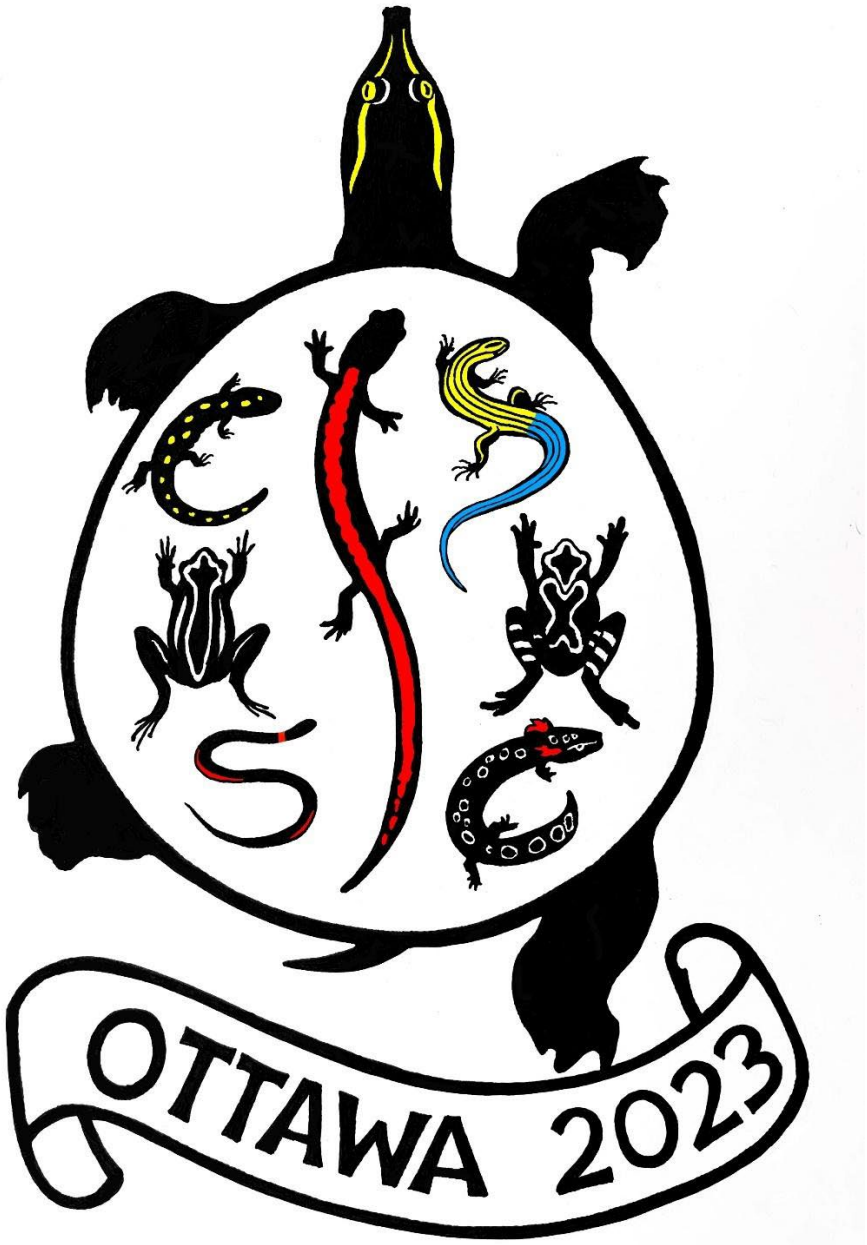
10th Annual Meeting of the Canadian Herpetological Society

10ème Congrès Annuel de la Société d'Herpétologie du Canada



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Welcome

On behalf of the CHS Meetings and Workshops Committee, welcome to the city of Ottawa, Ontario, for the 10th Annual Meeting of the Canadian Herpetological Society/Société d'Herpétologie du Canada. This year's meeting continues a long-standing tradition of annual meetings to promote research and conservation of amphibians and reptiles in Canada. We are excited to host everyone either virtually or in-person in Ottawa.

CHS Conference Organizing Committee

- Christina Davy (Chair, Local Organizing Committee)
- Amanda Bennett (Vice President, Canadian Herpetological Society)
- Pamela Rutherford (Chair, Meetings and Workshop Committee)Tyler Ambeau
- Daphnée Bernier
- Sean Boyle
- Greg Bulté
- Joe Crowley
- Rachel Dillon
- Jeffrey Ethier
- Jeff Hathaway
- Rosie Heffernan
- Aleta Karstad
- Claudia Lacroix
- Hannah McCurdy-Adams
- Reta Meng
- Caitlin Menzies
- Tori Miller
- Kelsey Moxley
-
- Fred Schueler
- David Seburn

Logo Design: Aleta Karstad

T-Shirts: Printed by Nish Tees

Carleton University
Our conference venue is Carleton University (1125 Colonel By Dr, Ottawa, ON), which is located on the traditional and unceded territories of the Algonquin Nation.

The Friday workshop will be held in Southam Hall (Room 520). Saturday and Sunday registration, talks, breaks, and the poster session will be in Richcraft Hall in the Richcraft Atrium, Theatre (RB2200), and Conference Space (RB2220/2224). Richcraft Hall has men's and women's washrooms available in the Atrium and a gender inclusive washroom next door on the second floor of the Steacie Building. The banquet will be hosted at Teraanga Commons (on campus). Teraanga Commons has men's and women's washrooms on the second floor and a gender inclusive washroom on the first floor.

A Campus Map is available on the last page of this program.

Internet (Wifi) access:

Select the following network: CU-Wireless Network
Username: CarletonGuests
Domain: net.carleton.ca
Password: RavensCU23!

Silent Auction and Book Raffle
Funds raised from the silent auction and book raffle help CHS/SHC deliver student awards and student travel bursaries — so please bid! The silent auction opens on Saturday 16 September at the start of lunch (12:00) and closes on Sunday 17 September at the end of lunch (13:30). The silent auction will be held in Richcraft Hall.

*Note that t-shirt sales (Sunday only), cash bar (for the Poster session and Banquet), silent auction, and book raffle purchases are **CASH ONLY.***

ScotiaBank ATMs are available on campus at several convenient locations (see campus map on last page):

- Nideyinàn – 1st Floor
- Nideyinàn – 4th Floor
- Teraanga Commons
- Gymnasium Complex

Meals
Light refreshments will be provided during morning and afternoon breaks in the Richcraft Hall Atrium. **Conference attendees are responsible for bringing or purchasing their own lunches.** A variety of options are available on campus:

- Starbucks in Teraanga Commons (Saturday 10am to 6pm, Sunday 9am to 4pm)
- Tim Hortons in Carleton Athletics (Saturday and Sunday 8:30am to 3pm)
- Ollie's Pub in Nideyinàn (Saturday 11am to 5pm)
- Residence Cafeteria on the 3rd floor of Teraanga Commons (Saturday and Sunday 7:30am to 10pm, where lunch and dinner are $14.25 (+tax) and all-you-can-eat, pay with debit or credit)

Off-campus options are approximately 1.5 to 2 km away and include McDonalds and Tim Hortons at the corner of Bronson and Renfrew, as well as several pubs and restaurants on Bank Street (e.g., Patty's Pub and Quinn's Ale House are approx. 1.2 km away on Bank St. just south of Grove Ave).

Travel to/from Carleton University

Pay and display parking is available on-campus. All visitor parking areas on campus are programmed based on the rate of $4.50 per hour time period. Core/premium parking areas (Lot P1, P16) are enforced as four-hour maximum parking limit areas. **Weekend rates (Daily) Saturday or Sunday are $6.00 (all-day).**

The campus is also accessible via **public transit**. Visit https://www.octranspo.com/ for more information on public transit routes and fares, and to plan your trip.

For folks who might be looking for **carpool, Uber sharing, or walking buddies** to/from nearby hotels and conference events, please check out this shared Google spreadsheet organized by Scales Nature Park: Carpool rideshare walking group organizer sheet for CHS2023 - Google Sheets

Health and Safety

We will provide masks at the registration desk, and encourage participants to wear masks at their own discretion. There is no mask mandate at Carleton University, but CHS recognizes that COVID-19 is on the rise in the Ottawa area. If you are experiencing symptoms of COVID-19, please stay home (or in your hotel room), and contact CHS2023@canadianherptology.ca for the Zoom link and a refund of your in-person registration fees.

Canadian Herpetological Society

The Canadian Herpetological Society (canadianherpetology.ca) is a registered Canadian charity that advances reptile and amphibian research and conservation in Canada by:

- promoting scientific research on reptiles and amphibians and disseminating the results;
- facilitating collaboration among amateur and professional herpetologists;

- advancing public understanding of our native reptile and amphibian species, the threats they face and the conservation solutions that exist; and
- promoting, supporting, and leading conservation and stewardship projects.

CHS is made up of researchers, conservation practitioners, naturalists, educators, and other individuals with an interest in Canada's reptiles and amphibians.

