wrapped up. It also means time to share our science and news in TCH! I always enjoy leafing through these pages, to see great photos, to read about what research and stewardship my Canadian colleagues have been up to, who we recognize for their contributions to the biology and conservation of our favourite critters, and what's coming up over the next year. In this issue, I am especially pleased to share the biographic tributes that Wayne Weller has compiled about two Canadian icons in herpetology – Barb Froom and Craig Campbell – their long lists of contributions are humbling. Wayne also provides an update on Chorus Frogs in Ontario, and we have our usual abstracts from newly-minted scientists. I hope you enjoy this fall 2019 issue of TCH.



2019 CHS conference participants at the Redpath Museum

MEETINGS

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

Canadian Herpetological Society 2019 Conference and Annual General Meeting

David Green and Heather Gray

Redpath Museum, McGill University, Montreal, QC
david.m.green@mcgill.ca

The 2019 Canadian Herpetological Society (CHS) conference and annual general meeting was held at the Redpath Museum of McGill University in Montréal, Québec, from September 20th through 23rd. In total, 129 people from all across Canada, as well as some from the United States, registered and attended the meeting.

Even before the CHS conference officially started, it was a busy herpetological day at the Redpath Museum on Friday, Sept. 20th, as the Museum hosted a day-long, international symposium on declining amphibian populations. Sixteen speakers from as far away as Ecuador and Italy presented new and exciting findings essential for coming to an understanding of the unfolding crisis afflicting amphibians worldwide. With 114 registered participants, including many members of CHS as well as McGill students and faculty, the symposium was very well attended and filled the Museum's Auditorium for the whole day.

Immediately following the symposium, the CHS conference officially started with an opening reception in the Museum's 2nd floor Dawson Gallery. Overseen by the Museum's Gorgosaurus, and other inanimate

creatures in the Museum's display cases, well over 100 people gathered for a wonderful and nicely lubricated evening that provided ample opportunity for people to relax, share experiences, crow about their latest results, and reconnect with old friends.

The scientific program of the conference began on Saturday morning with a welcome from the Local Organizing Committee Chair, Dr. David Green, the CHS President, Dr. Jackie Litzgus, and the Director of the Redpath Museum, Dr. Hans Larsson, and ended late Sunday afternoon. Altogether, 54 contributed talks were presented in two concurrent sessions over the two days and 13 posters were presented in the poster session held in the Museum's 2nd floor Dawson Gallery on Saturday afternoon. Each day began with an opening keynote address. Dr. Larsson spoke on Saturday morning and talked about crocodiles, both ancient and modern, in a talk entitled "Wranglin' crocs through the ages". On Sunday morning, Dr. Mathieu Denoël, from the University of Liège in Belgium, talked about "Facultative paedomorphosis in newts: a fascinating polyphenism threatened by environmental change".

The CHS Annual General Meeting was held on the Saturday evening after the poster session. The AGM was well attended with 47 members present in the Redpath Museum's Auditorium. The meeting began with an introduction to the incoming board of directors and a showing of appreciation for all the efforts which the outgoing treasurer, Jose Lefebvre, put into the CHS. The past (Joe Crowley) and current (Jackie Litzgus) Presidents gave updates on accomplishments from this year, including the ratification of the CHS' constitution and bylaws, as well as a Patrick Gregory-dedicated symposium at this summer's JMIH in Snowbird, Utah. We then heard from each of the committees, highlights

included: That membership is up by 25% for a total of 173 but still less than the 2600 followers on Facebook; collaboration between CHS and the Key Biodiversity Areas (KBA) Canada initiative, including the potential to use previously designated IMPARA sites to help determine Canadian sites that would meet the IUCN's KBA criteria; and that the CHS blog will be out this fall! An election was held for one new Board member, Treasurer, and John Urquhart was elected to that position. Jackie (on behalf of Jose) presented the annual financial report, followed by an introduction to the host city, Sudbury, ON, for next year's meeting.



Dr. Hans Larsson speaking at the 2019 CHS conference. Photo by Joe Crowley

On Saturday evening, the conference banquet was held in the ballroom of Thompson House at McGill University. Jonathan Choquette, as always, did a bang-up job as our master of ceremonies and kept the evening's activities on schedule. Our travelogue speaker was Steve Marks, who entertained us with his reptile-catching adventures in Australia. Steve's talk was followed by the annual awards ceremony. Anne Yagi received the Blue Racer Award in recognition of her many years of outstanding research and conservation work in southern Ontario. The Silver Salamander Award went to the Ecomuseum Zoo in Sainte-Anne-de-Bellevue, which has for decades been a standard bearer for conservation and education concerning amphibians and reptiles throughout the St. Lawrence Valley. Jérémie Maranda accepted the award on behalf of David Rodrigue, the Director of the Ecomuseum, who could not attend. For details about all of this year's award recipients, see News and Announcements in this issue of TCH. As a CHS banquet would not be complete without a CHS Quiz, Joe Crowley tested our knowledge of herpetology with more than enough head-scratchers to inspire people to study up on Canadian herpetological history before next year's conference.

Monday's field trip was to Parc de la Rivière-des-Mille-Îles just north of Montréal in Laval. Despite the cool and rainy weather, 30 hardy herpetologists headed

out. They were introduced to the Parc and its mission in the amphitheater of the new welcome centre. They then had the opportunity to go for a walk in the woods to look for herps, as well as have a tour of the extensive habitat restoration work being done in the Parc. They all enjoyed a delicious lunch back at the impressive welcome centre. After lunch, participants had a tour of the labs where rescued turtles get a chance at survival. A small but representative collection of local herps (and fish) had everyone taking photographs. A visit to the museum or a paddle on the river concluded the visit. Thanks to Anaïs Boutin and Joel Bonin for organizing the field trip and an extra big "merci" to Anaïs and everyone at the Parc for hosting the visitors.



CHS field trip participants observing a Northern Leopard Frog (top); an American Toad observing CHS field trip participants (bottom). Photos by Joe Crowley

All in all, it was highly a successful conference, with wonderful and inspiring people who gave great research presentations and recounted conservation success stories. A huge thank you is owed to the Redpath Museum and McGill University for hosting the event and to the members of the local organizing committee who kept the whole thing afloat, especially Jessica Ford (volunteers and check-in desk), Nathalie Jreidini (publicity), Eric Guerra-Grenier (audio-visual), Pablo Menendez (auction), Heather Gray (catering) and Hervé Maranda (sponsorships), as well as Ginette

Dussereau and Caroline Leblond on the Redpath Museum staff. The local organizing committee is grateful to the many generous sponsors, enthusiastic volunteers and CHS Board members who contributed to the conference, and, of course, to all the presenters who came to the meeting. We will see you next year in Sudbury!



Symposium to Honour Pat Gregory at the Joint Meeting of Ichthyologists and Herpetologists (JMIH)

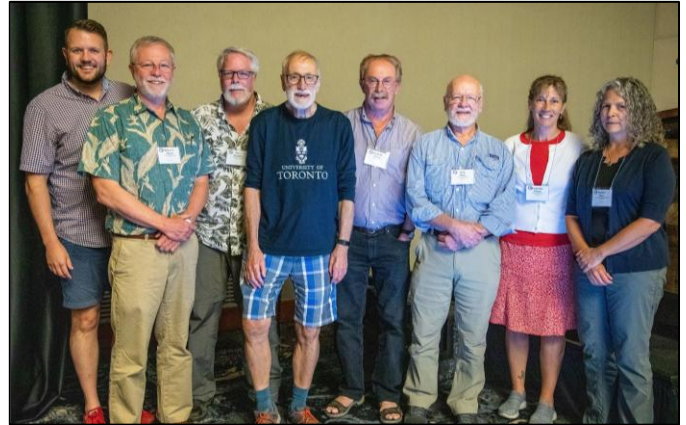
Jackie Litzgus

Laurentian University, Sudbury, ON
jlitzgus@laurentian.ca

The JMIH was held amongst the towering mountains of Snowbird, Utah in July 2019. The CHS hosted a special session honouring the contributions of Dr. Patrick Gregory, Professor Emeritus at the University of Victoria, BC; one of the grandfathers of Canadian herpetology. Prior to the merger of CARCNet and CAH, Pat was a member of CAH for the period 1986-2013, Treasurer for 1986-2013, and President for 2002-2013. Pat was a founding Co-president of the newly-merged CHS in 2013, and served on the CHS Board for the period 2014-2016. Pat received our Blue Racer Award in 2006 and our Michael Rankin Distinguished Canadian Herpetologist Award in 2015. Pat has also been honoured with awards from the JMIH societies, including the Distinguished Herpetologist Award from Herp League (2008), the Johnson Award for Excellence in Service from ASIH (2013), and the Fitch Award from ASIH (2015). Over his long career studying the ecology and conservation of snakes, Pat was continuously funded by the National Research Council Canada (NRC) and the National Sciences and Engineering Research Council of Canada (NSERC) and he has published more than 95 peer-reviewed papers and book chapters.

The invited speakers at the JMIH session included Pat as the opening talk, followed by talks from Rocky Parker, Bob Mason, Rick Shine, Steve Beaupre, Heather Waye, and David Green. The session ended with an opportunity for other folks to say a few words, at which time Mo Donnelly gave a personal heart-felt thanks to Pat for his mentorship in the societies that make up the

JMIH consortium. After the session, we convened over beers and snacks in Al Savitsky's hotel room to raise a few toasts to Pat's retirement. Pat told me the session was his favourite part of the meeting, and of course, being the humble person that he is, said that he didn't think he deserved all of that brew-ha-ha. Au contraire! Congratulations Pat on your retirement from your Canadian colleagues and friends!



Invited speakers at the JMIH session honouring Dr. Pat Gregory – from left to right: Rocky Parker, Bob Mason, Steve Beaupre, Pat Gregory, David Green, Rick Shine, Jackie Litzgus and Heather Waye.

FEATURE ARTICLES

A Tribute to Barbara Ellen Froom, 1926-2018

Wayne F. Weller

Associate, Herpetology Section, Department of Natural History, Royal Ontario Museum, Toronto, ON
wayneweller@bell.net

Barbara Ellen Froom, one of Canada's most respected popular naturalists, passed away at the Vermont Square Long Term Care facility in Toronto, Ontario on 26 September 2018 at the age of 92. Barb was born in Toronto on 15 April 1926, and lived in the city all her life. She is survived by her brother, a niece, and two nephews.

Barbara Froom was a co-founding member of the Canadian Amphibian and Reptile Conservation Society (CARCS) in 1960, along with Alex Findlay, E.B.S. (Shelly) Logier, Francis Cook, and others. Barb was the Editor of the Society's Bulletin from its inception in November 1960 until her retirement from this position in October 1987. She kept meticulous notes on all public and executive staff meetings, and if it were not for Barb providing that material to me, I would not have been

able to provide details of the Society’s evolution and activities in the early years of its existence (Weller 2016. TCH 6(2):6-13). Barb contributed 9 articles to the Bulletin, and for 24 years over the period of May 1963 to October 1987, contributed news briefs, author biographies, and commentary to 111 CARCS Bulletins. She participated in several interviews with radio media over the years in an attempt to change the public’s attitudes in a positive direction towards amphibians and reptiles.

Barb worked in the Conservation Information Section, Operations Branch of the Ontario Department of Lands & Forests (became Ontario Ministry of Natural Resources in 1972). One of her tasks was to review provincial newspapers on a daily basis, and prepare folders of articles pertinent for distribution to senior staff. Another task was to gather information on Ontario amphibians and reptiles for the Department of Lands & Forests.

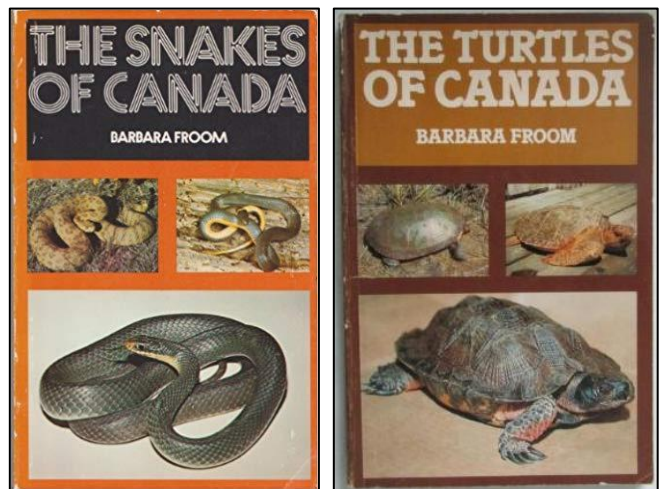


Barbara Froom. Photo credit: Obituary (Legacy.com)

Barb kept a number of snakes in captivity over the years. She is known particularly for keeping two Northern Ribbonsnakes (*Thamnophis sauritus*), which she named “Buttons” and “Bows”, for over 10 years. Barb also kept two Eastern Gartersnakes (*Thamnophis sirtalis*), named “Bijou” and “Bettina” for almost that long, and a Smooth Greensnake (*Opheodrys vernalis*) for a slightly shorter period of time. During many of our in-person and telephone discussions over the years, Barb

would somehow work into the conversation the latest updates concerning her snakes.