President: Jolene Laverty (Nova Scotia Department of Lands and Forestry, NS)
Vice-President: Amanda Bennett (Council of Canadian Academies, ON)
Past President: Pamela Rutherford (Brandon University, MB)
Treasurer: Ori Urquhart (Blazing Star Environmental, ON)
Secretary: James Paterson (Ducks Unlimited, MB)
Directors at Large: Christina Davy, Marc Dupuis-Desormeaux, Claudia Lacroix, Aidan Maloney, Hannah McCurdy-Adams
Webmaster: Devin Martin

Special Thanks

Brandon University, Pamela Rutherford, and Scales Nature Park for in-kind tech contributions and support.

Scales Nature Park for live animal demonstrations during breaks.

SCALES NATURE PARK
The Best Canadian Reptile Experience!

All the LOC members, CHS members, attendees, and Carleton students and staff who helped out in-person throughout the conference, including the student award competition judges and session chairs.

Presentation Instructions

CHS 2023 is a hybrid event, with all talks streamed via Zoom. Please follow the below guidelines to ensure the conference runs smoothly.

All talks must be uploaded to the conference Dropbox before the start of your session. You can upload your talk to the Dropbox directly by using the link below:

https://www.dropbox.com/scl/fo/6yc3f7eqs640229aaimzu/h?rlkey=c7wa2zlj4ciis7oc3ssvch1sq&dl=0

You can also upload your talk at the registration desk, either by bringing it on a USB key, or by uploading to Dropbox from your laptop with the help of the registration desk team. Please come to your presentation room **15 minutes before your session begins** to ensure your talk is available on the presentation computer.

All talks must be submitted as a PDF (.pdf), PowerPoint 2016 (.pptx) or Power Point Show (.ppsx).

All presentations will be loaded from the local computer.

Please present from the podium and speak into the microphone so that your colleagues online can both see and hear you.

Online participants are encouraged to ask questions in the Zoom chat. There will be someone in person monitoring the chat and sharing questions with the speakers.

15-minute talks
Target 10-12 minutes for your presentation to leave a few minutes for questions.

5-minute lightning talks
Please use your full allotted time. There are no questions at the end of 5-minute talks, though they are scheduled immediately prior to a break.

Posters
Posters must be smaller than 120cm long x 90cm high.

Please Note: We are recording talks!

If you do not want your talk to be posted on the CHS YouTube channel, please contact Pamela Rutherford as soon as possible at conference@canadianherpetology.ca.

Schedule Overview

Friday 15 September 2023 (all times in EDT)

1300–1600	**Genomics Amphibian and Reptile Prioritization Workshop**	Sam Jones (Canadian BioGenome Project), Jacqueline Litzgus, Pamela Rutherford	Southam Hall Room 520 (and Zoom)
1800–2300	**Friday Night Social at The Prescott**	Informal meet and greet for all CHS registrants, and scavenger hunt (with prizes!) Come for dinner, drinks, snacks, whatever	379 Preston St., Ottawa, ON

Saturday 16 September 2023

0800–0830	**Registration**					Atrium
0830–0900	**Opening Address and Welcome**			Jolene Laverty, President CHS/SHC Christina Davy, Chair LOC		Richcraft Theatre (RB2200)
0900–1000	**Keynote Address**			Grégory Bulté		Richcraft Theatre (RB2200)
1000–1030	Break (30 min) *Live animals from Scales Nature Park*			Coffee/tea + light snacks		Atrium
1030–1200	**Session 1: Behavioural Ecology**	Chair: Greg Bulté	Richcraft Theatre (RB2200)	**Session 2: Salamander Conservation**	Chair: Leslie Anthony	RB 2220/2224
1200–1330	Lunch (not provided)					
1200–1330	CHS Board of Directors Meeting (GLEL Lab, Nesbitt Building)					
1330–1500	**Session 3: Herpetofaunal Conservation (I)**	Chair: Jacqueline Litzgus	Richcraft Theatre (RB2200)	**Session 4: Genetics**	Chair: Nick Cairns	RB 2220/2224
1500–1530	Break (30 min)			Coffee/tea + light snacks		Atrium
1530–1700	**Annual General Meeting**			CHS Board of Directors, Chairs of CHS Committees		Richcraft Theatre (RB2200)

1700–1830	Poster Session		Atrium
1830–2300 1830–1900 **1900–2000** 1930–2000 **2000–2100** 2100–2130	**Banquet** Reception (cash bar) **Dinner is served** Awards **Travelogue** Great Canadian Herp Quiz	**Travelogue** Stephanie Winton Wildlife Preservation Canada **Herp Quiz** Steve Marks	Teraanga Commons

Sunday 17 September 2023

0830–0845	**Registration**					Atrium
0845–0900	**Opening Address**			Christina Davy, LOC Chair		Richcraft Theatre (RB2200)
0900–1000	**Keynote Address**			Sean Boyle		Richcraft Theatre (RB 2200)
1000–1030	**Break (30 min)** *Live animals from Scales Nature Park*			Coffee/tea + light snacks		Atrium
1030–1200	**Session 5: Herpetofaunal Conservation (II)**	Chair: Marc Mazerolle	Richcraft Theatre (RB2200)	**Session 6: Ecology & Physiology**	Chair: Christina Davy	RB 2220/2224
1200–1330	**Lunch (not provided)** **Lunch with a Mentor** (for those who signed up – meet in Atrium)					
1330–1345	**Silent Auction (ends at 1330) and Book Raffle**					
1345–1515	**Session 7: Behaviour & Life History**	Chair: Rachel Dillon	Richcraft Theatre (RB2200)	**Session 8: Conservation Projects & Community Engagement**	Chair: Kelsey Moxley	RB 2220/2224
1515–1545	**Group Photo & Break**			Coffee/tea + light snacks		Atrium
1545–1645	**Session 9: Distributions & Translocations**	Chair: Hannah McCurdy-Adams	Richcraft Theatre (RB2200)	**Session 10: Population Monitoring**	Chair: David Lesbarrères	RB 2220/2224

1645–1700	**Closing Remarks**	Christina Davy Jolene Laverty	Richcraft Theatre (RB2200)

Monday 19 September 2022

0800–1700	**Field Trip**	Led by Greg Bulté and Joe Crowley	Queen's University Biological Station
0800	Pickup from Holiday Inn Express & Suites, Airport (2881 Gibford Drive)		
0815	Pickup from Fallowfield Station (3347 Fallowfield Road)		
1030	**Arrive at QUBS**		
1200	Lunch		
1530	**Depart QUBS**		
1645	Drop off at Fallowfield Station		
1700	Drop off at Holiday Inn Express & Suites, Airport		

Friday 15 September 2023

1300–1600 EDT: Genomics Amphibian and Reptile Prioritization Workshop

Location: Southam Hall, Room 520 + Zoom
Registration required!

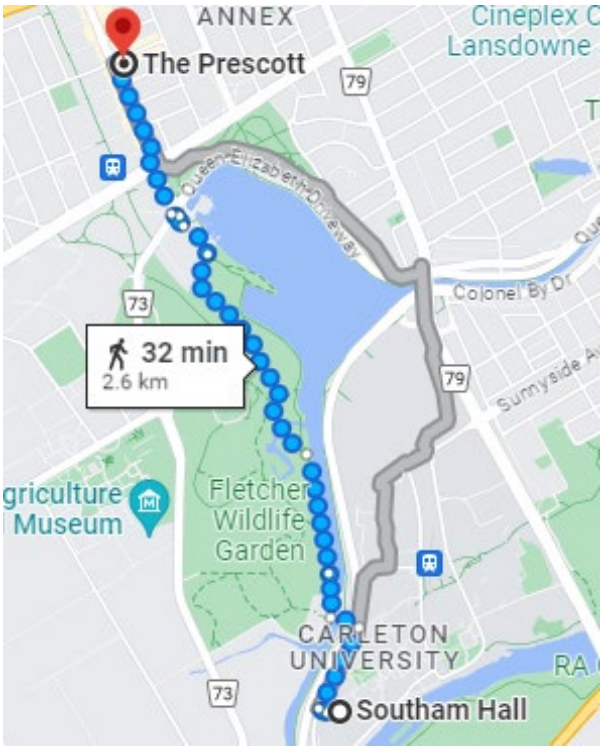
The goal is to prioritize species for the Canadian BioGenome Project, led by Samantha Jones (Canadian BioGenome Project), Jacqueline Litzgus (Laurentian University), and Pamela Rutherford (Brandon University). The workshop is being offered at no cost to attend, but in-person attendance is limited, and registration is required. There will also be an option to attend the workshop virtually via Zoom (registration required to received Zoom link).

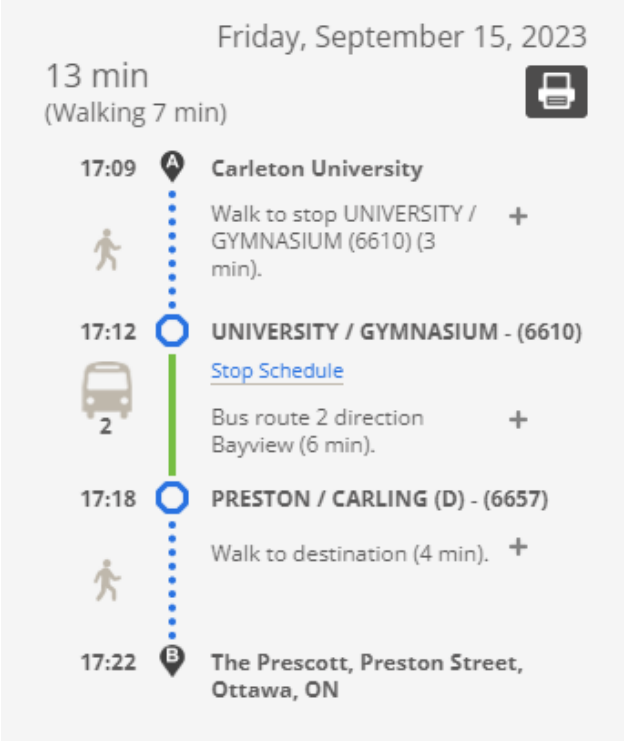
Friday Night Social

1800–2300 EDT: The Prescott

Location: 379 Preston St, Ottawa, ON
https://theprescott.com/

The CHS Local Organizing Committee has booked a private space at The Prescott for the evening for an information social event. The Prescott is a pleasant 3 km walk through the Dominion Arboretum from Southam Hall (where the workshop is being held). It is also accessible via personal vehicle or public transit. There is no cost to attend, though guests are responsible for purchasing their own food and drinks. All CHS registrants are welcome to arrive at any time throughout the evening to meet up with friends new and old! BUT there will be a scavenger hunt from 7:15 - 8:45, with prizes, so plan to arrive in time if you'd like to participate.





Saturday 16 September 2023

0900–1000 EDT: Keynote Address

Richcraft Hall: Richcraft Theatre (RB2200)

Sex, Oxygen, and Otter Matters: Tales from a Map Turtle Hibernaculum

Grégory Bulté, PhD
Instructor III
Department of Biology
Carleton University,
Ottawa, ON

Greg is a biology instructor at Carleton University where he develops and teaches courses about ecology and evolution. From 1998 to 2001, he completed a wildlife technician degree at the Cégep de Sainte-Foy in Québec City. At which time he got his first taste for herpetological research in the form of Lyme disease, chiggers, and poison ivy blisters while assisting snake and turtle research in Maryland. He then pursued an undergraduate degree in Biology at l'Université du Québec à Trois-Rivières and furthered his interests for wildlife research and herpetology by working as a field technician in Ontario, Québec, and Nevada. In 2009, the University of Ottawa gave him a PhD for spending four and half years pondering the sex life of map turtles under the supervision of Dr Gabriel Blouin-Demers. This was followed by a brief post-doctoral stint staring at fish parasites in Dr Mark Forbes' laboratory at Carleton University. In 2011, Greg started in his current position as an instructor. When he's not doing what he's being paid for, he continues to study turtles, tries to convince his colleagues to study turtles, frolics in the woods surrounding his cabin, and whittles. Since 2003, he has been running a demography study of map turtles in Lake Opinicon and he's currently involved in a hodgepodge of collaborative projects on the ecology and behaviour of turtles.

1030–1200 EDT: Session 1: Behavioural Ecology

Richcraft Hall: Richcraft Theatre (RB2200)

Session 1: Behavioural Ecology (Chair: Grégory Bulté)	
1030–1045	*The call of the Ottawa wilds: Seasonal and diel patterns in calling behaviour of boreal chorus frogs (*Pseudacris maculata*)* Jeffrey Ethier
1045–1100	*Intra- and interspecific hibernation site selection of three sympatric snake species* Veronica McKelvey
1100–1115	*Studying the effect of a short-distance mitigation-translocation on Great Basin Gophersnake movement behaviour* Lily Ragsdale
1115–1130	*It's time to go: Untangling social and ecological drivers of nest emergence in turtles* Claudia Lacroix
1130–1145	*Lunch-clubs and dinner dates: Using feeding aggregations to explore freshwater turtle sociality* Caitlin Menzies
1145–1150	Toads at the spa: Western Toad breeding activity at Liard Hot Springs Purnima Govindarajulu
1150–1155	Assessing the impacts of climate change on breeding phenology of temperate anurans Alyssa Reynolds
1155–1200	*Ecology of species at risk turtles within the footprint of a transmission line and a proposed highway expansion* Brooke Carroll

Student presentations are in *italics.*

1030–1200 EDT: Session 2: Salamander Conservation

Richcraft Hall: RB 2220/2224

Session 2: Salamander Conservation (Chair: Leslie Anthony)	
1030–1045	A decade of Bsal research: Trends and perspectives David Lesbarrères
1045–1100	Lessons on constructing effective breeding ponds for imperilled *Ambystoma* salamanders based on data collected from Pelee Island, Ontario Thomas Hossie
1100–1115	*Integrating data from different sources to evaluate impacts of forest management on spring salamanders* Anaïs Baillet
1115–1130	*Sensitivity tests and independent evaluation are critical when using species distribution models to inform conservation translocations: A case study using long-toed salamanders* Jayna Bergman
1130–1145	*Highway to Hell: Estimating road crossing hotspots and modeling mortality for endangered Jefferson salamanders (*Ambystoma jeffersonianum*)* Justine Kaseman
1145–1200	*The effect of forest harvesting practices on salamanders and their habitat* Sara Leslie

Student presentations are in *italics.*

1330–1500 EDT: Session 3: Herpetofaunal Conservation (I)

Richcraft Hall: Richcraft Theatre (RB2200)

Session 3: Herpetofaunal Conservation (I) (Chair: Jacqueline Litzgus)	
1330–1345	Advancing protections for a relict population of Sharp-Tailed Snake (*Contia tenius*) through collaboration, community engagement, and Indigenous monitoring Leslie Anthony
1345–1400	Using long-term data to simulate extinction risk for two Massasauga (*Sistrurus catenatus*) populations in Ontario, Killbear Provincial Park and Wainfleet Bog Katharine Yagi
1400–1415	The do's and don'ts of environmental consulting: A case study of an Eastern Foxsnake (*Pantherophis gloydi*) population in southwestern Ontario Anne Yagi
1415–1430	Population viability analysis and influence of headstarting on an urban Blanding's Turtle (*Emydoidea blandingii*) population Rachelle Fortier
1430–1445	Freshwater turtle climbing abilities: implications for the design and use of shoreline erosion control structures Kara Scott
1445–1450	Drawdowns of doom: Bio(herpeto)diversity impacts of water level management in impoundments Fred Schueler
1450–1455	Introduction to the Canadian Eastern Massasauga Rattlesnake Recovery Implementation Group (CEMRRIG) Hannah McCurdy-Adams
1455–1500	Exploring the interactions between inland water-based recreation and freshwater turtles Albana Berberi

Student presentations are in *italics.*

1330–1500 EDT: Session 4: Genetics

Richcraft Hall: RB 2220/2224

Session 4: Genetics (Chair: Nick Cairns)	
1330–1345	*Ex situ management stabilizes the genetic health of Canada's most endangered amphibian, the Oregon Spotted Frog (*Rana pretiosa*); but is it enough?* Briar Hunter
1345–1400	*Using environmental DNA to map the contact zone of* Pseudacris maculata *and* Pseudacris triseriata *in southwestern Ontario* Madeleine Robitaille
1400–1415	*Population genetics of Blanding's Turtle (*Emydoidea blandingii*) in Outaouais* Daphnée Bernier
1415–1430	*Molecular evolution of visual opsin genes in side-neck and hidden-neck turtles* Golnar Jalilvand
1430–1445	Population genomic data to inform conservation translocations of Long-toed Salamanders in Alberta Julie Lee-Yaw
1445–1450	*A chromosome-level genome assembly for Western Chorus Frog (*Pseudacris triseriata*)* Ying Chen
1450–1455	*Rattling on: Conservation genomics of Massasauga Rattlesnakes* Meg Britt
1455–1500	Ophidiomycosis (snake fungal disease) surveillance in snake populations within an urban park in Southern Ontario Christine Drader

Student presentations are in *italics.*

Canadian Herpetological Society
Société d'Herpétologie du Canada

Annual General Meeting — Draft Agenda

15 September 2023 at 15:30–17:30 EDT
Richcraft Hall: Richcraft Theatre (RB2200)

1. Welcome Remarks (President: J. Laverty)
    a. Acknowledgements and attendance
    b. Approve agenda
    c. Approve 2022 AGM minutes (see email to membership)

2. Introduction of the 2023 CHS Board of Directors
    a. Board Members: J. Laverty (President), A. Bennett (Vice President), P. Rutherford (Past President), J. Paterson (Secretary), O. Urquhart (Treasurer), A. Maloney (Student Director), Directors-at-Large: C. Davy, M. Dupuis-Desormeaux, C. Lacroix, H. McCurdy-Adams
    b. Board Departure: A. Maloney