Barb was the author of several articles in naturalist journals (e.g. The Ontario Naturalist, The Ontario Field Biologist, Trail & Landscape). She produced booklets on Ontario Snakes (1967, 1971) and Ontario Turtles (1971), which were published and distributed by the Department of Lands & Forests. In 1972, Barb wrote and narrated a 24:34 min vinyl record on Canadian rattlesnakes in the Canadian Nature Series (you can listen to the recording at <https://www.youtube.com/watch?v=NwVJ4az8UXA>). Over a 10-year period (1972-82), Barb authored 3 books: The Snakes of Canada (1972), The Turtles of Canada (1976), and Amphibians of Canada (1982). Barb was shocked and displeased when she learned that the publisher was promoting her The Snakes of Canada book by sending boxes with breathing holes and filled with bedding material and marked “Live Snakes” to book stores across Canada. Most of Barb’s material listed below was published over 40 years ago, and is unavailable for purchase from primary outlets. Barb’s contributions to the CARCS Bulletins, her books on snakes (1972) and amphibians (1982), and most of her booklets can be accessed through the Library at the Royal Ontario Museum (ROM). Copies of much of Barb’s material are filed in the Herpetology Section library or reprint collection at the ROM.



In 1975, designated International Women’s Year, Barb was honoured by the National Museum of Natural Sciences as one of 19 Canadian women natural scientists who made significant contributions to various fields of the natural sciences in Canada (Smith 1976. Canadian Field-Naturalist 90(1):1-4). The Museum created a temporary and travelling exhibit to display examples of the accomplishments of these 19 women. On 15 February 1975, CBC TV News featured a 6:32

min interview with 4 of the women so honoured, and on 22 July 1975 The Winnipeg Free Press and the Medicine Hat News ran a story on this travelling exhibit.

Acknowledgements

An obituary appeared in the Toronto Star, 1 & 2 October 2018. I wish to thank Aleta Karstad for providing details concerning the promotion of Barb's The Snakes of Canada book, and Amy Lathrop for advising me of Barb's material at the ROM. I am not able to provide information pertaining to Barb's early life, despite making several attempts to contact the Froom family.

Bibliography of Barbara Ellen Froom's Works

Froom, B. undated (circa 1961-62). The Massasauga Rattler. Canadian Amphibian and Reptile Conservation Society Bulletin. 3 pp.

Froom, B. unknown (post 1972). The White-tailed Deer in Ontario. Ontario Ministry of Natural Resources.

Froom, B. 1962. Terrarium Pets. The Young Naturalist 4(1).

Froom, B. 1963. Keep Them Alive! Canadian Amphibian and Reptile Conservation Society Bulletin, May-June 1963:2-4.

Froom, B. 1964. Water Snakes. The Ontario Naturalist 2(3):23-25.

Froom, B. 1965. The habits of a captive Smooth Green Snake. Ontario Field Biologist 19(1):15-17.

Froom, B. 1965. Captive Reptiles Present Problems. Canadian Amphibian and Reptile Conservation Society Bulletin, Supplement No. 2, May 1965: 4 pp.

Froom, B. 1965. The Massasauga Rattlesnake. Special Publication Number 2, Federation of Ontario Naturalist, Don Mills, Ontario. 13 pp.

Froom, B. 1967. Ontario Snakes. Ontario Department of Lands and Forests, Conservation Information Section, Operations Branch, Toronto, Ontario. 36 pp.

Froom, B. 1968. Let Them Live! Trail and Landscape 2(5):130-133.

Froom, B. 1970. A Cause for Alarm. Canadian Amphibian and Reptile Conservation Society Bulletin 8(3):1-8. January-February 1970.

Froom, B. 1970. Captive Reptiles Present Problems. Canadian Amphibian and Reptile Conservation Society Bulletin, Supplement No. 3, March 1970 (re-release and update of 1965 version). 4 pp.

Froom, B. 1971. Ontario Snakes. Ontario Department of Lands and Forests, Conservation Information Section, Services Branch, Toronto, Ontario. 36 pp. Reprint of 1967 edition.

Froom, B. 1971. Ontario Turtles. Ontario Department of Lands and Forests, Conservation Information Section, Operations Branch, Toronto, Ontario. 25 pp.

Froom, B. 1972. The Snakes of Canada. McClelland and Stewart Limited, Toronto and Montreal. 128 pp.

Froom, B. 1972. Canadian Rattlesnakes. 33 1/3 rpm Long Play vinyl stereo record. SPL 301, Pentagon, Canadian Nature Series. Distributed by Allied Records Corporation.

Froom, B. 1973. Ontario Amphibians. Ontario Ministry of Natural Resources, Information Services Branch. Newsletter Series. Mimeograph. 55 pp.

Froom, B. 1974. A Pet Melanistic Garter Snake Dies of Cancer. Canadian Amphibian and Reptile Conservation Society Bulletin 12(3):1-6. June-July 1974.

Froom, B. 1976. The Turtles of Canada. McClelland and Stewart Limited, Toronto and Montreal. 120 pp.

Froom, B. 1977. Results of an Autopsy on a Hybrid Garter Snake. Canadian Amphibian and Reptile Conservation Society Bulletin 14(4):1-3. March-April 1977.

Froom, B. 1979. E.B. Shelly Logier. Canadian Amphibian and Reptile Conservation Society Bulletin 16(5):1-3. May-June 1979.

Froom, B. 1982. Amphibians of Canada. McClelland and Stewart Limited, Toronto and Montreal. 120 pp.

Froom, B. 1989. Shed Snake Skins. Canadian Amphibian and Reptile Conservation Society Bulletin 26(4):1-2. March-April 1989.



Northern Ribbonsnake. Photo by Joe Crowley



A Tribute to Craig Arthur Campbell, 1939-2018

Wayne F. Weller

Associate, Herpetology Section, Department of Natural History, Royal Ontario Museum, Toronto, ON
wayneweller@bell.net

Craig Arthur Campbell (Figure 1) was in his 80th year when he passed away peacefully and with dignity at The Village of Winston Park in Kitchener, Ontario on 27 December 2018 having suffered bravely for a lengthy period of time with Progressive Supranuclear Palsy (Steele-Richardson-Olszewski syndrome), an untreatable brain disorder. Craig is survived by his wife, Jane, his sister-in-law, and nephew and his wife. He is predeceased by his parents, Dorothy and Ross Campbell.



Figure 1. Craig and wife, Jane, at Pinehurst Lake Conservation Area (Pinehurst Rd, Town of Ayr, ca 25 km SSE of Waterloo) in Fall 2016. Craig's first publication (Campbell 1967) was a list of amphibian and reptile species known from this property. Photo enlarged and cropped from the original by Karin Dobbs.

Craig was born in Kitchener, Ontario in 1939, the only child of Dorothy and Ross Campbell. He grew up in the Kitchener area attending several elementary schools due to his family's frequent moves. Craig attended Waterloo Collegiate Institute, and graduated in 1957 from Kitchener-Waterloo Collegiate and Vocational School. In 1957, Craig enrolled at Waterloo College (became Waterloo Lutheran University, now Wilfrid Laurier University), and graduated in 1961 with an Honours degree in English and History. He was awarded a gold medal for English by the College. Craig taught English, History, Geography and Art at Waterloo Collegiate Institute in 1961 after graduation, and English at Waterloo Lutheran University during 1962-63. From 1963 until he retired from teaching in 1970, Craig taught English and History at Kitchener-Waterloo Collegiate and Vocational School.

Encouraged by his parents and grandparents, Craig developed interests in the natural world. He was passionate about the conservation of natural heritage and

explored and read all he could about plants and animals, and their habitats. Craig became increasingly aware at an early age that he wanted to become an environmental activist, and left teaching in 1970 to begin a career as a field ecologist and independent environmental consultant. His only formal study of biology was in high school. Craig's expertise as a naturalist developed through reading and his own field experiences.

Craig was an accomplished artist and displayed an exceptional talent in his early years. When he was 7 or 8 years of age, the Kitchener Public Library held an exhibit of his paintings. He continued to paint plants and dogs throughout his teen years (sometimes on commission), and much later he painted a series of Ontario amphibians and reptiles from live specimens in their natural habitat (e.g. Blanding's Turtle, *Emydoidea blandingii*; Five-lined Skink, *Plestiodon fasciatus*; and, Blue-spotted Salamander, *Ambystoma laterale* (Figure 2)). Craig is also known for his drawings which he included with many of his publications (e.g. Campbell 1973c; Northern Spring Salamander, *Gyrinophilus p. porphyriticus*) and consultant reports.



Figure 2. Craig Campbell's 1970s painting of Blue-spotted Salamander (*Ambystoma laterale*). Photo by W.F. Weller.

Craig was a member of the Kitchener-Waterloo Field Naturalists (KWFN, now Waterloo Region Nature). In the 1960s, he founded the Conservation Committee of that organization and was its Chairman from 1964-71. He held many offices in the KWFN, and in the late 1970s accepted a lifetime membership. Craig was also a member of the Canadian Amphibian and Reptile Conservation Society (CARCS) from the mid-1960s until the Society disbanded in 1991. From January 1973 onward, Craig held the position of Vice-President except during September 1975 to January 1978 when he held the position of President (Weller 2016). Craig and Jane were strong and consistent supporters of Ecojustice, Ontario Nature, and the Nature Conservancy of Canada for many years.

Craig's work reflects a life full of achievements. Among his many achievements was the compilation in the late 1960s and early 1970s of a guide to the mammals of Waterloo County and South Wellington County, including illustrated text, maps of occurrence, and an account of each species (Campbell et al. 1972). Craig's tremendous effort to document the occurrence of the Timber Rattlesnake (*Crotalus horridus*) in Ontario, and his field research during the 1960s-70s on the Blue Racer (*Coluber constrictor foxii*) on Pelee Island in southwestern Ontario was instrumental in the Ontario Ministry of Natural Resources designating these 2 of only 4 species (Government of Ontario 1973) protected under Ontario's first Endangered Species Act, 1971 (proclaimed on 23 July 1971). In 1977, based largely on the results of Craig's field work on Pelee Island, the Lake Erie Watersnake (*Nerodia sipedon insularum*) was added to the list of species "threatened with extinction" (Ontario Ministry of Natural Resources 1977; Ontario Regulation 33/77). Craig, along with G.R. Francis produced an amphibian and reptile atlas for Waterloo Region in the late 1970s and early 1980s (Francis and Campbell 1983), the first such document for Canada. The format they developed was utilized by the Ontario Herpetofaunal Summary (Oldham and Weller 1992) for the provincial-wide herpetological atlas program. Craig made substantial contributions to this atlas program, especially for Pelee Island, over the period 1978-88. Craig participated in both phases of the Ontario breeding bird atlas programs (1981-85, Cadman et al. 1987; 2001-05, Cadman et al. 2007), including a co-authorship of a species account (Sandilands and Campbell 1987b).

Craig received several awards over his 50+ year career as an ecologist, environmental activist, and researcher. On 21 June 2013, Craig received Ontario Nature's W.W.H. Gunn Conservation Award at their 83rd annual meeting at the YMCA Geneva Park (Lake Couchiching) for demonstrating outstanding volunteer service to the study of Ontario's natural heritage. Craig was instrumental in Waterloo Region's identification of municipally-designated environmental sensitive areas in 1976 (the first in Canada!), and the Region's adoption of these areas into environmental planning. In a ceremony at The Village of Winston Park (his residence at the time) on 11 March 2016, Craig received the Lieutenant Governor's Ontario Heritage Lifetime Achievement Award (administered by the Ontario Heritage Trust) in recognition of his 50+ years of exceptional volunteer contributions to the conservation of Ontario heritage, environmental sustainability and biodiversity, and cultural and natural heritage. Craig was inducted into the Waterloo Region Hall of Fame in 2018 for his

dedication to the plight of threatened and endangered species and the urgent need to protect their habitats, and for his contributions to the conservation of Ontario's natural heritage. In October 2018, a self-guided, 5-stop interpretive hiking trail through the 360+ hectare "rare Charitable Research Reserve" along the Grand River near Cambridge, Ontario (southwest of Toronto) was named "The Craig Campbell Fern Walk" hiking trail in Craig's honour (Figure 3).

Music, especially classical music, meant a great deal to Craig. Exploration of the natural world, whether work-related or not, gave him much joy. Craig took great pleasure in the richness of friendship, and in the companionship of the family cats.



Figure 3. Interpretive sign at the beginning of "The Craig Campbell Fern Walk" trail through the "rare Charitable Research Reserve" near Cambridge, Ontario. Photo credit: unknown.

Craig was incredibly generous of his time, and in sharing results of his research. Unable at the time to accept an invitation from Environment Canada to write the Recovery Strategy for the Timber Rattlesnake in Canada, Craig loaned staff at Environment Canada all

the correspondence and material he had assembled for their use in compiling the report. He reviewed drafts of the report and was instrumental in its conclusions (Environment Canada 2010). In the 1970s, Craig generously shared with this author information he collected on Western Chorus Frogs (*Pseudacris triseriata*) in the Parry Sound area of Georgian Bay, Ontario, and on salamanders of the Jefferson Salamander complex (*Ambystoma laterale* – *jeffersonianum*) in the Waterloo Region. Craig's information supplemented with additional field work led to a greater understanding of the distribution of these species in these areas. Some of Craig's files and correspondence, including many of his publications and unpublished reports listed in his bibliography have been donated to the Royal Ontario Museum in Toronto. Access to this material can be arranged through the museum Library. Other material, such as field notebooks, research material and photographs pertaining to botany, herpetology, ornithology, environmentally significant areas, and zoological topics in general has been deposited in the Region of Waterloo Archives in Kitchener, Ontario. Access to this material, which occupies 3.45 m of shelf space, can be accessed by contacting the Region of Waterloo Archives.

Family, friends and colleagues gathered in Waterloo on 2 February 2019 to celebrate Craig's life. Many remarked that Craig was one of the most respected naturalists in Ontario having become well-known locally, provincially and nationally as an expert on Ontario's mammals, amphibians and reptiles, butterflies, and plants. Several spoke from their own perspective of Craig's passion for the environment, and others spoke specifically of his professional contributions to our knowledge of the distribution and ecology of many of Ontario's species at risk. His early surveys and checklists will continue to serve as useful tools for future conservationists. Craig will be missed by his family and many friends and colleagues.

Acknowledgements

An obituary appeared in the local newspaper (Waterloo Region Record) and on the website of the Erb and Good Family Funeral Home, Kitchener, Ontario. I thank Jane Campbell for providing personal information. Karin Dobbs provided the photo of Craig and Jane at Pinehurst Lake Conservation Area. I benefitted from the information provided by Charlie Cecile, Ken Dance, Alan Macnaughton, Dave Perrin, and others at Craig's Celebration of Life luncheon. I extend my thanks to Mike Oldham for providing a list of Craig's non-herpetological publications and reports. I thank Amy Lathrop and staff at the Royal Ontario Museum Library,

and Charlotte Woodley at the Region of Waterloo Archives for accepting Craig's unpublished reports, correspondence, field notebooks, and other research material so that it will be available to future researchers.

Literature Cited

- Cadman, M.D., P.F.J. Eagles, and F.M. Helleiner (compilers). 1987. Atlas of the Breeding Birds of Ontario. University of Waterloo Press. xx + 617 pp.
- Cadman, M.D., D.A. Sutherland, G.G. Beck, D. Lepages, and A.R. Couturier (eds.). 2007. The Atlas of the Breeding Birds of Ontario, 2001-2005. Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto. xxiii + 706 pp.
- Environment Canada. 2010. Recovery Strategy for the Timber Rattlesnake (*Crotalus horridus*) in Canada. *Species at Risk Act Recovery Strategy Series*. Environment Canada, Ottawa. v + 17 pp.
- Government of Ontario. 1973. Ontario Regulation 433/73. Ontario Gazette, Volume 2:1251.
- Oldham, M.J. and W.F. Weller. 1992. Ontario Herpetofaunal Summary: compiling information on the distribution and life history of amphibians and reptiles in Ontario. Pp 21-22. In C.A. Bishop and K.E. Pettit (eds.), Declines in Canadian amphibian populations: designing a national monitoring strategy. Occasional Paper Number 76, Canadian Wildlife Service, Environment Canada. 120 pp.
- Ontario Ministry of Natural Resources. 1977. Endangered Species Issue. Ontario Fish and Wildlife Review 16(4):1-24.
- Weller, W.F. 2016. A detailed account of the formation and activities of Canada's first herpetological organization: The Canadian Amphibian and Reptile Conservation Society (CARCS). The Canadian Herpetologist 6(2):6-13.

Bibliography of Craig Arthur Campbell's Works

Compiled by Wayne F. Weller and Michael J. Oldham

- Campbell, C.A. undated. Amphibians and Reptiles of the Credit River Valley Watershed. Credit Valley Conservation Authority, Meadowvale, Ontario.
- Campbell, C.A. undated. Map of Herpetologically Significant Areas, Bronte Creek Provincial Park. 1 pg.
- Campbell, C.A. 1967. A preliminary check-list of the amphibians and reptiles of Pinehurst Lake Park, Ontario. Canadian Amphibian and Reptile Conservation Society Bulletin 6(2):1-3. November-December 1967.

- Campbell, C.A. 1968. Winter bird population study, 1967-68. *Ontario Field Biologist* 22:25-26.
- Campbell, C.A. 1969a. Herptile-hunting on holiday - Part 1 (Amphibians). *Canadian Amphibian and Reptile Conservation Society Bulletin* 7(4):1-3. March-April 1969.
- Campbell, C.A. 1969b. "Who cares for the Fowler's Toad?" *The Ontario Naturalist* 1969(4):24-27.
- Campbell, C.A. 1969c. Field Report #1, Point Pelee National Park. Point Pelee National Park, Leamington, Ontario.
- Campbell, C.A. 1969d. Winter bird population study, 1968-69. *Ontario Field Biologist* 23:39-40.
- Campbell, C.A. 1970a. Reptile and Amphibian survey, Skunk's Misery (Middlesex County Forest) near Newbury, Ontario. Unpublished Field Report No. 17 for Canadian Amphibian and Reptile Conservation Society. 4 pp.
- Campbell, C.A. 1970b. Winter bird population study, 1969-70. *Ontario Field Biologist* 24:31-32.
- Campbell, C.A. 1970c. Breeding bird population study, 1970. *Ontario Field Biologist* 24:33-36.
- Campbell, C.A. 1970d. Climax maple-beech forest. *Audubon Field Notes* 24:547-548.
- Campbell, C.A. 1971a. Herptile-hunting on holiday - Part II. *Canadian Amphibian and Reptile Conservation Society Bulletin* 9(2):1-4. March-April 1971.
- Campbell, C.A. 1971b. Butler's garter snake in Canada: a review of previously recorded and newly recorded colonies. *Canadian Amphibian and Reptile Conservation Society Bulletin* 9(5):1-4. November-December 1971.
- Campbell, C.A. 1971c. An ecological study for the Spotted Turtle *Clemmys guttata* in Huronia (Ontario Ministry of Natural Resources, administrative district). Unpublished report. Ministry of Natural Resources, Huronia District, Midhurst, Ontario. 20 pp.
- Campbell, C.A. 1971d. Certain elements of the herpetology of Effingham Provincial Park. 9 pp. Appendix VI of I.D. Macdonald and T.J. Beechey (1970/1971). Effingham Provincial Park, a biological inventory. Unpublished report. Ministry of Natural Resources, Park Planning Branch, Toronto, Ontario.
- Campbell, C.A. 1971e. Pelee Island Inventory. Unpublished report. Environmental Planning Series 2(16). Miscellaneous Report. Ministry of Natural Resources, Environmental Planning Section, Park Planning Branch, Toronto, Ontario. May-July 1971. 120 pp.
- Campbell, C.A. 1971f. Herpetology of Rondeau Provincial Park. Unpublished report. Environmental Planning Series 2(11). Miscellaneous Report. Ministry of Natural Resources, Environmental Planning Section, Park Planning Branch, Toronto, Ontario. September 1971. 16 pp + map.
- Campbell, C.A. 1971g. Report on Wainfleet Bog. Unpublished report. Nature Conservancy of Canada, Toronto, Ontario.
- Campbell, C.A. 1971h. Certain elements of the herpetology of Sibley Provincial Park in relation to master-planning for the Park. Pp 59-65 in D.G. Cuddy and R. Norman. Ecological report on Sibley Provincial Park. Internal report. Environmental Planning Series 2(25). Life Science Report. Ministry of Natural Resources, Environmental Planning Section, Park Planning Branch, Toronto, Ontario. 103 pp.
- Campbell, C.A. 1971i. Reptile and Amphibian Survey, Skunk's Misery (Middlesex County Forest) near Newbury, Ontario. *The Cardinal* 71:4-7.
- Campbell, C.A. 1971j. Elements of the Herpetology of Rondeau Provincial Park in Relation to Master Planning of the Park. Internal Report. Ontario Department of Lands and Forests, Parks Branch. 15 pp + map.
- Campbell, C.A. 1971k. Pelee Island Inventory. Ontario Department of Lands and Forests, Provincial Parks Branch, Toronto. OFER 7102. iv + 163 pp.
- Campbell, C.A. 1971l. Winter bird population study, 1970-71. *Ontario Field Biologist* 25:42-44.
- Campbell, C.A. 1971m. Climax maple-beech forest. *Audubon Field Notes* 25:637.
- Campbell, C.A. 1972. Winter bird population study, 1971-72. *Ontario Field Biologist* 26:50-53.
- Campbell, C.A. 1973a. An ecological survey for the Spotted Turtle. Unpublished report. Canadian Wildlife Service, Ottawa, Ontario.
- Campbell, C.A. 1973b. A survey of the herpetofauna of Bronte Creek Provincial Park. Unpublished report. Ministry of Natural Resources, Environmental Planning Section, Park Planning Branch, Toronto, Ontario. OFER 7309. July 1973. 21 pp.
- Campbell, C.A. 1973c. Salamanders on Foster Mountain. *Trail & Landscape* 7(2):33-39.
- Campbell, C.A. 1973d. Urban park (No. 55). *American Birds* 27:696-697.
- Campbell, C.A. 1974a. Survival of reptiles and amphibians in urban environments. Pp 61-66 in J.H. Naves and D.R. Progulske (eds.). *Wildlife in an Urbanizing Environment*. Co-operative Extension Service, University of Massachusetts.
- Campbell, C.A. 1974b. A preliminary assessment of ecological assets and impacts on Walpole Island Indian Reserve. Unpublished report. Ontario Region,