3. Report from President (J. Laverty)
    a. Success of CHS 2023 Ottawa (95 talks, over 150 attendees)
    b. In memoriam

4. Election for Board Position (A. Bennett)
    a. One vacancy (Student Director)
    b. Election to be held online in late fall

5. Committee Updates
    a. Awards (J. Laverty – Chair)
    b. IMPARA (S. Hecnar – Chair)

c. Membership (A. Bennett – Chair)
d. Publications and Website (J. Crowley – Chair)
e. Conservation (D. Seburn – Chair)
f. Meetings and Workshops (P. Rutherford – Chair)
    i. February online conference
    ii. Planning for 2024 and 2025 in-person conferences
g. Social Media (S. Gillingwater – Chair)
h. EDI Committee (Gabrielle Rimok and Briar Hunter)

6. Report from the Treasurer (O. Urquhart)

7. Any other business

8. Adjournment

1700–1830 EDT: Poster Session

Richcraft Hall Atrium

Poster Session
Turtle body size: What's the big deal? Tyler Ambeau
Are isolated island Watersnakes and Gartersnakes in eastern Lake Ontario genetically and phenotypically distinct? Arjun Augustine
*Demographic Analysis of a Coastal Population of Spotted Turtles (*Clemmys guttata*) on Long Island, New York* Michaela Bouffard
An inexpensive artificial snake hibernaculum built using readily available plumbing supplies Jonathan Choquette
City slicker salamanders: Examining the behaviour of a widespread Plethodontid salamander across a gradient of urbanization Josh Christiansen
The effects of urbanization on population health of Atlantic Canadian salamanders Georgia Christie
Windfarm and wildfire: Spatial ecology of an endangered freshwater turtle in an impacted landscape Stephanie Delay
Impacts of silvicultural treatments on small fauna co-occurrence in the context of assisted tree migration William Devos
Natural variation in chorus frog population size and evaluation of reintroduction techniques after restoration Jeanne Dudemaine
Restoration design and ecohydrological assessment of peatland overwintering habitat for reptiles Rachel Fallas

Impact of imidacloprid-based chemical control for Hemlock Woolly Adelgid (*Adelges tsugae*) on the Eastern Red-Backed Salamander (*Plethodon cinereus*) David Fox
Investigating the presence of non-native Gartersnakes (Thamnophis sirtalis) on the island of Newfoundland Andrea Gigeroff
Restructuring, rebranding and succession planning: the past, present and future of Scales Nature Park Jeff Hathaway
Evolutionary history and geography as predictors of divergence in trilling chorus frog (*Pseudacris*) advertisement call attributes Dylan Kaufman
DNA methylation and demethylation modifications supporting anoxia tolerance and recovery in liver of wood frogs experiencing oxygen deprivation Panashe Kupakuwana
*Measuring the success of an innovative fence design for mitigating road mortality of Eastern Foxsnakes (*Pantherophis gloydi*) and other at-risk reptiles in eastern Georgian Bay, Ontario* Sabrina Lounsbury
Investigating the impacts of wildfire and windfarm construction on anuran bioacoustics in central Ontario Aidan Maloney
Testing autonomous recording units for mapping suitable habitat for calling populations of Western Toads Hannah Meikle
Development of assisted reproductive technologies for the conservation of *Atelopus sp. (spumarius complex)* Renato Naranjo
Do introduced Wild Turkeys prey on the endangered Blue Racer on Pelee Island? Orianne Tournayre
“We have done so much, for so long, with so little, that we are now qualified to do anything with nothing” – postal cards from field parties to the Herpetology Section of the National Museum of Natural Sciences, 1976-1986 Fred Schueler
Expeditions of Canada’s National Herpetology Collection Fred Schueler

A decision-tree framework for conservation genomics: lessons from the Eastern Massasauga Rattlesnake Hana Thompson
*A novel loop-mediated isothermal amplification (LAMP) assay for highly specific field detection and identification of the Boreal Chorus Frog (*Pseudacris maculata*)* Haolun Tian
Reptile road mortality at the Ojibway Prairie Complex, an ongoing threat at a future National Urban Park Cory Trowbridge
*Identifying Eastern Foxsnake (*Pantherophis vulpinus*) critical habitat along the Eastern coast of Georgian Bay at Shawanaga First Nation* Kyle Vincent
In the belly of the beast: Examining the diet of a domestic invasive amphibian to gain insight into its impact and the mechanisms that promoted its success Maya Williams

Student presentations are in *italics.*

Saturday 16 September 2023

2000–2100 EDT: Travelogue

Teraanga Commons

‘Tails’ from Mauritius: The Adventures of Wildlife Preservation Canada’s 31st New Noah

Stephanie Winton, MSc, RPBio
(she/her)

Species Conservation Planning Coordinator – Canadian Species Initiative, Wildlife Preservation Canada

Assistant Facilitator, IUCN SSC Conservation Planning Specialist Group (CPSG Canada)

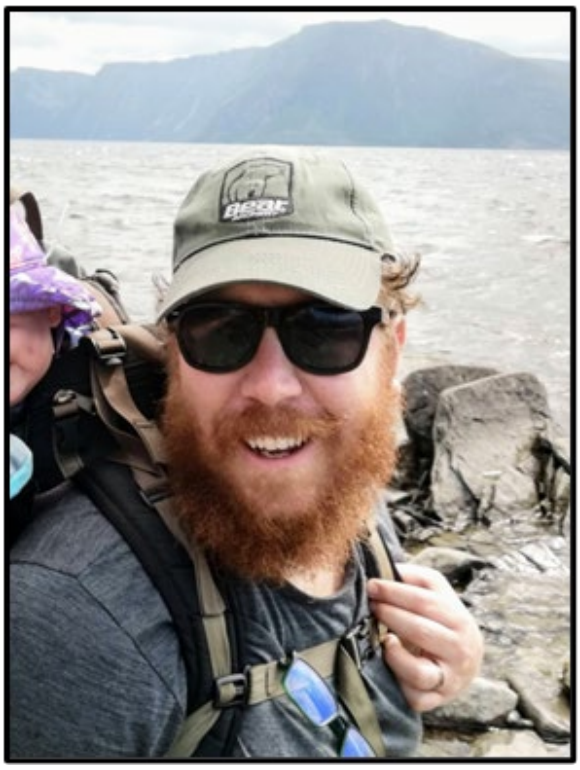
Stephanie was selected as the 31st Canada’s New Noah in 2022 and traveled to the island of Jersey in the English Channel and the tropical island of Mauritius in the Southwest Indian Ocean to participate in training and practical experience in endangered species management. Following this experience, she has returned to work with Wildlife Preservation Canada to build capacity for species conservation planning in Canada through the Canadian Species Initiative and is training to be a conservation planning workshop facilitator with the IUCN SSC Conservation Planning Specialist Group. Stephanie holds a master’s degree in conservation biology from Thompson Rivers University where she studied the impacts of road mortality on the Western Rattlesnake in BC. When not at her computer (or traveling the world) you can find Stephanie hiking, skiing, or volunteering with local conservation projects.

Sunday 17 September 2023

0900–1000 EDT: Keynote Address

Richcraft Hall: Richcraft Theatre (RB2200)

Conservation in a Human-Dominated Landscape



Sean Boyle, PhD

NSERC Postdoctoral Fellow
Department of Biology
Carleton University
Ottawa, ON

As of January 2024: Assistant Professor, School of Science and the Environment, Memorial University of Newfoundland and Labrador

Human land-use practices have enormous and diverse impacts on wildlife, including influencing their spatial patterning and population ecology. Often as ecologists we must make assumptions about our study species and systems, however, challenging these assumptions is essential to our ability to better model these effects on wildlife, and the potential value of interventions. Dr. Sean Boyle will discuss some assumptions related to the spatial and population ecology of wildlife and how by addressing them we can improve conservation outcomes.