- Planning Section, Department of Indian and Northern Affairs. May 1974. 29 pp.
- Campbell, C.A. 1974c. Winter birds in the Town of Parry Sound, 1964-1973. *Ontario Field Biologist* 28:19-47.
- Campbell, C.A. 1975a. Reproduction and ecology of turtles and other reptiles and amphibians of Lake Erie and St. Clair in relation to toxic chemicals. Unpublished report. Contract No. CWS 7475/022. Canadian Wildlife Service, Ottawa. April 1975. 15 pp.
- Campbell, C.A. 1975b. A report on the Blue Racer (*Coluber constrictor foxi*) in Ontario: its status, requirements and management. Ministry of Natural Resources, Division of Fish and Wildlife, Wildlife Branch, Toronto, Ontario. July 1975. 31 pp.
- Campbell, C.A. 1975c. Progress report on field research for CARCS. *Canadian Amphibian and Reptile Conservation Society Bulletin* 13(2):1-3. September-October 1975.
- Campbell, C.A. 1975d. Amphibians and reptiles of the Niagara Escarpment Planning Area. Unpublished report. Niagara Escarpment Commission. 21 pp.
- Campbell, C.A. 1975e. Ecology and reproduction of Red-shouldered Hawks in the Waterloo Region, southern Ontario. *Raptor Research* 9:12-17.
- Campbell, C.A. 1975f. Distribution and breeding success of the Loggerhead Shrike in southern Ontario. Unpublished report No. 6065. Canadian Wildlife Service.
- Campbell, C.A. 1976a. Preliminary field study of the Blue Racer (*Coluber constrictor foxi*) on Pelee Island, Ontario. Unpublished report. Ministry of Natural Resources, Chatham District, Chatham, Ontario. 62 pp + maps.
- Campbell, C.A. 1976b. Resource Inventory Report, preliminary ecological report on Lighthouse Point, Fish Point and East Sister Island Nature Reserves, Essex County, Ontario. Unpublished report. Ministry of Natural Resources, Division of Parks, Chatham District, Chatham, Ontario. OFER 7602. x + 115 pp.
- Campbell, C.A. 1976c. Amphibians and reptiles of the Niagara Escarpment Planning Area. Unpublished report. Ministry of Natural Resources, Central Region, Richmond Hill, Ontario. 21 pp.
- Campbell, C.A. 1976d. Addendum to: Amphibians and Reptiles of the Niagara Escarpment Planning Area. Ontario Ministry of Natural Resources, Central Region, Richmond Hill, Ontario. 1 pg.
- Campbell, C.A. 1976e. Amphibians and reptiles of the Credit River Valley watershed. Unpublished report. Ecologistics Ltd.
- Campbell, C.A. 1977a. The status, range, and ecology of the Island or Lake Erie Water Snake (*Natrix sipedon insularum*). Unpublished report. Canadian Wildlife Service, Ottawa, Ontario. March 1977. 29 pp.
- Campbell, C.A. 1977b. The range, ecology and status of the Queen Snake (*Regina septemvittata*) in Canada. Unpublished report. Canadian Wildlife Service, Ottawa, Ontario. April 1977. 35 pp.
- Campbell, C.A. 1977c. Range, requirements and status of the Eastern Spiny Softshell (*Trionyx spiniferus spiniferus*) in Canada. Unpublished report. Canadian Wildlife Service, Ottawa, Ontario. August 1977. 32 pp.
- Campbell, C.A. 1977d. The status of the Black Rat Snake *Elaphe obsoleta obsoleta* in Ontario, and particularly in Haldimand-Norfolk Region. Unpublished report. Privately distributed. October 1977. 19 pp.
- Campbell, C.A. 1977e. Range, status, ecology and dorsal spot fusion in the Pickerel Frog (*Rana palustris*). Unpublished report. Canadian Wildlife Service, Toxic Chemicals Division, Ottawa, Ontario. 49 pp + 6 figures.
- Campbell, C.A. 1977f. The status of two rare Ontario reptiles: a progress report. Canadian Amphibian and Reptile Conservation Society, Annual National Meeting, Winnipeg, Manitoba. September 1977. 16 pp.
- Campbell, C.A. 1977g. The status of the Black Rat Snake in Ontario. Pp 21-23 in Oriskany of Ontario. 39 pp.
- Campbell, C.A. 1977h. Some threatened frogs and toads in Ontario. Pp 130-131 in T. Mosquin and C. Suchal (eds.). Canada's Threatened Species and Habitats. Proceedings of Symposium of Canada's Threatened Species and Habitats, co-sponsored by the Canadian Nature Federation and the World Wildlife Fund (Canada) in Ottawa 20-24 May 1976. Canadian Nature Federation Special Publication No. 6: x + 185 pp.
- Campbell, C.A. 1977i. Canada's threatened turtles. Pg 132 in T. Mosquin and C. Suchal (eds.). Canada's Threatened Species and Habitats. Proceedings of Symposium of Canada's Threatened Species and Habitats, co-sponsored by the Canadian Nature Federation and the World Wildlife Fund (Canada) in Ottawa 20-24 May 1976. Canadian Nature Federation Special Publication No. 6: x + 185 pp.
- Campbell, C.A. 1977j. Survival of reptiles and amphibians in urban environments. *Canadian Amphibian and Reptile Conservation Society Bulletin* 14(3):1-4. January-February 1977.

- Campbell, C.A. 1978a. Reproduction and ecology of turtles and other reptiles and amphibians of Lakes Erie and St. Clair in relation to toxic chemicals. Part II: Results, Discussion and Conclusion. Unpublished report. Contract No. CWS 7475/022. Canadian Wildlife Service, Ottawa, Ontario. January 1978. 54 pp.
- Campbell, C.A. 1978b. Some threatened frogs and toads in Ontario. Canadian Amphibian and Reptile Conservation Society Bulletin 16(2):1-2. November-December 1978.
- Campbell, C.A. 1979a. Amphibians and reptiles of the Spooky Hollow Sanctuary (Norfolk County). The Wood Duck.
- Campbell, C.A. 1979b. Preliminary herpetological survey and evaluation of proposed habitat alterations at Big Creek National Wildlife Area, Port Rowan, Ontario. Unpublished report. Contract KL-110. Canadian Wildlife Service, London, Ontario. August 1979. 40 pp.
- Campbell, C.A. 1981. Mosa Township - Middlesex County Forest. The Cardinal 103:5.
- Campbell, C.A. 1982a. Herpetological Survey and Inventory of Breeding and Migratory Birds and Some Mammals at Oshawa's Second Marsh, Oshawa, Ontario. Unpublished report. Technical assistance by D.P. Coulson and M.C. Sharp. Environment Canada, Canadian Wildlife Services, Ontario Region.
- Campbell, C.A. 1982b. Biotic Components of Spooky Hollow Sanctuary and Short Hills Wilderness Area Nature Reserves owned by Hamilton Naturalists' Club. Unpublished report. Hamilton Naturalists' Club. 108 pp.
- Campbell, C.A. 1984. Technical Report summary: GO-ALRT program Hamilton. Unpublished report. Ontario Ministry of Transport and Communications.
- Campbell, C.A. 1991. A status report for the Lake Erie Water Snake (*Nerodia sipedon insularum*) in Canada. Unpublished report. Subcommittee on Amphibians and Reptiles, Committee on the Status of Endangered Wildlife in Canada. 55 pp.
- Campbell, C.A. and D.M. Britton. 1977. Pteridophytes of the Regional Municipality of Waterloo, Ontario. Canadian Field-Naturalist 91(3):262-268.
- Campbell, C.A., A.A. Bryant and D.P. Coulson. 1986. Status, Distribution and Life History Characteristics of Some Uncommon Butterflies of the Carolinian Forest Zone. Unpublished report. World Wildlife Fund (Canada). 125 pp.
- Campbell, C.A. and D.P. Coulson. 1989. Status, distribution and life history characteristics of some butterflies at risk in the Carolinian Forest Zone. Unpublished report. Ontario Ministry of Natural Resources. 74 pp.
- Campbell, C.A., D.P. Coulson, and A.A. Bryant. 1990. Status, distribution and life history characteristics of some butterflies at risk in the Carolinian Forest Zone. Pp. 207-252 in G.M. Allen, P.F.J. Eagles, and S.D. Price (eds.). Conserving Carolinian Canada. University of Waterloo Press, Waterloo. 346 pp.
- Campbell, C.A., K.A. Cowcill, and T.E. Martens. 1997. Changes among the mammals of Wellington County, 1640-1997. Wellington County History 10:63-90.
- Campbell, C.A., A.I. Dagg, M. Dyer, and M.E. Gartshore. 1972. Mammals of Waterloo and South Wellington counties. Privately published. iv + 131 pp.
- Campbell, C.A. and A.I. Dagg. 1976. Bird populations in downtown and suburban Kitchener-Waterloo, Ontario. Ontario Field Biologist 39(1):1-22.
- Campbell, C.A. and G.R. Donaldson. 1980. A Status Report for the Eastern Spiny Softshell Turtle, *Trionyx spiniferus spiniferus*, in Canada. Unpublished report. Ontario Ministry of Natural Resources, Toronto. 50 pp. (Edited and revised in March 1985 by M.E. Obbard).
- Campbell, C.A. and G.R. Donaldson. 1991. Draft status report on the Eastern Spiny Softshell Turtle *Apalone spinifera* in Canada. Unpublished report. Committee on the Status of Endangered Wildlife in Canada. 61 pp.
- Campbell, C.A., B.W. Evered, D.W. Perrin, M.C. Sharp, and B.B. Weller. 1981. The Great Lakes Biogeographic Province: A Canadian Review of Source Material. Unpublished report. Nature Conservancy of Canada, Toronto. 2 volumes.
- Campbell, C.A. and G.R. Francis. 1980. Faunal inventories of natural areas in southern Ontario. Chapter 3.4 (pp 108-117) in S. Barrett and J. Riley (eds.). Protection of Natural Areas in Ontario. Working Paper No. 3, Faculty of Environmental Studies, York University, Downsview, Ontario.
- Campbell, C.A. and L.E. Lamb. 1984. A Preliminary Annotated List of the Plants of the Regional Municipality of Waterloo, Ontario. Privately published. 109 pp.
- Campbell, C.A., L.B. Needham, and S.M. Nevin. 1988. The Mammals of Pelee Island. Pp 150-162 in J.F. Downhower (ed.). The Biogeography of the Island Region of Western Lake Erie. Ohio State University Press, Columbus, Ohio, USA.
- Campbell, C.A. and D.W. Perrin. 1979a. A Status Report for the Blue Racer, *Coluber constrictor foxi*, in Canada. Ontario Ministry of Natural Resources, and

- Committee on the Status of Endangered Wildlife in Canada. 42 pp.
- Campbell, C.A. and D.W. Perrin. 1979b. A survey of the Queen Snake (*Regina septemvittata*) in southwestern Ontario. Unpublished report. Ministry of Natural Resources, Wildlife Branch, Toronto, Ontario. August-September 1979. 62 pp.
- Campbell, C.A. and D.W. Perrin. 1980. The Queen Snake, *Regina septemvittata* (Say) Baird and Girard 1853, in Canada. 23rd Annual Meeting of the Society for the Study of Amphibians and Reptiles, and 28th Annual Meeting of Herpetologists' League. Milwaukee, Wisconsin, USA. August 1980.
- Campbell, C.A. and D.W. Perrin. 1991. Status report on the Racer, *Coluber constrictor*, in Canada. Unpublished report. Subcommittee on Amphibians and Reptiles, Committee on the Status of Endangered Wildlife in Canada. 54 pp.
- Campbell, C.A. and D.W. Perrin. 1997. Status report on the Racer *Coluber constrictor* in Canada, with additions on the Eastern and Western Yellowbelly Racers by J. Malcolm Macartney, and with additions on the Blue Racer by Ben Porchuk. Committee on the Status of Endangered Wildlife in Canada.
- Campbell, C.A. and P.D. Pratt. 1971. Preliminary Pelee Island inventory. Unpublished report. Ministry of Natural Resources, Parks Branch, Toronto, Ontario. 34 pp.
- Campbell, C.A. and A.A. Reznicek. 1977. New vascular plant records on Pelee and East Sister Islands, Essex County, Ontario. Canadian Field-Naturalist 91(4):384-390.
- Campbell, C.A., W.H. Schaefer, and G.D. Donaldson. 1974. A report on biota of parts of Cruickston Park Farm. Appendix 6 in D.C. Lothian. Cruickston Park Farm ecological study. University of Guelph, Guelph, Ontario. Unpublished report.
- Dagg, A.I. and C.A. Campbell. 1975. Studies in urban nature. Bulletin of the Conservation Council of Ontario 22:10-14.
- Dance, K.W. and C.A. Campbell. 1981. Eastern Hognose Snake sighted at Point Pelee National Park, Ontario. Ontario Field Biologist 35(1):40-42.
- Fahselt, D., P. Maycock, G. Winder, and C.A. Campbell. 1979. The Oriskany Sandstone Outcrop and associated natural features, a unique occurrence in Canada. Canadian Field-Naturalist 93(1):28-40.
- Francis, G.R. and C.A. Campbell. 1983. The herpetofauna of Waterloo Region, Ontario. Ontario Field Biologist 37(2):51-86.
- John, R. and C.A. Campbell. 1975. Tentative checklist of amphibians and reptiles of Northumberland-Durham Counties. In A. Goebel, L. Steele, C.A. Campbell, W. Eberlie, R. John, E. McDonald, and R. Parrot (eds.). Flowers, butterflies and herptiles of the Port Hope and Cobourg area, including a revision of the birds. Willow Beach Field Naturalists, Port Hope, Ontario.
- Oldham, M.J. and C.A. Campbell. 1986. Status report on Blanchard's Cricket Frog, *Acris crepitans blanchardi*, in Canada. Unpublished report. Subcommittee on Amphibians and Reptiles, Committee on the Status of Endangered Wildlife in Canada. 79 pp.
- Oldham, M.J. and C.A. Campbell. 1990. Status report on the Blanchard's Cricket Frog, *Acris crepitans blanchardi*, in Canada. Unpublished report. Committee on the Status of Endangered Wildlife in Canada. 31 pp.
- Plourde, S.A., E.L. Szepesi, J.L. Riley, M.J. Oldham, and C.A. Campbell. 1989. Distribution and Status of the Herpetofauna of Central Region, Ontario Ministry of Natural Resources. Ontario Ministry of Natural Resources, Parks and Recreational Areas Section, Central Region, Richmond Hill. OFER SR 8903. iv + 30 pp.
- Sandilands, A.P. and C.A. Campbell. 1987a. Status Report on The Least Bittern, *Ixobrychus exilis*, in Canada. Unpublished report. Committee on the Status of Endangered Wildlife in Canada. 26 pp.
- Sandilands, A. and C. Campbell. 1987b. Le Conte's Sparrow (Bruant de Le Conte), *Ammodramus leconteii*. Pp 454-455 in M.D. Cadman, P.F.J. Eagles, and F.M. Helleiner (compilers.). Atlas of the Breeding Birds of Ontario. University of Waterloo Press. 617 pp.
- Sharp, M.J. and C.A. Campbell. 1982a. Breeding ecology and status of Red-shouldered Hawks (*Buteo l. lineatus*) in Waterloo Region. Ontario Field Biologist 36(1):1-10.
- Sharp, M.J. and C.A. Campbell. 1982b. An Ontario range extension for the Dorcas Copper Butterfly, *Epidemia dorcas* Kirby. Canadian Field-Naturalist 96(2):208-209.
- Weller, W.F., C.A. Campbell, J. Lovisek, B. Mackenzie, D. Servage, and T.N. Tobias. 1979. Additional records of salamanders of the *Ambystoma jeffersonianum* complex from Ontario, Canada. Herpetological Review 10(2):61-62.



ERRATUM: A Summary of Ten Years of the Marsh Monitoring Program for Breeding Amphibians at the Atikokan Generating Station – Table 1

The article “A Summary of Ten Years of the Marsh Monitoring Program for Breeding Amphibians at the Atikokan Generating Station” by **Dan Gregory** was published in TCH Vol. 8 No. (fall 2019) 1 but Table 1 was accidentally omitted. It is provided here.

Table 1. Number of years amphibian species were recorded at a particular call level (CL) by wetland and by month.

Wetland	CL	WOFR			CHFR			SPPE			NLFR			GRTR			GRFR			MIFR			AMTO		
		M	J	Jy	M	J	Jy	M	J	Jy	M	J	Jy	M	J	Jy	M	J	Jy	M	J	Jy	M	J	Jy
MMP - extensive emergent marsh interspersed with submerged aquatics and open water	1	1			1			4	4		5	1	1	1	6	2		9	9						
	2							2																	
	3							4	1																
RW1 - four small interconnected ponds with discontinuous marsh along the margins and interior	1	2			6			1	1		1			1	5		1	4	1					2	
	2							2						2					1						
	3							6																	
RW2 - shallow permanent pond, open water with scattered shallow marsh cover	1	2			3			1	5	1	3	1	1	2	5		8	5							
	2							1						2											
	3							8																	
RW3 - small shallow pond consisting mainly of open water with partial shallow marsh margin	1	1			1			4		1	1			2	1	1	2	1							
	2													4											
	3							10	1					2											
RW4 - two small adjacent ponds with shallow marsh margins and open water interior	1	2			3			1						5											
	2				2			5						2											
	3				1			4						1											
RW5 - sedge meadow-marsh adjacent to open bog, including adjacent ponded ditches	1				4			7	1					3											
	2	2			1	2		1	1					1											
	3				2	1		2																	
RW6 - intermittently ponded shallow depression in broad, open cultural site	1				1	2		2						2											
	2				3	3		1						1											
	3				5	2																			
RW7 - depression in open dredge spoils site varying in water depth, extent, intermittence	1	1			9	2		3	2		1	4		2	8		1						2		
	2							2																	
	3							3																	
RW8 - shaded woodland pond with mainly open water but partial cover by thicket swamp	1							3	2					3											
	2													1											
	3	1						4						1											
RW9 - broad open shallow cattail marsh-shrub thicket swamp complex with local open water areas	1				7			1	1			1		2											
	2							3	1					2											
	3							3	2																
RW10 - old and active beaver ponds with varying extent of open water and shallow marsh communities	1				2			2	2					4	1						1				
	2							1																	
	3							1																	



Calling American Toad (left), Cope’s Gray Treefrog (middle) and Northern Leopard Frog (right). Photos by Joe Crowley (left) and Nick Cairns (middle, right)

FIELD NOTES

A Review of our Knowledge of Chorus Frogs (*Pseudacris*) in the District of Parry Sound, ON

Wayne F. Weller

Associate, Herpetology Section, Department of Natural History, Royal Ontario Museum, Toronto, ON
wayneweller@bell.net

In Eastern Canada, Western Chorus Frogs currently, or at least historically, have been known from the Québec City area of Québec south westward along the St. Lawrence into Ontario. They have extended northward to the Parry Sound area of Georgian Bay, to north of Algonquin Provincial Park along the Ottawa River, and south westward into Essex County and the Niagara Peninsula area (Powell et al. 2016:141). In 2007, the results of a mitochondrial DNA study of Chorus Frogs across North America (Moriarty-Lemmon et al. 2007) indicated that those in western Québec and those in southern Ontario north of approximately the boundary of the Carolinian Forest Region (Rowe 1972) should be referred to as Boreal Chorus Frogs (*Pseudacris maculata*), and those south of this boundary as Western Chorus Frogs (*Pseudacris triseriata*). In 2008 (COSEWIC 2008:13), the boundary between species was represented by a line roughly joining Hamilton, Tillsonburg, Strathroy, and Sarnia – the designable unit to the north being referred to as the Great Lakes / St. Lawrence faunal province, and that to the south, the Carolinian faunal province. More recently, Rogic et al. (2015) and Rogic et al. (2019) have used advanced genetic tests to confirm that Chorus Frogs in south western Québec and eastern Ontario are Boreal Chorus Frogs (*P. maculata*). In the last couple of years the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Canadian Wildlife Service (CWS), and Queens University (Dr. S. Loughheed, Kingston, ON) have partnered to further study this taxonomic issue, and more precisely determine the contact zone of these 2 species in southwestern Ontario.

This past April, I contacted CWS and offered to search for Chorus Frogs in the Parry Sound area where several years ago I had success finding them (Weller and Palermo 1976). Obtaining Chorus Frog tissue from this area (the northern limit of its range in western central Ontario) would be, I believed, a valuable contribution to this project. Prior to conducting field work, I reviewed available sources of locality information in the Parry Sound area and discovered that the information shown on the current 2018 version of the Western Chorus Frog on-line map presented by

Ontario Nature’s Ontario Reptile and Amphibian Atlas (ORAA) program is incomplete.

This map indicates that *P. triseriata* has been reported from 4 UTM squares in the District of Parry Sound (Figure 1, coloured red, yellow, and green). My review, however, indicates that this species is, or has, been known from an additional 8 UTM squares (Figure 1, uncoloured Squares). In total, Chorus Frogs have been reported from 12 squares, and 19 individual localities within these squares (Table 1). The precise locality of these sites is not shown on Figure 1 nor divulged in Table 1 due to the current or future conservation status of Chorus Frogs in Ontario; however, mapping showing the precise locality and a table listing the latitude and longitude of these 19 sites have been forwarded to Ontario Nature. Following the ORAA’s format of colour-coding squares to coincide with time periods, Figure 2 indicates how our current knowledge of Chorus Frogs in the District of Parry Sound should be represented. It is important to note that although the red colour of 9 of the 12 squares indicates that Chorus Frogs have been reported prior to and since 1999, no records have been received since 2001. I searched for Chorus Frogs in many of these areas in 2015 under seemingly very good weather conditions (28 April - 1500hr at 16° C air temperature until 1900hr at 8° C, sunny; 2100–2200hr at 6-7° C; 29 April – 1200-2100hr at 15-10° C, sunny) and in 2019 also under seemingly very good weather conditions (14 May – 1500-2045hr at 14-9° C, sunny; 15 May – 0910-1520hr at 8-16° C) without any success whatsoever. Spring Peepers (*Pseudacris crucifer*) were calling loudly from most areas, as were Leopard Frogs (*Lithobates pipiens*) and Wood Frogs (*L. sylvaticus*) from many areas.

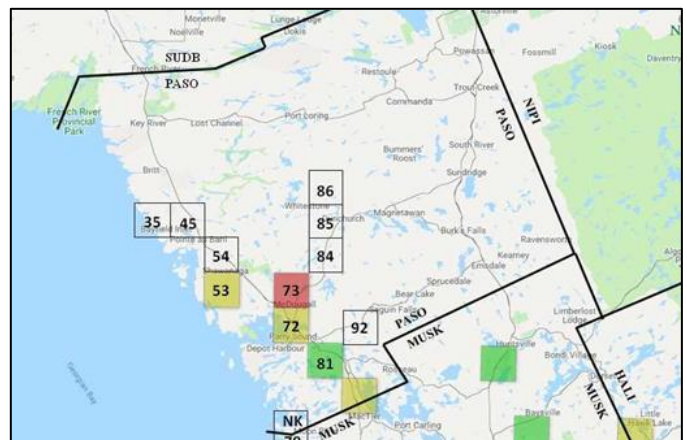


Figure 1. Numbered squares represent UTM Squares (10km X 10km) in the District of Parry Sound (PASO), Ontario within which records of Chorus Frogs have been reported. Coloured squares are as represented in Ontario Nature’s 2018 edition of the Ontario Reptile and Amphibian Atlas (ORAA) for Western Chorus Frog (*Pseudacris triseriata*): red for records prior to 1999 only; yellow for records after 1999 only; green

for records prior to 1999, in 1999, and since 1999. Uncoloured squares contain records which are presented in this paper, but have not been mapped in the 2018 edition of the ORRA mapping. Unnumbered squares (yellow or green) represent Chorus Frog records in adjacent Districts (MUSK = Muskoka; HALI = Haliburton). Other adjacent Districts (NIPI = Nipissing; SUDB = Sudbury) are also shown. All squares are within Grid Zone Designation 17T, and 100,000m Square Identification NL (e.g. 17NL35), except the most southern square in PASO which is 17NK79.

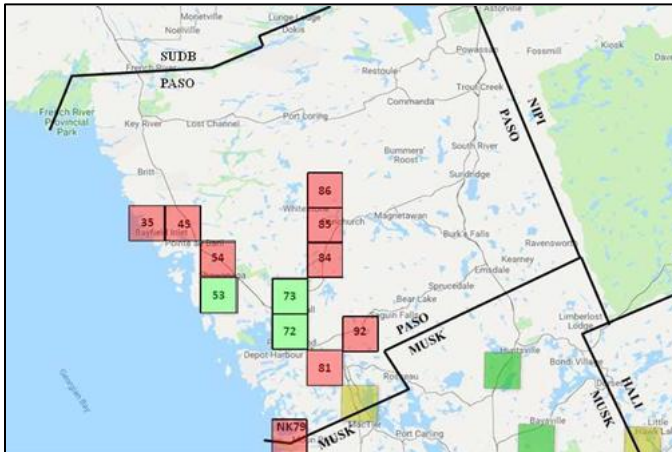


Figure 2. Coloured squares represent our current knowledge of Chorus Frog distribution in the District of Parry Sound following the ORAA format. Square numbers and colours are as in Figure 1.

I would anticipate that reports and peer-reviewed papers will be published when the results of the current study are available. Shortly thereafter, I expect that COSEWIC will update the 2008 version of its assessment and status report (COSEWIC 2008) and include current range maps. It is important, therefore, that all available information on the current and historic range of Chorus Frogs in the area of the District of Parry Sound is consolidated and readily available to authors, researchers and resource managers.

Acknowledgements

I thank Hannah McCurdy-Adams (CWS; currently with Wildlife Preservation Canada), Stephen Lougheed (Queen’s University), and Steven Kell (Shawanaga First Nation) for providing information on the results of the project’s field surveys. I also thank Smera Sukumar (Ontario Nature) for providing information in their files, and permission to use the Western Chorus Frog ORAA map as my base map.

Literature Cited

COSEWIC. 2008. Assessment and update status report on the Western Chorus Frog (*Pseudacris triseriata*) in Canada: Carolinian population and Great Lakes/St.

Lawrence-Canadian Shield population. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Canada. vii + 47 pp.

Moriarty-Lemmon, E., A.R. Lemmon, J.T. Collins, J.A. Lee-Yaw, and D.C. Cannatella. 2007. Phylogeny-based delimitation of species boundaries and contact zones in trilling chorus frogs (*Pseudacris*). *Molecular Phylogenetics and Evolution* 44:1068-1082.

Powell, R., R. Conant, and J.T. Collins. 2016. Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America. 4th Edition. Houghton Mifflin Harcourt. 494 pp.

Rogic, A., N. Tessier, and F.-J. Lapointe. 2019. Genetic characterization of imperiled Boreal Chorus Frogs identifies populations for conservation. *Journal of Herpetology* 53(2):89-95.

Rogic, A., N. Tessier, S. Noël, A. Gendron, A. Branchaud, and F.-J. Lapointe. 2015. A “trilling” case of mistaken identity: mitochondrial DNA identifies chorus frogs in southern Québec (Canada) as *Pseudacris maculata* and not *P. triseriata*. *Herpetological Review* 46:1-7.

Rowe, J.S. 1972. Forest regions of Canada. Publication No. 1300. Canadian Forestry Service, Ottawa. 171 pp.

Simpson, H. 1978. A preliminary life science inventory of O’Donnell Point Candidate Nature Reserve. Unpublished Report. Ministry of Natural Resources, Division of Parks, Algonquin Region, Huntsville, Ontario. 28 pp.