Sunday 17 September 2022

1030—1200 EDT: Session 5: Herpetofaunal Conservation (II)

Richcraft Hall: Richcraft Theatre (RB2200)

Session 5: Herpetofaunal Conservation (II) (Chair: Marc Mazerolle)	
1030–1045	Reptilian riches of Shawanaga First Nation: Empowering communities to conserve herpetofauna diversity in eastern Georgian Bay Steven Kell
1045–1100	Improving wildlife fencing for herpetofauna to ensure effective implementation: An analysis of global mitigation case studies Steve Mars
1100–1115	*Effect of ecopassages on Blanding's Turtle (*Emydoidea blandingii*) home range at Chalk River Nuclear Laboratories* Andrea O'Halloran
1115–1130	Investigating the responses of turtles and snakes to *Phragmites australis* management at St. Clair National Wildlife Area Kaitlyn Hall
1130–1145	A biodiversity mapping and assessment tool for the amphibians and reptiles of the Prairies Ecozone of Canada James Paterson
1145–1200	Impacts of windfarm development and wildfire on the species-at-risk reptiles of eastern Georgian Bay Jason Ashawasagai

Student presentations are in *italics.*

1030—1200 EDT: Session 6: Ecology & Physiology

Richcraft Hall: RB 2220/2224

Session 6: Ecology & Physiology (Chair: Christina Davy)	
1030–1045	*Beyond the visual field: Identifying shifts in selective pressures on anuran phototransduction genes across differing photic environments* Taegan Perez
1045–1100	*Egg incubation of some squamate reptiles from the Western Ghats, India* Dikansh Parmar
1100–1115	Effects of water pH and salinity on frog skin pH Karen Vanderwolf
1115–1130	*Assisted reproductive technology implications for snake conservation in Canada* Ginger Elliott
1130–1145	*That changed a tad(pole): Varying ecological effects of toad tadpoles with inter-annual variation* Jessica Ford
1145–1150	*Investigating sexual dichromatism in a central Ontario population of Spotted Turtles (*Clemmys guttata*)* Steph Thibeault
1150–1155	*Assessing the ecohydrological impacts of wildfire on Massasauga Rattlesnake (*Sistrurus catenatus*) overwintering habitat* Rachel Fallas
1155–1200	*Microplastics as an Emerging Risk to the Health of Amphibians* Alex Jardine

Student presentations are in *italics.*

1345—1515 EDT: Session 7: Behaviour & Life History

Richcraft Hall: Richcraft Theatre (RB2200)

Session 7: Behaviour & Life History (Chair: Rachel Dillon)	
1345–1400	*Site specific studies to identify site specific protections: Habitat use and selection of the Blanding's Turtle in coastal Georgian Bay* Jonah Lehman
1400–1415	Behavioural fevers as a coping strategy for snakes with ophidiomycosis Sean Boyle
1415–1430	*Demographic assessment of a freshwater turtle assemblage in an urban protected area in the context of ongoing threats and mass mortality events* Tharusa Wijewardena
1430–1445	Hidden Markov model-based classification of Blanding's Turtle behavioural states from multi-sensor biologger data Kelton Adderly-Heron
1445–1500	*Investigating the effects of sex and age on movement and survival in the endangered Five-lined Skink (*Plestiodon fasciatus*)* Erin Allen
1500–1515	Island hopping through urban filters: Anthropogenic habitats and colonized landscapes alter morphological and performance traits of an invasive amphibian James Baxter-Gilbert

Student presentations are in *italics.*

1345—1515 EDT: Session 8: Conservation Projects & Community Engagement

Richcraft Hall: RB 2220/2224

Session 8: Conservation Projects & Community Engagement (Chair: Kelsey Moxley)	
1345–1400	The Canadian BioGenome Project Samantha Jones
1400–1415	Ontario Reptile and Amphibian Atlas: The power of community engagement Jenna Quinn
1415–1430	Updates and insights from the Saving Turtles at Risk Today (START) and Conservation Action, Research, and Education about Snakes (CARES) projects in central Ontario Jeff Hathaway
1430–1445	Saving the toads (and how we did it) David Green
1445–1500	*Status of turtle populations in Point Pelee National Park: A 21-year update* Ian Wick
1500–1515	Assessing injury rates in Northern Map Turtles (*Graptemys geographica*) from motorboats using iNaturalist Canada David Seburn

Student presentations are in *italics.*

1545–1700 EDT: Session 9: Distributions & Translocations

Richcraft Hall: Richcraft Theatre (RB2200)

Session 9: Distributions & Translocations (Chair: Hannah McCurdy-Adams)	
1545–1600	Integrating eDNA and citizen science observations to model distribution of a temperate freshwater turtle near its northern range limit Wenxi Feng
1600–1615	*Don't worry, be happy: Blanding's Turtles (*Emydoidea blandingii*) living in a reference condition in Georgian Bay* Reta Lingrui Meng
1615–1630	Lizardsicle: Overwintering microhabitat usage by *Phrynosoma hernandesi* Nicholas Cairns
1630–1645	*Investigating the impacts of wildfire and windfarm construction on squamate community ecology in central Ontario* Aidan Maloney
1645–1650	*Understanding the effectiveness of mitigation translocation for Columbia Spotted Frogs (*Rana luteiventris*) in British Columbia, Canada* Megan Winand
1650–1655	*Selection and validation of release sites for conservation translocations of a temperate-zone snake* Jonathan Choquette
1655–1700	*Assessing the impacts of climate change on Gray Ratsnake geographic range in Southern Ontario* Andrea Gomez-Sanchez

Student presentations are in *italics.*

1545–1700 EDT: Session 10: Population Monitoring

Richcraft Hall: RB 2220/2224

Session 10: Population Monitoring (Chair: David Lesbarrères)	
1545–1600	*Determining the presence of* Ophidiomyces ophiodiicola *in New Brunswick and Nova Scotia* Issac Acker
1600–1615	Accounting for individual heterogeneity in capture probability when estimating abundance of breeding Spotted Salamanders from mark-recapture surveys Doug Armstrong
1615–1630	Understanding long-term Northern Map Turtle population trends using local ecological knowledge Albana Berberi
1630–1645	Vernal pool amphibian inventories: Can environmental DNA replace traditional methods? Yann Surget-Groba
1645–1700	Body scoring for Musk Turtle (*Sternotherus odoratus*): Using in situ data to inform ex situ management Hana Thompson

Student presentations are in *italics.*

End of Contributed Talks

Determining the presence of *Ophidiomyces ophiodiicola* in New Brunswick and Nova Scotia

Issac Acker, Julia Riley

Mount Allison University, Sackville, Canada

Abstract

Wildlife disease has been a concern for ecologists as faunal populations decline globally. However, some potentially harmful fungal diseases like Snake Fungal Disease (SFD) remain understudied. Since the description of SFD, monitoring has occurred to understand its distribution, but, to the best of our knowledge, no studies on SFD's presence have been completed outside the Great Lakes Region of Ontario and Québec within Canada. Thus, this research aimed to test for the presence of *Ophidiomyces ophiodiicola*, the fungus that causes SFD, in two unstudied provinces: New Brunswick (NB) and Nova Scotia (NS). During this work free-ranging snakes were sampled across their 2022 active season, and dead snakes collected between 2011 to 2022 by museums and research institutions were also sampled. In total, 158 samples from 6 snake species and skins were sampled from NB, NS, and Maine, USA. Samples were analyzed at the Animal Health Laboratory using a standardized quantitative polymerase chain reaction (qPCR) assay and no *O. ophiodiicola* DNA was detected. We did not find evidence that SFD is present in NB or NS. This research highlights the importance of rigorous monitoring throughout Canada to determine the current occurrence SFD and to assess its threat to biodiversity.

Oral – 15 minutes

Student

Hidden Markov model-based classification of Blanding's Turtle behavioural states from multi-sensor biologger data

Kelton Adderley-Heron, Patricia Chow-Fraser

McMaster University, Hamilton, Canada

Abstract

Conducting ecological research on animals often requires in situ assessments of animal behaviours. In species such as Blanding's Turtles (*Emydoidea blandingii*), however, individuals are often cryptic and reside in complex natural environments which results in only a small portion of their behaviour or movements being observed. Increasingly, the use of biologgers with multiple sensors, including accelerometers, are being used to record behaviours in free-ranging individuals. Here we use data from biologgers that contain an integrated tri-axial accelerometer, GPS logger, and immersion sensor, attached to Blanding's Turtles in Northeastern Georgian Bay. We fit an unsupervised 5-state Hidden Markov Model (HMM) using two data streams (variance in pitch and immersion) to identify 5 behavioural states: active in water, resting in water, active out of water, resting in water, and digging/nesting. To test the accuracy of the model we visually classified behavioural states from video recordings and compared them to the HMM-inferred states. A robust classification model will allow us to narrow the knowledge gaps related to free-ranging freshwater turtle behaviour and how abiotic and biotic variables may influence the expression of an individual's behavioural states.

Oral – 15 minutes

Investigating the effects of sex and age on movement and survival in the endangered Five-lined Skink (*Plestiodon fasciatus*)

Erin Allen[1], James Paterson[2], Christina Davy[3]

[1]1Institute of Environmental and Interdisciplinary Science Carleton University, Ottawa, ON, Canada. [2]Institute for Wetland and Waterfowl Research, Ducks Unlimited Canada, Stonewall, MA, Canada. [3]Department of Biology, Carleton University, Ottawa, ON, Canada

Abstract

Habitat loss and degradation from land conversion pose substantial threats to species already experiencing multiple environmental pressures. Northern ectotherm populations face lower productivity and climatic extremes, confining them to pockets of habitat that meet their specific thermal and moisture requirements. Northern ectotherm populations often overlap with high human activity, where they must persist as small, isolated subpopulations. Southwestern Ontario is one such overlapping hotspot for at-risk ectotherms and human activity and houses nine geographically isolated and presumably declining subpopulations of endangered Carolinian Common Five-lined Skinks (*Plestiodon fasciatus*). Movement ecology and survival estimates may better inform management of these dwindling populations and can help in assessing population viability. We used *P. fasciatus* mark-recapture data collected in Rondeau Provincial Park in 2018 and 2019 to compare movement ecology and survival rates between sexes and age classes. We compared the minimum distance travelled between sex and age classes using linear models and estimated annual apparent survival rates for each class with a Cormack-Joly-Seber model. We found that all sex and age classes travelled similar distances, but that survival was significantly lower in adult female (0.40; CI 0.29-0.52) and juvenile (0.28; CI 0.13-0.44) skinks than in adult males (0.68; CI 0.55-0.81). Our results show that female skinks face different threats or greater impacts from threats than males and can be used to inform the management and recovery of Carolinian skink populations. Future research should explore the factors causing higher male survival and investigate whether the observed differences affect the viability of this skink population.