Weller, W.F. and R.V. Palermo. 1976. A northern range extension for the Western Chorus Frog, *Pseudacris triseriata triseriata* (Wied), in Ontario. *Canadian Field-Naturalist* 90(2):163-166.



Calling Boreal Chorus Frog (*Pseudacris maculata*). Photo by Nick Cairns

Table 1. Chorus Frog records representing 19 localities in the District of Parry Sound, Ontario. Vouchered records are in bold italics font. Institutional acronyms for vouchers are as follows: **CM** – Carnegie Museum of Natural History, Pittsburgh, PA, U.S.A; **NMNS** – National Museum of Natural Sciences (currently Canadian Museum of Nature), Ottawa, ON, Canada.

UTM Square	Location	Date	Contributor	Remarks
17NL35	Bayfield Wharf	16 May 1973	W.F. Weller	1 calling
17NL45	Hwy 69/Harris River	30 June 1989	M. Young	1 observed
17NL53	<i>Sand Bay</i>	<i>20 July 1947</i>	<i>P.L. Swanson</i>	<i>2 collected; CM 28622-23</i>
	Dillons Cove	15-16 Apr 2001	J. Niskanen	2 obs 15 Apr; 1 obs 16 Apr
17NL54	Shawanaga Village	13 May 1972	C.A. Campbell	calling loudly
	N of Shawanaga Village	16 May 1973	W.F. Weller	8-10 calling
17NK79	Twelve Mile Bay	1978	Simpson (1978)	reported to author by D. Sutherland
17NL72	Parry Sound area	10 May 1970 & 5 May 1973	C.A. Campbell	several calling
	SW of Waubamik	4 May 1974	W.F. Weller	8 calling
	Parry Sound	30 Apr & 4 May 2001	M. Doyle	calling
17NL73	NE of Waubamik	18 May 1975	W.F. Weller	1 calling
	SSE of Waubamik	12 May 1999	B. Nicholson	2 observed
17NL81	SE of Parry Sound	1996-2001	J.T. Thompson	backyard survey program
17NL84	NW of McKellar	4 May 1974	W.F. Weller	2 calling
17NL85	SW of Dunchurch	4 May 1974	W.F. Weller	1 calling
17NL86	<i>NW of Dunchurch</i>	<i>4 May 1974</i>	<i>W.F. Weller & R.V. Palermo</i>	<i>2 collected; NMNS 15858</i>
	W of Maple Island	18 May 1975	W.F. Weller	3 calling
	<i>Maple Island</i>	<i>18 May 1975</i>	<i>W.F. Weller</i>	<i>3 collected; NMNS 16675</i>
17NL92	Orrville area	2 May 1975	C.A. Campbell	3 calling



Update from the Herpetological Ecology Lab at Lakehead University

Stephen J. Hecnar

Lakehead University
Thunder Bay, ON
shecnar@lakeheadu.ca

Field activities in 2019 were not as extensive as in past years; however, there was some noteworthy progress. We completed our 30th consecutive year of Common Five-lined Skink surveys at Point Pelee National Park. Skink abundance at the site has had its ups and downs over the past three decades (see Hecnar et al. 2015). A steep decline in numbers occurred from 2014 to 2018 as water levels increased in Lake Erie and reached record highs. Much of the beach dune habitat used by skinks and other reptiles was lost over this period because of increased frequency and severity of storm erosion events. We suspect that higher ground water levels in the park may also be flooding hibernaculae as observed in the past (T. Linke, pers. comm.). Skink abundance increased slightly in 2019 suggesting that habitat restoration activities further inland in the park are having a positive effect on the population size. Similar patterns of skink decline over this same time period were observed at Rondeau Provincial Park 70 kms to the east (J. Patterson, pers. comm.). These trends raise concerns over the effects of climate change on reptiles along the shorelines of the Great Lakes and highlight the importance of active management to restore natural open habitats that is being practiced in several parks in the Carolinian region.

We published results of our long-term data on skink clutch size at Point Pelee and compared it with published data from other locations across the species range. We found that clutch size increases significantly with female body size but average clutch size remained stable over time at Point Pelee. Comparing average clutch size with data published from other locations across the species range indicated no geographic trends (Hecnar et al. 2019).

We also documented the first observations of an exotic reptile species in Canada. A Mediterranean Gecko (*Hemidactylus turcicus*) stowaway on a motorhome returning from Florida in April 2018 disembarked at a trailer park in Grand Bend, Ontario where it regularly entertained patrons through the summer (see Hecnar and Hecnar 2019). A lack of observations in 2019 suggests that the individual did not survive the Canadian winter. The expanding range with this and other records across several states in recent years document the propensity of this species for vehicle

dispersal, which will likely increase as the climate warms.

Amphibian fieldwork included the fifth consecutive year of documenting the entire calling season for five species breeding in temporary roadside drainage ditches and ponds along a section of the Trans Canada Highway in Thunder Bay. Not surprisingly, date of first activity, length of calling season, and calling effort varied greatly among years with weather. One trend observed is increased Gray Treefrog activity that concurs with its expanding distribution across Northwestern Ontario. Other projects included collaborating with colleagues studying long-term trends of Central Newt populations in boreal lakes and the geographic distribution of axanthic (blue-coloured) Green Frogs. Many more blue Green Frogs occur in the northeast quadrant of the range than expected (Hecnar et al., unpublished data).



Common Five-lined Skink. Photo by Joe Crowley

References

- Hecnar, S.J., and D.R. Hecnar. 2018. *Hemidactylus turcicus* (Mediterranean Gecko). Dispersal by motor vehicle. *Herpetological Review* 49(4): 742.
- Hecnar, S.J., and D.R. Hecnar. 2019. Clutch size in *Plestiodon fasciatus* near its northern range boundary and variation across the species range. *Herpetological Review*: accepted.
- Hecnar, S.J., D. Brazeau, and D.R. Hecnar. 2015. Tales of Blue Tails: Over 25 Years of Five-Lined Skink Research in Southwestern Ontario. *The Canadian Herpetologist* 5(2):6-9.

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.

Eagle, A. M.Sc. 2019. Brandon University (Supervisor: P. Rutherford).

Wetland habitat use and road mortality of amphibians and reptiles in southwestern Manitoba.

The purpose of my research was to examine amphibian and reptile species' abundances and distributions, with a broader goal of contributing information to mitigation planning to conserve wetland ecosystems within the Prairie Pothole Region of southwestern Manitoba. My main objectives were to 1) determine species' composition, abundance, and distribution in roadside wetlands, 2) determine which habitat factors affect abundance, distribution, and species' composition, 3) assess the impacts of roads on amphibians and reptiles by studying road mortality on different road surfaces, and 4) recommend management and conservation strategies. I surveyed 30 roadside ponds in southwestern Manitoba nearest the towns of Waskada and Coulter for seven amphibian species. I used a combination of visual, auditory, dip net, and funnel trapping methods to determine abundance and distribution across three road segments. I collected habitat data and measured water chemistry (pH, salinity, total dissolved solids, and conductivity) to determine relationships between occurrence and habitat variables. Conductivity, total dissolved solids, and land use were the most influential factors in occurrence. Hotspot analysis revealed two locations of high amphibian occurrence. Roadkill data was collected from 2015 to 2017 including seven amphibian species and six reptile species. Pedestrian surveys along four roads including two paved and two gravel determined locations and magnitudes of roadkills. Reptiles had the most roadkills overall. Roadkill decreased among years but didn't change seasonally. Paved roads had more roadkill than gravel roads. Hotspot analysis revealed two locations with high mortality but these did not correspond to areas with high occurrence. Further research is needed to determine more hotspots and areas that require mitigation. Potential strategies include signage and reduced speed zones, seasonal drift fencing with pitfall traps, and ecopassages.

Kell, S. M.Sc. 2019. Laurentian University (Supervisor: J. Litzgus).

Nesting in close quarters: Causes and benefits of high density nesting in painted turtles.

Nesting is a costly time for female turtles, both energetically and from threat of predation. Females must

ensure maximum survival of offspring for population stability and individual fitness. I observed signs of communal nesting in female Painted Turtles (*Chrysemys picta*). My goals were to determine; are females choosing to nest at high nest-densities, what cues do they use to select nest sites, are offspring benefitted. Using ArcGIS, I found that females nested in clusters, the location of clusters varied among years, and that nest site selection was not strongly determined by environmental characteristics. When female turtle models were placed on the nesting embankment females nested most often with the highest density of models (Figure 1). In ~25% of cases, nests were so clustered that eggs were deposited directly into existing nests or directly beside existing nests. Survival of clustered nests (49%) was higher than that of solitary nests (39%). In incubators, older clutches had faster incubation times, suggesting embryonic communication as a mechanism promoting hatching synchrony. We strongly suggest that female Painted Turtles choose to nest in close proximity to conspecifics, and that this clustering results in a fitness benefit.



Figure 1. Female Painted Turtle nesting between models in Algonquin Park. Flags mark the locations of additional nests. Photo credit: S. Kell.

Mullin, D. M.Sc. 2019. Laurentian University (Supervisor: J. Litzgus).

Evaluating the effectiveness of headstarting for Wood Turtle (*Glyptemys insculpta*) population recovery.

Headstarting is a conservation strategy that assumes raising hatchling turtles to larger body sizes increases their survivorship compared to wild non-headstarted turtles. This increased survivorship should increase population growth rate relative to wild recruitment. There are, however, few published results of long-term population recovery using headstarting. The lack of

demographic assessment of population recovery has led to an overall lack of quantitative assessment of the effectiveness of headstarting as a conservation action. Headstarting needs to be efficient and effective as a poorly executed headstarting project can result in species extinction given it is often used with critically endangered species. We released 3 cohorts of headstarted Wood Turtles (*Glyptemys insculpta*) with varying degrees of headstarting to determine if headstarting increases survivorship (Figure 1). I showed that headstarting turtles to a larger body size confers a survival advantage, and this survival advantage should increase population growth rate relative to wild recruitment. I then quantitatively assessed the effectiveness of a 15-year Wood Turtle headstarting program by modeling population-specific demographic parameters to evaluate recovery efforts, and determine the next phase of recovery. I found some evidence of population recovery, but also identified challenges and make several management recommendations that should enhance the success of the headstarting program. Overall, I have provided support for headstarting as an effective conservation strategy, with the caveat that all headstarting projects must be paired with management plans that maintain high adult and juvenile survival.



Figure 1. Wood turtles outfitted with radio transmitters. From left to right: wild adult, head-started adult, head-started juvenile, direct-release hatchling. Photo credit: D. Mullin.

Philpott, S. M.Sc. 2019. Brandon University (Supervisor: P. Rutherford).

Landowner attitudes and *Ambystoma tigrinum* larvae as bioindicators of healthy agricultural wetlands in southeastern Manitoba.

Amphibians are in a global state of decline. Habitat destruction and alteration for development and agriculture are among the causes for these declines. Livestock watering wetlands may represent an amphibian refuge in an otherwise barren landscape dominated by historical wetland drainage. This thesis focused on 1) the Endangered *Ambystoma tigrinum* at the northern extent of the North American range in

southeastern Manitoba, Canada, and 2) how regional landowners value and manage wetlands on their property. The main goals of this thesis were to 1) determine if barriers between livestock positively impacted breeding activities for *Ambystoma tigrinum* and amphibian community abundance at isolated depressional wetlands in southeastern Manitoba and 2) determine which demographic variables predict pro-environmental attitudes and environmentally sensitive management practices in landowners in Manitoba. I monitored amphibian breeding activity and water chemistry at wetland sites (n = 30) over two breeding seasons (2017 and 2018) and administered landowner surveys (n = 77) across southern Manitoba, including within the Seine-Rat River Conservation District. Generalized Linear Models were used to understand the effect of environmental and survey response factors from Principal Components Analyses. The results indicated that artificial and modified wetlands used for agriculture, when properly managed, can provide amphibian breeding habitat when natural wetlands are scarce. Additionally, landowners with higher levels of education, median incomes and proximity to protected areas are more likely to exhibit pro-environmental attitudes than landowners with lower levels of education.



Blotched Tiger Salamander. Photo by Nick Cairns

Sowers, R.M. H.B.E.M. 2018. Lakehead University. (Supervisor: S.J. Hecnar).

The effects of biogeographic factors on the persistence and distribution of the Common Five-lined Skink in southern Ontario.

The management of biogeographic factors associated with species at risk populations is an excellent conservation tool if the effects of such factors are thoroughly understood. Biogeographic factors, or habitats, such as prairie/savannah remnants and sandy

shorelines, and their effects on the distribution of the Common Five-lined Skink populations in Ontario, were analyzed. Results indicate strong effects of varying degrees from both biogeographic factors on the two skink populations, the Great Lakes – St. Lawrence and the Carolinian population, indicating that these habitats influence the distribution of this lizard species. The effects of said biogeographic elements changed between each population, implying that variations in latitude lead to changes in critical habitat. Within each population extant and extirpated/historical locations showed no significant variation in proximity to sandy shoreline and prairie/savannah habitat. This indicated that extant populations have not survived due to closer proximity to essential habitat, and the isolation of local populations has remained consistent, leading to long-term extinction rates which prevent recolonization (non-equilibrium metapopulations). Considering these biogeographic elements as critical requirements allows for more effective habitat management tactics for the Common Five-lined Skink to prevent future population losses. Ultimately, biogeographic components associated with species at risk can be a useful addition to habitat management used in the conservation of any species.

Zagorski, G. M.Sc. 2019. Laurentian University (Co-supervisors: J. Litzgus and D. Boreham).

Using spatial ecology data to inform development and mitigation of a trap rock quarry in Blanding's turtle (*Emydoidea blandingii*) habitat.

Mining practices can negatively impact turtles through degradation of wetlands and surrounding upland habitat, alteration of movement corridors, accidental mortality, and increased risk of nest and turtle predation. These impacts, in turn, can cause changes in patterns of energy allocation, skewed sex ratios and changed demography, which may ultimately lead to population declines. The aim of my study was to describe the demography of, and identify critical habitat for, a population of globally-endangered Blanding's turtles (*Emydoidea blandingii*) inhabiting an area of interest for development of a trap rock quarry. In addition to generating important knowledge about population ecology and habitat use, my study can serve as the "before" study in a Before-After Control-Impact (BACI) study quantifying impacts of quarrying on turtles. Using radiotelemetry, GPS dataloggers, and capture-mark-recapture surveys, data were collected at an impact (quarry) site and a control site, and thermal data were collected during overwintering using iButtons. I captured 56 turtles at the impact site and 13 at the

control site, and estimated population sizes were 79.6 +/- 17.9 (1.84 turtles/ha) and 16.0 +/- 21.2 (0.32 turtles/ha), respectively. Body size was larger at the control site, but body condition was similar at both sites. Daily distances moved and home range sizes did not differ between sites, and were generally smaller than conspecific values reported in the literature. I identified nesting (15 impact, 2 control) and overwintering (12 impact, 7 control) sites, both considered critical habitats. Overwintering water depth ranged from 30-150 cm (before ice-on) and turtles overwintered at temperatures reported previously in the literature (1.5 to 0.5 °C). My data can be used to quantitatively inform quarry development and mitigation strategies, essential components to balancing the needs of species at risk and humans.



Blanding's Turtle. Photo by Scott Gillingwater

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.

- Boyle, S.P., R. Dillon, J.D. Litzgus, and D. Lesbarrères. 2019. Desiccation of herpetofauna on roadway exclusion fencing. *Canadian Field-Naturalist* 133(1): 43-48. <https://doi.org/10.22621/cfn.v133i1.2076>.
- Brazeau, D.J., and S.J. Hecnar. 2018. Summer movements of the Common Five-lined Skink (*Plestiodon fasciatus*) in the northern portion of its range. *Herpetological Conservation and Biology* 13(3): 743-752.
- Cicchino, A.S., N.A. Cairns, G. Bulté, and S.C. Lougheed. High and dry: Trade-off in arboreal

calling in a treefrog mediated by local environment. Behavioral Ecology.

<https://doi.org/10.1093/beheco/arz169>.

Dillon, R.M., S.P. Boyle, J.D. Litzgus, and D. Lesbarrères. 2019. Build it and some will use it: A test of road ecopassages for Eastern Gartersnakes. Journal of Herpetology (accepted 5 August 2019; ms# 18-163R).



Eastern Gartersnake. Photo by Joe Crowley

Francis, E.A., P.D. Moldowan, M.A. Greischar and N. Rollinson. 2019. Anthropogenic nest sites provide warmer incubation environments than natural nest sites in a population of oviparous reptiles near their northern range limit. Oecologia 190(3): 511-522.

Hawkshaw, D.M., P.D. Moldowan, J.D. Litzgus, R.J. Brooks, and N. Rollinson. 2019. Discovery and description of a novel sexual weapon in the world's most widely-studied freshwater turtle. Evolutionary Ecology (In press; ms# EVEC-D-18-00118R2).

Heaven, P.C., J.D. Litzgus, and M.T. Tinker. 2019. A unique barrier wall and underpass to reduce road mortality of three freshwater turtle species. Copeia 107(1): 92-99.

Hecnar, S.J., D.R. Hecnar, D.J. Brazeau, J. Prisciak, A. MacKenzie, T. Berkers, H. Brown, C. Lawrence, and D. Dobbie. 2018. Structure of coastal zone herpetofaunal communities in the southern Laurentian Great Lakes. Journal of Herpetology 52(1): 19-27.

Hecnar, S.J., and D.R. Hecnar. 2018. *Hemidactylus turcicus* (Mediterranean Gecko). Dispersal by motor vehicle. Herpetological Review 49(4): 742.

Hecnar, S.J., and D.R. Hecnar. 2019. Clutch size in *Plestiodon fasciatus* near its northern range boundary and variation across the species range. Herpetological Review (Accepted).

Hecnar, S.J. 2019. Salamanders of the Thunder Bay Area. Section In: Thunder Bay Nature Guide. Thunder Bay Field Naturalists (In press).

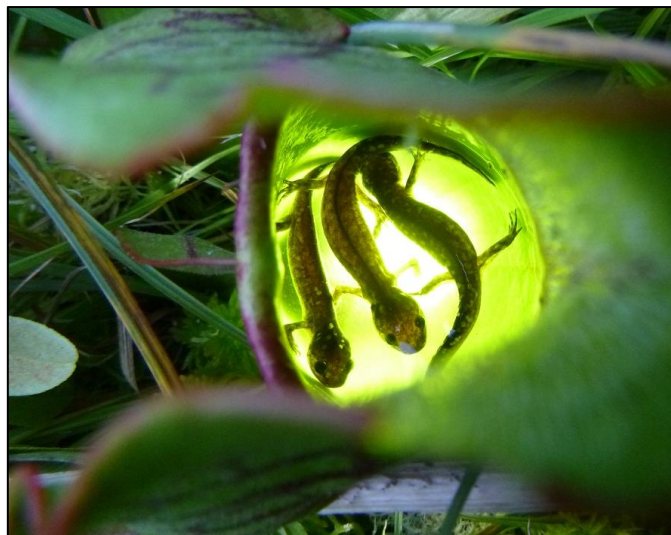
Hecnar, S.J. 2019. Do green frogs get the blues? ON Nature magazine. Invited manuscript. (In press).

Hughes, G.N. and J.D. Litzgus. 2019. Impact of natural resource extraction on thermal properties of wood turtle (*Glyptemys insculpta*) habitat. Journal of Thermal Biology. (doi: 10.1016/j.jtherbio.2019.07.031).

Hughes, G.H., M.Q. Kennedy, and J.D. Litzgus. 2019. Preliminary assessment of the success of rehabilitation in snapping turtles (*Chelydra serpentina*) through post-release measures of spatial behavior and body condition. Herpetological Review 50(1): 58-62.

Loder, A.L., R. Weeber, S.N.P. Wong, I.S. Spooner and M.L. Mallory. 2019. Correlates of waterbody characteristics and the occurrence or diversity of larval amphibians in central Ontario, Canada. Bulletin of Environmental Contamination and Toxicology 103: 571-578.

Moldowan*, P.D., M.A. Smith*, T. Baldwin, T. Bartley, N. Rollinson and H. Wynen. 2019. Nature's pitfall trap: Salamanders as rich prey for carnivorous plants in a nutrient-poor northern bog ecosystem. Ecology 100(10): e02770. *equal contributions.



One is lonely, two is company, and three is crowded. Metamorphic Spotted Salamanders (*Ambystoma maculatum*) trapped in the leaf of a Northern Pitcher Plant (*Sarracenia purpurea purpurea*), Algonquin Provincial Park. Photo by Patrick Moldowan

Moore, M.N. and S.J. Hecnar. 2018. *Anaxyrus americanus* (American Toad) Electric fence mortality. Herpetological Review 49(2): 299.

Myette, A., T.J. Hossie and D.L. Murray. 2019. Defensive posture in a terrestrial salamander deflects predatory strikes irrespective of body size. Behavioral Ecology

<https://doi.org/10.1093/beheco/arz137>.

Paterson, J.E., J. Baxter-Gilbert, F. Beaudry, S. Carstairs, P. Chow-Fraser, C.B. Edge, A.M. Lentini, J.D.

- Litzgus, C.E. Markle, K. McKeown, J.A. Moore, J.M. Refsnider, J.L. Riley, J.D. Rouse, D.C. Seburn, J.R. Zimmerling, and C.M. Davy. 2019. Road avoidance and its energetic consequences for reptiles. *Ecology and Evolution* (doi: 10.1002/ece3.5515).
- Winton, S.A., R. Taylor, C.A. Bishop, and K.W. Larsen. 2018. Estimating actual versus detected road mortality rates for a northern viper. *Global Ecology and Conservation* 16:e00476. <https://doi.org/10.1016/j.gecco.2018.e00476>
- Valenzuela, N., R. Litterman, J. Neuwald, B. Mizoguchi, J. Iverson, J.L. Riley, and J. Litzgus. 2019. Extreme thermal fluctuations from climate change to unexpectedly accelerate demographic collapse of vertebrates with temperature-dependent sex determination. *Scientific Reports* 9: 4254 (doi: 10.1038/s41598-019-40597-4).
- Zagorski, G.Z., D.J. Boreham, and J.D. Litzgus. 2019. Endangered species protection and evidence-based decision-making: Case study of a quarry proposal in endangered turtle habitat. *Global Ecology and Conservation* <https://doi.org/10.1016/j.gecco.2019.e00751>
- Zagorski, G., D. Boreham, and J.D. Litzgus. 2019. *Emydoidea blandingii* (Blanding's Turtle). Feeding. *Herpetological Review* 50(1): 121.

recipient is **Anne Yagi**, an independent consultant and founder of 8Trees Inc., who worked in the field of amphibian and reptile conservation with the Ontario Ministry of Natural Resources and Forestry for over 30 years. Anne started to focus on projects monitoring and protecting species-at-risk populations in the 1990s, including populations of Eastern Massasauga Rattlesnake, Spotted Turtle, Fowler's Toad, and Allegheny Mountain and Northern Dusky Salamanders. She is currently the Chair of the Fowler's Toad and Dusky Salamander Recovery and Implementation teams, and a member of recovery teams for the Peregrine Falcon, Bald Eagle, Ontario turtles, and Massasauga Rattlesnake. Anne documented population declines, developed the "life-zone" concept for understanding subterranean winter survival, and designed ecosystem experiments aimed at establishing and encouraging winter habitat restoration for Massasauga Rattlesnakes over 15 years of dedicated research. She has mentored and employed numerous field assistants, providing them with unique experiences to study and protect many of Ontario's species-at-risk. Through her efforts as founder of 8Trees Inc., Anne has developed outreach programs with local communities to promote awareness of sensitive breeding habitat for Fowler's Toads, citizen science efforts for species-at-risk, and is always a valiant defender of herps and their habitats throughout Southern Ontario.

NEWS AND ANNOUNCEMENTS

2019 CHS Award Recipients

Amanda Bennett
Oxford Mills, Ontario
abenne03@gmail.com

Each year, CHS takes great pleasure in recognizing the significant and meaningful contributions made by members of the Canadian herpetological community to the study and conservation of amphibians and reptiles in Canada. Annual recognition awards are given to deserving recipients, identified from nominations made by the CHS membership and the local organizing committee. A call for nominations is made via email to the membership in the month(s) preceding the annual conference, but nominations can be forwarded to the Awards Committee at any time during the year (check out our [CHS Awards page](#) for more information or contact canadianherpetology@gmail.com).

The Blue Racer award recognizes the cumulative contributions over a number of years to the conservation of amphibians and/or reptiles in Canada. This year's



Katherine Yagi (middle) and Jackie Litzgus (right) presenting the Blue Racer Award to Anne Yagi (left). Photo by Joe Crowley

The Silver Salamander award is presented to an individual or organization in recognition of a specific contribution to the conservation of amphibians and/or reptiles in Canada. This year, CHS recognizes the **Ecomuseum Zoo** for their long and outstanding support of herpetological research and conservation in Québec. The Ecomuseum, opened in 1988, with a goal of focusing the education, research, and conservation activities of the Saint-Lawrence Valley National

Historic Society. As a major partner with the provincial government, the Ecomuseum Zoo supports and coordinates the Atlas of Amphibians and Reptiles of Québec (AARQ), which acts as the information source for the Centre de données sur le patrimoine naturel du Québec (CDPNQ), and informs the preparation of species status reports that help guide habitat conservation. Over the years, the Ecomuseum Zoo's Research and Conservation team has led and assisted with projects on Northern Map Turtle, Eastern Musk Turtle, and Spiny Softshell populations, including the release of 475 softshell hatchlings incubated from eggs rescued from flooding at one of only two known nesting sites in Québec. In 2014, the Ecomuseum Zoo collaborated with the Biodôme de Montréal and the University of Ottawa to develop a captive breeding program for the Western Chorus Frog, which was listed as vulnerable in Québec in 2000 and has been subject to continued breeding habitat loss and fragmentation. The Ecomuseum Zoo continues to be instrumental in public outreach and education on reptile and amphibian conservation in Québec, producing publicly available guidebooks and information on practical conservation solutions.