Oral – 15 minutes

Student

Turtle body size: What's the big deal?

Tyler Ambeau, Christina Davy

Carleton University, Ottawa, Canada

Abstract

Body size directly affects an organism's ecology – how they interact with their environment. Simultaneously, environmental conditions including temperature and productivity, can influence an organism's body size and how quickly it matures. Understanding how environmental factors influence variation in growth and adult body size within and between populations can provide insight into population health. Generally, mammals and birds follow Bergmann's Rule and James' Rule, which predict that body size within and among species increases as temperature decreases across latitudinal gradients. However, the drivers of body size in ectotherms such as turtles are less clear. Variation in turtle body size across latitudinal gradients differs depending on the taxonomic scale being observed. Generally, turtle species trend toward larger body size at lower latitudes but intraspecific populations tend to increase in size at higher latitudes. An increase in body size may allow for adaptation to colder northern climates by increasing fat storage capabilities, increasing winter survival. Examining sexual size dimorphism, which is present in many species, can elucidate different selective pressures between the sexes. Sexual selection for larger males or fecundity selection favouring larger females may help drive observed body size trends. Here, we review current literature on drivers of body size, growth rates and sexual size dimorphism in turtles, to set the stage for a current, collaborative study of Spotted Turtles (*Clemmys guttata*) in Ontario. Understanding variation in body size can inform conservation efforts by quantifying differences in maturation time among populations, which is vital for determining population viability.

Poster

Student

Accounting for individual heterogeneity in capture probability when estimating abundance of breeding Spotted Salamanders from mark-recapture surveys

Patrick Moldowan[1,2], Glenn Tattersall[3], Doug Armstrong[2], Njal Rollinson[1,2]

[1]School of the Environment, University of Toronto, Toronto, Ontario, Canada. [2]Algonquin Wildlife Research Station, Whitney, Ontario, Canada. [3]Department of Biological Sciences, Brock University, St. Catharines, Ontario, Canada

Abstract

Estimates of abundance are necessary for assessing the status of amphibian populations but may be subject to biases. From 2008–2019 we conducted a mark-recapture study of Spotted Salamanders (*Ambystoma maculatum*) breeding in Bat Lake, a 3.4-ha fish-free kettle bog in Algonquin Park, to monitor trends in abundance and survival. This involved setting minnow traps every 8–10 m around the circumference of the lake, checking them daily over most of the breeding season, and individually identifying animals based on their unique spot patterns. To validate the resulting estimates, in 2017 we erected a drift fence around the lake and subsequently obtained full censuses of the breeding population. This revealed that the numbers of males estimated from a standard Jolly-Seber model (data collated into one survey per year) and robust model (multiple surveys per year) were 25–30% as large as the true numbers for 2018–2019. The numbers of females were inestimable due to extremely low recapture probabilities. Hierarchical modelling of the data revealed strong individual heterogeneity in capture probability. We therefore re-analysed the data using a hierarchical Jolly-Seber model where the number of undetected animals was estimated through data augmentation. This model suggested that only 12% of the individuals present during the study had been captured, and produced abundance estimates for both males and females that were consistent with the drift fence censuses. These estimates fluctuated over time, ranging from 1277 (975–1670) to 5058 (3113–7706) for males and 2050 (1431–2646) to 5727 (3678–8505) for females.

Oral – 15 minutes

Impacts of windfarm development and wildfire on the species-at-risk reptiles of eastern Georgian Bay

Jason Ashawasagai[1], Mike Ashawasagai[1], Siobhan Galway[2], Ori Urquhart[3]

[1]Blazing Star Environmental, Henvey Inlet First Nation, Canada. [2]Blazing Star Environmental, Orillia, Canada. [3]Blazing Star Environmental, Oshawa, Canada

Abstract

Eastern Georgian Bay is comprised of a complex mix of geological, ecohydrological, and biological characteristics that form a distinct landscape and provide unique habitat for many at-risk reptile species. In 2017, construction of the Henvey Inlet Wind Energy Centre (HIWEC) began along the northeastern stretches of Georgian Bay, a known hotspot for reptile diversity, and continued until fall 2019. During that time, the Parry Sound 33 wildfire swept the region. Land development and the severity and frequency of wildfires are expected to increase in the area, posing threats to vulnerable populations of reptile species in this ecologically significant region. It is therefore critical to understand how these species may respond to and recover from both anthropogenic and natural disturbance events. However, long-term impact monitoring of these disturbance events has never been conducted in Canada. As a result, Blazing Star Environmental (BSE), under the recommendation of Ganawenim Meshkiki (GMI), initiated a long-term monitoring study with the purpose of understanding how abundance, habitat use, and body condition of SAR reptiles respond to the impacts of wind energy development, post-fire succession, and various mitigation and habitat improvement measures. Vegetation monitoring and reptile mark-recapture surveys were conducted in four treatment areas of varying impact: control, impacted by wildfire, impacted by windfarm development, and impacted by both wildfire and windfarm development (n=12 sites total). Data from this project can be used to predict impacts and inform mitigation strategies for land development and wildfire, increase resilience of SAR against climate change, and recover SAR populations.

Oral – 15 minutes

Are isolated island watersnakes and gartersnakes in eastern Lake Ontario genetically and phenotypically distinct?

Arjun Augustine[1], Janet Greenhorn[2], Sheldon Lambert[3], Briar Howes[4], Kent Prior[4], Stephen C. Lougheed[1]

[1]Department of Biology, Queen's University, Kingston, Canada. [2]Wildlife Research and Monitoring Section, Ontario Ministry of Natural Resources and Forestry, Peterborough, Canada. [3]Thousand Islands National Park, Parks Canada, Mallorytown, Canada. [4]Conservation Programs Branch, Parks Canada, Gatineau, Canada

Abstract

Islands have long been celebrated for having endemic biota and providing textbook examples of adaptive radiations. Many studies examine the role of marine island archipelagoes in divergence among conspecific populations and ultimately species diversification, but far fewer explore such phenomena in freshwater islands. We quantify genetic differentiation among populations of Northern Watersnake (*Nerodia sipedon sipedon*) and Eastern Gartersnake (*Thamnophis sirtalis sirtalis*) on Main Duck Island and nearby Yorkshire Island, small Lake Ontario islands over 12 km from the nearest shorelines, and their nearest mainland conspecifics. We predict that gartersnakes will exhibit greater genetic differentiation between the island and mainland populations than the relatively more aquatic watersnakes. A pilot study using microsatellites found some genetic differences between Main Duck Island snakes and their conspecifics on the Canadian mainland. We have expanded our sampling region to include mainland sites in New York and more mainland Canadian locales, and we will use a genome-wide panel of single-nucleotide polymorphism (SNP) markers from reduced representation sequencing to provide more statistical power than microsatellites. We add phylogeographic analysis of mitochondrial cytochrome B DNA sequence to address the possibility of sex-biased gene flow, and analysis of head morphology to test for signatures of dietary differences between island and mainland snakes. If found to be genetically and phenotypically distinct from mainland populations, Main Duck Island snake populations would be a compelling local example of a freshwater island shaping evolutionary trajectories, with possible consequences for elevation to distinct designatable units.

Poster

Student

Integrating data from different sources to evaluate impacts of forest management on Spring Salamanders

Anaïs Baillet, Sylvain Jutras, Marc Mazerolle

Laval University, Quebec City, Canada

Abstract

In forest ecosystems, logging and infrastructures for wood transportation are the main anthropogenic sources of fine sediments in aquatic habitats. These sediments can threaten organisms that depend on aquatic environments, such as stream salamanders. Our study aimed to quantify the impacts of forest management (e.g., cut surface, density of roads, upstream culverts) on the abundance of Spring Salamanders (*Gyrinophilus porphyriticus*) in southern Quebec. The species is of conservation concern both at the federal and Quebec levels. We assembled data sets to carry out analyses at three different spatial scales using hierarchical Bayesian models that account for imperfect detection probability. At a fine spatial scale, we collected count data and eDNA at 61 sites visited in August and September 2022. At an intermediate scale, we gathered data from seven professional surveys at 695 sites. At a broad scale, we integrated citizen science data and professional surveys in the same model to assess the species distribution in 1432 cells of 1km^2. At the fine scale, results indicated that the abundance of spring salamanders decreased with increasing density of forest roads (-0.55; 95% CRI = -0.92 – -0.20). Abundance was higher when the upstream culvert was at an intermediate distance. Surprisingly, the abundance was lower when the upstream culvert was further away (-1.46; 95% CRI = -2.17 – -0.80). At intermediate and broad spatial scales, Spring Salamander abundance and occupancy, respectively, did not vary with forestry-related disturbances.