David Green (right) presenting the Silver Salamander Award to Jérémie Maranda (left). Photo by Joe Crowley

The E.B.S. Logier Communication award is presented to an individual or organization in recognition of a significant contribution to the research and/or conservation of amphibians and reptiles in Canada through the publication of hard copy, digital, or other means of text or visual-based communication. **The Ontario Reptile and Amphibian Atlas (ORAA)** is a province-wide, citizen-science initiative run by **Ontario Nature** that has been engaging researchers, conservation practitioners, and members of the public in amphibian and reptile conservation and research in Ontario. Over the 10-year program, the ORAA gathered 261,730 new amphibian and reptile occurrences, representing a 3-fold

increase to the provincial record. The success of the atlas includes broad education and engagement of tens of thousands of people through its website and Facebook page, and the establishment of local area coordinators and champions throughout Ontario, helping to formalize a provincial network of reptile and amphibian citizen scientists. These networks and social media tools have provided an invaluable forum for people to share ideas and ask questions, engaging the public in amphibian and reptile education and conservation at a scale that is truly unique to Canada. Through its public communications tools, the ORAA has become a definitive source for amphibian and reptile information in Ontario, including dynamic range maps and real-time advice and answers from Ontario's professional herpetological community. The ORAA will have a profound and long-lasting benefit for the conservation of Ontario's amphibians and reptiles, making Ontario Nature a deserving recipient of the E.B.S. Logier Communications Award for their efforts in developing and implementing this program.



Joe Crowley (right) presenting the E.B.S. Logier Communication award to Smera Sukumar (left). Photo by Joe Crowley's camera

In addition to the Annual Recognition Awards, we also recognize the best student platform and poster presentations at the annual CHS conference. Many thanks to Leslie Anthony, Connie Browne, Christina Davy, Yohann Dubois, Tom Herman, Matt Keevil, Julie Lee-Yaw, David Lesbarrères, Steve Marks, Hannah McCurdy-Adams, Damien Mullin, James Paterson, Pam Rutherford, Katharine Yagi, and Gabby Zagorski for providing their valuable feedback as volunteer judges. As always, it is a challenge to identify a winner among the many fascinating and excellent presentations given by our student membership each year. Thanks to all participants for sharing their research with us. The 2019 student presentation award winner is **Katie Ellsworth**, for her talk entitled "Knowledge and opinions of turtle

road mortality mitigation efforts on Hwy 69, Ontario”. The 2019 student poster award winner is **Morgan Skinner**, for his poster entitled “Individual differences in sociability and boldness in Eastern Garter Snakes”. Congratulations to the 2019 award recipients; we look forward to hearing about more student research at the 2020 meeting in Sudbury.

To help students get to the conference, CHS provides travel bursaries (valued at \$250 each) to a randomly drawn subset of applicants who present either a platform or poster at the conference, are travelling greater than 500 km to be there, and are CHS members. This year’s travel bursary recipients were Jared Connoy, Katie Ellsworth, Carter Rouleau, Hayley Vlcek, Heather Van Den Diepstraten, and Morgan Skinner. Travel award bursary applications are due by August 31st of each year — be sure to submit your application to take advantage of this opportunity.

Congratulations to all of this year’s award recipients, and thank you for your ongoing dedication and contribution to the field of herpetology in Canada.



2020 CHS Conference in Sudbury, ON

Jackie Litzgus

Laurentian University, Sudbury, ON

jlitzgus@laurentian.ca

SAVE THE DATE! The Canadian Herpetological Society will hold its 2020 conference and annual general meeting at Laurentian University in Sudbury, nestled among over 300 lakes in Northern Ontario, on **September 11-13, 2020**. The talks will take place in the newly-renovated Classroom Building, the banquet will be held in the Vale Cavern at Science North (<https://www.sciencenorth.ca/facility-rentals>), preceded by a cocktail hour on the live animal exhibit floor. From the Science North website: “The Vale Cavern is the most iconic and extraordinary space in the city. Where else can you dine, dance, or conduct a meeting inside a cave blasted out of solid rock?” There is also an airplane hanging from the ceiling... seriously. A block of hotel rooms has been reserved at the Travelway Inn (<http://travelwayinnsudbury.com/>) across the road from Science North. The meeting will be co-hosted by David Lesbarrères and Jackie Litzgus. We look forward to welcoming you all to the Big Nickel!



Ontario Reptile and Amphibian Atlas data in action: Identifying records that represent genotypes of Ontario’s *Ambystoma* complex salamanders

**Brittney Vezina¹, Wayne F. Weller²,
and Smera Sukumar¹**

¹ Ontario Nature, Toronto, ON

(csintern@ontarionature.org;
smeras@ontarionature.org)

² Niagara Falls, ON (wayneweller@bell.net)

The Ontario Reptile and Amphibian Atlas (ORAA) was launched by Ontario Nature in 2009 with the goal of understanding the presence and distribution of reptile and amphibian species across Ontario. This citizen science program engaged both members of the public interested in the province’s herpetofauna, and naturalists, researchers and scientists alike to report their observations to Ontario Nature. Over the 10-year lifespan of the ORAA, Ontario Nature has compiled almost 262,000 records. Earlier this year, the data collection phase of the ORAA came to a close as the project transitioned from compiling records to data analysis in an effort to help identify significant trends and conservation implications using not only the records in this extensive database, but also the 147,000 records compiled by the Ontario Herpetofaunal Summary.

Our first task was to compile and sort through all *Ambystoma* complex salamander records in the database with the purpose of identifying those which represented the various members of the complex. This complex is represented by 4 bisexual species (Jefferson Salamander, *A. jeffersonianum*; Blue-spotted Salamander, *A. laterale*; Small-mouthed Salamander, *A. texanum*, and Eastern Tiger Salamander, *A. tigrinum*), and several polyploid unisexual genotypes. These individuals are extremely difficult to identify without genetic testing, which makes understanding their distribution in the province challenging. In order to address this deficiency, we teamed up with Dr. Jim Bogart (University of Guelph) and Amy Lathrop (Royal Ontario Museum) to compile and identify genotype and location information for as many of the over 6,800 records as possible. Of this total, the genetic information for over 2,000 records is attributed to Dr. Bogart.



Two species in the *Ambystoma* complex – the Jefferson Salamander (top) and Blue-spotted Salamander (bottom). Photos by Joe Crowley

We are excited to announce that we have completed this task. For 38.8% of the records in this database, both genotype and digital location are now highlighted. For 0.4% of the records, the genotype is known but unfortunately not the location. For the remaining 60.8% of the records, the location is known but the genotype cannot be assigned because either they represent observations, or the specimens were collected prior to having the technology to determine genotype. As a result of the efforts put into this task, it is now possible to list and map the distribution in Ontario of all salamanders of this complex, and that of any of the various genotypes of this complex. It is our hope that this is just the beginning of increasing our knowledge of the distribution of the salamanders of this complex, and will assist in furthering the efforts to conserve these salamanders in Ontario.

We extend our sincere thanks to Dr. Jim Bogart and Amy Lathrop for their valuable contributions to the success of our efforts, and to all ORAA participants for contributing observations to the database. If you are interested in learning more about this database, please contact Smera Sukumar at Ontario Nature.



Assembly and Dissolution of an Ontario Herpetological Bibliography

Wayne F. Weller¹, Michael J. Oldham²,
and Amy Lathrop³

- ¹ Associate, Herpetology Section, Department of Natural History, Royal Ontario Museum, Toronto, ON.
Email: wayneweller@bell.net
- ² Provincial Botanist, Ontario Natural Heritage Information Centre (NHIC), Ministry of Natural Resources and Forestry, Peterborough, ON. Email: michael.oldham@ontario.ca
- ³ Herpetology Technician, Department of Natural History, Royal Ontario Museum, Toronto, ON.
Email: amyl@rom.on.ca

When the Ontario Herpetofaunal Summary (OHS) was initiated in 1984, the goal was to assemble observations of amphibians and reptiles in Ontario into a database that would provide up-to-date dot-distribution maps (e.g. Oldham and Sutherland 1986, Oldham 1988, Weller and Oldham 1988) and could serve to update the maps presented in Logier and Toner (1961). Naturalists and people with a keen interest in amphibians and reptiles were encouraged to submit to the OHS any information stored away in their personal field journals and any future observations they would acquire. The OHS program was intended initially to run for five years (1984-88) similar to the highly successful first Ontario breeding bird atlas conducted over 1981-85 (Cadman et al. 1987). As the fifth and anticipated final year of the program approached, two of us (MJO and WFW) thought that the effort to assemble information should include locality information extracted from peer-reviewed journals, conservation organization publications, and government and consultant reports. Attempts were made by both of us to borrow or acquire reprints and reports, and add appropriate information to the database. It was decided that a bibliography of such material should be assembled and stored away for safe keeping.

Acquiring literature material and incorporating locality information continued long past the fifth year of the program. At the end of 2004, just over 1730 publications and reports had been assembled, and the relevant information extracted and added to the OHS database. We estimate that roughly 75-80% of all

publications and reports were copied and stored for safe keeping – one set kept by MJO, the other by WFW.

With the creation of the Ontario Natural Heritage Information Centre (NHIC) in Peterborough in 1993, the entire MJO collection of the OHS bibliography was incorporated into the NHIC Library and has been kept up to date with the addition of more recent reports and publications. The NHIC maintains extensive hard-copy and digital files of published and grey literature related to the flora, fauna, and natural areas of Ontario. Hard-copy herpetology literature is filed by species as well as by county (for species checklists, natural area reports, etc.) in both manual and digital files. Access to the NHIC Library, including the herpetological material is by appointment only – contact NHIC on-line through NHICrequests@ontario.ca or by telephone (705-755-2159). Items cannot be removed from the Library. Access to some documents containing precise locality information for species at risk may be restricted.

After 2004, the WFW collection remained dormant and in safe storage in private residences. No additions to this collection were made. In 2018, it was decided to donate some of the material to the Royal Ontario Museum. Since much of this collection included reprints and photocopies of papers published in journals which are currently available on line, this material was discarded. The remaining material, mostly significant government and consultant reports, etc. was donated to the Library at the Royal Ontario Museum, and is available to review. Requests for access can be made to the ROM Library & Archives with reference to Special Collection SC 189.

Literature Cited

- Cadman, M.D., P.F.J. Eagles, and F.M. Helleiner. 1987. Atlas of the Breeding Birds of Ontario. Jointly produced by the Federation of Ontario Naturalists and the Long Point Bird Observatory. 617 pp.
- Logier, E.B.S. and G.C. Toner. 1961. Check List of the Amphibians and Reptiles of Canada and Alaska. Contribution No. 53, Life Sciences Division, Royal Ontario Museum, Toronto. 92 pp.
- Oldham, M.J. [Ed. & Comp.]. 1988. Ontario Herpetofaunal Summary 1985. World Wildlife Fund Canada, Essex Region Conservation Authority, and Ontario Ministry of Natural Resources. 206 pp.
- Oldham, M.J. and D.A. Sutherland [Eds.]. 1986. Ontario Herpetofaunal Summary 1984. Essex Region Conservation Authority, and World Wildlife Fund Canada. 214 pp.
- Weller, W.F. and M.J. Oldham [Eds.]. 1988. Ontario Herpetofaunal Summary 1986. Ontario Field Herpetologists. 221 pp.



American Bullfrog (*Lithobates catesbeianus*) lakeside, Algonquin Provincial Park. Photo by Patrick Moldowan.



Smooth Greensnake. Photo by Nick Cairns



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

CHS/SHC MEMBERSHIP FORM

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

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

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

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

Total Amount Paid: _____

Please make cheques or money orders payable to Jose Lefebvre

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

Your Information:

Title: _____ First Name: _____ Last: _____

Institution/Affiliation: _____

Department/Section: _____

PO box / Unit / Building: _____

Street Address: _____

City: _____

Province / State: _____

Country: _____

Postal / Zip code: _____

Email: _____

Phone: _____ Fax: _____