Oral – 15 minutes

Student

Island hopping through urban filters: Anthropogenic habitats and colonized landscapes alter morphological and performance traits of an invasive amphibian

James Baxter-Gilbert[1,2], Julia Riley[1,2], Carla Wagener[3], Cláudia Baider[4], F. B. Vincent Florens[5], Peter Kowalski[6], May Campbell[7], John Measey[1]

[1]University of Stellenbosch, Stellenbosch, South Africa. [2]Mount Allison University, Sackville, Canada. [3]University of Oxford, Oxford, United Kingdom. [4]The Mauritius Herbarium, Réduit, Mauritius. [5]University of Mauritius, Réduit, Mauritius. [6]Blue Tide Solutions, Ballito, South Africa. [7]Grow Learning Support, Ballito, South Africa

Abstract

A hallmark of the modern era is the increasing spread of invasive species, particularly within island and urban ecosystems, and these occurrences provide valuable natural experiments by which evolutionary and invasion hypotheses can be tested. We used the invasion route of Guttural Toads (*Sclerophrys gutturalis*) from natural-native and urban-native populations (South Africa) to their urban-invasive and natural-invasive populations (Mauritius and Réunion) to determine whether phenotypic changes that arose once the toads became urbanized in their native range have increased their invasive potential before they were transported (i.e., prior adaptation) or whether the observed changes are unique to the invasive populations. This urban/natural by native/invasive gradient allowed us to examine differences in guttural toad morphology (body size, hindlimb, and hindfoot length) and performance capacity (escape speed, endurance, and climbing ability) along their invasion route. Our findings indicate that invasive island populations have reduced body sizes, shorter limbs in relation to SVL, decreased escape speeds, and decreased endurance capacities that are distinct from the native mainland populations (i.e., invasion-derived change). Thus, these characteristics did not likely arise directly from a pre-transport anthropogenic "filter" (i.e., urban-derived change). Climbing ability, however, did appear to originate within the urban-native range and was maintained within the invasive populations, thereby suggesting it may have been a prior adaptation that provided this species with an advantage during its establishment in urban areas and spread into natural forests. Our findings provide examples of two adaptive mechanisms for species to evolutionarily overcome the challenges of colonising novel landscapes.

Oral – 15 minutes

Improving wildlife fencing for herpetofauna to ensure effective implementation: An analysis of global mitigation case studies

Steve Mars, Steve Béga

Animex International, Toronto, Canada

Abstract

Wildlife fencing is used as a global mitigation solution for herpetofauna species to prevent roadkill. However, the fence material, height, and implementation requirements vary from country to country, state to state and region to region.

Although many government organizations and researchers are working to create fencing guidelines for a variety of species, the materials and installation methods are often vague and, in many instances, later discovered to be dangerous for the target species.

The lack of research and focus on this topic is resulting in many fences being installed and erected that are inadequate, environmentally damaging and ecologically ineffective. This can lead to frustration and resistance from stakeholders who want their investments in large projects to be sustainable and often end up being fined, delayed or paying for repairs.

Through collaboration and private-public partnerships, we have analyzed a comprehensive range of case studies from across the globe where innovative solutions have been rigorously tested to help solve problems that often hinder the implementation, management and success of wildlife mitigation schemes. Through this analysis, we have created a standardized set of fencing specifications and installation recommendations that consider the ecological, practical and climatic challenges faced all over the world.

This resource will become a valuable asset and help agencies across the world ensure they can easily implement reliable, cost-effective and ecologically sensitive mitigation measures to help reduce global wildlife mortality.

Oral – 15 minutes

Understanding long-term Northern Map Turtle population trends using local ecological knowledge

Albana Berberi, Emilia Callanan, Lana Rogoff, Steven Cooke, Gregory Bulté, Vivian Nguyen

Carleton University, Ottawa, Canada

Abstract

Local ecological knowledge (LEK) provides extensive, firsthand environmental information and has been increasingly used for species research and conservation. Here, we interviewed residents of Lake Opinicon, Ontario to elicit LEK on the long-term population trends of at-risk Northern Map Turtles (*Graptemys geographica*). Locals interviewed had experience on the lake ranging from 15 to 67 years, and all remain active on the lake today. LEK revealed that in Lake Opinicon, the Northern Map Turtle population from past to present has virtually stayed the same, but locals predicted that the population will decrease in the future. With LEK, we discovered that major threats to the Northern Map Turtle population were shoreline alteration, increased boat traffic, increased predation, and decreased water quality. LEK also revealed timelines for drastic changes in Northern Map Turtle habitat, including the introduction of invasive Zebra Mussels and the gradual increase in aquatic plants. For Northern Map Turtle conservation measures, locals suggested individuals can maintain natural shorelines, decrease boating speed near critical turtle habitat, reduce the use of bubblers, and use turtle nest protection boxes. Further, locals suggested governments and other large-bodied organizations can increase community awareness of turtle biology and protection strategies, fund community conservation efforts, and encourage more land trust agreements. Ultimately, LEK can provide nuanced insights on Northern Map Turtle population changes over time, which is especially beneficial for monitoring this long-lived species. We recommend scientists and policymakers further collaborate with local communities to elicit LEK for turtle population monitoring and implementation of feasible conservation measures.

Oral – 15 minutes

Exploring the interactions between inland water-based recreation and freshwater turtles

Albana Berberi, Jessika Guay, Gregory Bulté, Steven Cooke, Christina Davy, Vivian Nguyen

Carleton University, Ottawa, Canada

Abstract

Water-based recreation in freshwater ecosystems is increasing in popularity, but how does this recreation impact freshwater turtles? We conducted a review on 25 peer-reviewed articles on human-turtle interactions during water-based recreation, 24 of which reported negative effects of water-based recreation on turtle populations. Direct negative impacts included boat collisions with turtles and accidental hooking of turtles with fishhooks, while indirect negative impacts included human presence near critical turtle habitats, and wake action with subsequent shoreline erosion. Only one article reported positive interactions between humans and freshwater turtles when installing a nondisruptive turtle observation deck. Ten articles discussed conservation measures to mitigate turtle risks during water-based recreation, but none evaluated their efficacy. Conservation measures included regulating boat types, sizes, and access points, protecting critical turtle habitat, designating “no wake” boating zones, restricting fishing permits, installing turtle basking perches, promoting public awareness and outreach, and implementing community science and stewardship programs. Future research on human-freshwater turtle interactions during inland water-based recreation could explore the efficacy of conservation measures, potential interactions outside of regularly studied boating and fishing activities, and recreation-induced habitat alterations. Also, we recommend more research on the human dimension side of human-turtle interactions, including perceptions and knowledge from water users on the interactions they experience with turtles, and their awareness and actions of pro-environmental behaviours to protect turtles during water-based recreation.

Oral – 5 minutes

Sensitivity tests and independent evaluation are critical when using species distribution models to inform conservation translocations: A case study using Long-toed Salamanders.

Kaegan Finn[1], Jayna Bergman[2], Julie Lee-Yaw[2]

[1]University of Lethbridge, Lethbridge, Canada. [2]University of Ottawa, Ottawa, Canada

Abstract

Conservation translocations are an important tool for combating species declines and population losses. Species distribution models (SDMs) can facilitate the selection of suitable release sites for translocation programs. Yet, SDM predictions can be sensitive to model parameterization. In this study, we explored the impacts of three key decisions on Maxent models developed to inform reintroductions of the Long-toed Salamander (*Ambystoma macrodactylum*) in southwestern Alberta. We specifically tested the sensitivity of model predictions to 1) the type of environmental variables used to generate models, 2) choice of study extent, and 3) whether sample bias in the locality data was accounted for. We used independent presence-absence data from an extensive field survey to test the accuracy of models that varied these decisions. We found substantial differences in model predictions and performance among models. Models developed using local study extents were more accurate than those based on range-wide extents and decisions around correcting for sampling bias impacted model performance more than the type of environmental variables included in the models. We further demonstrate a novel approach that accounts for this uncertainty in model predictions when prioritizing potential release sites for translocations, incorporating both current and future climatic projections. Our study thus adds to our understanding of how different input decisions impact SDMs while simultaneously presenting one of the most rigorous demonstrations of the use of SDMs for conservation translocation planning.

Oral – 15 minutes

Student

Population genetics of Blanding's Turtle (*Emydoidea blandingii*) in Outaouais

Daphnée Bernier[1], Bautisse Postaire[2], Yann Surget-Groba[1,2]

[1]Université du Québec en Outaouais, Gatineau, Canada. [2]Institut des Sciences de la forêt tempérée, Ripon, Canada

Abstract

Assessing the genetic connectivity and diversity of natural populations is a key component for efficient conservation and management plans of endangered species. Our research aims to describe for the first time the genetic structure and gene flows of Blanding's Turtle (*Emydoidea blandingii*) in Outaouais and Ottawa's Greenbelt, at the northern edge of the species' range. The long-term goal of this study is to identify genetically isolated populations that could require independent conservation measures. Indeed, population isolation could be promoted by natural features like topology and anthropogenic pressures, such as increasing habitat fragmentation. Due to urban and farmland development during the last century, it is expected that the Outaouais populations (assumed previously connected) are nowadays fragmented or even totally isolated. In addition, the Ottawa River could represent a strong barrier to gene flow for this species, similar to that of the Hudson River. Assuming that the Ottawa River is a strong obstacle, it is expected that Outaouais' and Ottawa's populations are genetically isolated. We genotyped 15 microsatellites from 200 individuals, sampled from 17 wetland locations between 2021 and 2023. Combining this genetic data to landscape features will help identify ecological corridors and key conservation areas, to improve current management plans.

Oral – 15 minutes

Student

Demographic analysis of a coastal population of Spotted Turtles (*Clemmys guttata*) on Long Island, New York

Michaela Bouffard[1], Michael Bottini[2], Jacqueline Litzgus[1]

[1]Laurentian University, Sudbury, Canada. [2]Seatuck Environmental Association, Islip, USA

Abstract

Descriptions of demographic parameters are important for making inferences about population dynamics and for informing local conservation planning of species at risk. Spotted Turtles (*Clemmys guttata*), a globally endangered species, are distributed along the Atlantic coastal plain of North America and occupy a diversity of habitat types throughout their range. At a unique maritime coastal site on Long Island, New York, a long-term mark-recapture study occurred from 1996 to 2023, providing an opportunity to perform a demographic analysis on this population. The data were collected using visual encounter surveys and live-trapping during the turtle active season across three sampling events (1996-2000, 2003-2005, and 2021-2023, respectively). Our objective is to describe the age class ratios, sex ratios, biomass and population size estimates to project trends in site-specific population dynamics. Our preliminary data analyses yielded 66 unique turtle captures in the 1996-2000 sampling event (24 F, 20 M, 21 J, and 1 H), 70 turtles in 2003-2005 (26 F, 26 M, 18 J), and 68 turtles in 2021-2023 (36 F, 19 M, 13 J), indicating relatively equal adult sex ratios and evidence for recruitment given the large relative proportion of juvenile captures (approx. 26% across all sampling events combined). Four Spotted Turtles were present in all three sampling events. Our research will provide data to inform decisions regarding the conservation of Spotted Turtles in the study population and at other sites with similar coastal habitat.

Poster

Student

Behavioural fevers as a coping strategy for snakes with ophidiomycosis

Sean P Boyle[1], Rachel M Dillon[1], James E Paterson[2], Christina M Davy[1]

[1]Carleton University, Ottawa, Canada. [2]Ducks Unlimited Canada, Stonewall, Canada

Abstract

Understanding behavioural and physiological responses to illness is important to managing the impact of emerging infectious diseases (EIDs) on wildlife. For example, some free-ranging ectotherms bask to induce a febrile state (behavioural fever) to cope with infections, but the additional movement and exposure required to maintain this state may increase exposure to threats (e.g., predation, road mortality). *Ophidiomyces ophidiocola* is a pathogenic fungus that causes ophidiomycosis (snake fungal disease) in some snakes. Ophidiomycosis is characterized by epidermal lesions containing fungal hyphae, and although most affected snakes appear to recover, it can cause mortality. Field observations of increased basking in snakes with ophidiomycosis suggested that infected snakes may be inducing a febrile state, but this hypothesis has not been explicitly tested. We used temperature loggers (WeePITs) to test the prediction that Eastern Foxsnakes (*Pantherophis vulpinus*) with ophidiomycosis behaviourally elevate their body temperature higher or for longer periods than control snakes (i.e., snakes without ophidiomycosis). Temperature loggers were surgically implanted in six snakes (3 showing clinical signs of ophidiomycosis, 3 without), and recorded body temperature every 10 minutes summer 2018. Contrary to our febrile state hypothesis, we found little difference in the two treatment groups' thermal profiles (T_{min}, T_{mean}, T_{max}, and basking frequency). These results suggest that the relationship between basking behaviour and recovery from ophidiomycosis is more complex than previously proposed, though we had limited power to detect a difference with 6 snakes. Testing proposed mechanisms by which EIDs can alter behaviour can generate recommendations to reduce mortality in endangered species.

Oral – 15 minutes

Rattling on: Conservation genomics of Massasauga Rattlesnakes

Meg Britt[1], Michelle DiLeo[2], Mark Szenteczki[3], Kelsey Moxley[4], Jeff Hathaway[4], Jacqueline D. Litzgus[5], Stephen C. Lougheed[1]

[1]Queen's University, Kingston, Canada. [2]Ministry of Natural Resources and Forestry, Peterborough, Canada. [3]Center for Industrial Biotechnology, Department of Chemical and Environmental Engineering, University of California, Riverside, USA. [4]Scales Nature Park, Oro-Medonte, Canada. [5]Laurentian University, Sudbury, Canada

Abstract

Many herpetofauna species are at the northern limit of their global distribution in Canada where they have been impacted by significant habitat fragmentation and loss, and many other human stressors. One such species is the Eastern Massasauga Rattlesnake (*Sistrurus catenatus*), the only remaining venomous snake in Ontario. It is currently listed as threatened under both the Ontario Endangered Species Act and the Federal Species at Risk Act, as well as a 'Specially Protected Reptile' under the Ontario Fish and Wildlife Conservation Act. COSEWIC currently recognizes two genetically distinct designatable units (Carolinian and Great Lakes–St. Lawrence), that inhabit different eco-regions separated by ~200 km of heavily, anthropologically-modified landscape. Unfortunately, given their high site-fidelity, limited migration, and slow reproduction rate, massasaugas are particularly susceptible to threats such as increasing habitat fragmentation, isolation, and road mortality. Effective and targeted conservation action requires assessment of contemporary genetical structuring and potential for local adaptation. Building on DNA microsatellite work and augmented ongoing sampling, we will use a suite of genomics tools to evaluate genetic structure, levels of inbreeding, and adaptive diversity (mainland and island populations), historical demographic changes, and interplay of microevolutionary forces affecting massasauga populations in Ontario. The results from this project can inform active habitat management and stewardship, conservation prioritization, ex situ conservation strategies, and management recommendations for policy makers.

Oral – 5 minutes

Student

Lizardsicle: Overwintering microhabitat usage by *Phrynosoma hernandesi*

Nicholas A. Cairns[1], Pamela L. Rutherford[2], Adam H. Sprott and Julia L. Riley[3]

[1]Royal Alberta Museum, Edmonton, Canada, [2]Brandon University, Brandon, Canada, [3]Mount Allison University, Sackville, Canada

Abstract

The availability of suitable overwintering sites is a major constraint on northern range limits in ecotherms like reptiles. Most temperate reptiles must overwinter below the frost line to survive brumation. In the Canadian semi-arid prairies, the Greater Short-horned Lizard (*Phrynosoma hernandesi*), persists in habitats where the annual temperature range can exceed 80^{o}C. From early research, *P. hernandesi* appears to have very specialized overwintering habits, using shallow burrows, congregating with conspecifics at suitable sites, and seem to be associated with snow cover. By overwintering in areas with predictable, consistent snow cover, these lizards are potentially selecting a relatively stable microclimate for brumation. As an ephemeral habitat feature, patterns of snow cover will likely change with future climatic shifts, which may lead to increased overwinter mortality. To date, the environmental conditions preferred by overwintering *P. hernandesi* and their relation to fitness are unknown. Our aim is to address this knowledge gap by quantifying overwintering site selection by *P. hernandesi* using thermal loggers. We have completed the first winter of data collection and cursory analysis. It does appear some sites predictably retain more snow and that snow stabilizes temperatures. Despite being stable when snow covered, temperatures at occupied sites still reached well below freezing suggesting *P. hernandesi* is one of very few freeze tolerant lizards and may be one of the most cold tolerant reptiles known.

Oral – 15 minutes

Ecology of species at-risk turtles within the footprint of a transmission line and a proposed highway expansion.

Brooke Carroll[1], Samantha Noganosh[2], Jacqueline Litzgus[1]

[1]Laurentian University, Sudbury, Canada. [2]Magnetawan First Nation, Britt, Canada

Abstract

The traditional lands of Magnetawan First Nation (MFN) in Ontario were recently bisected by a transmission powerline and are threatened by a pending highway expansion that will further destroy and fragment wetlands, uplands and forests that until now, have remained relatively pristine. Long-term monitoring has revealed that MFN lands are home to several species at risk reptiles that are already facing population declines due to road mortality, and the loss of critical habitats within the footprints of the developments may exacerbate these declines. The two main objectives of our research are to: (i) develop a baseline understanding of turtle communities within the proposed highway expansion by producing occupancy maps, (ii) investigate the relationship between turtle occupancy and habitat characteristics, including previous developments, using canonical correspondence analysis. Based on heat maps of turtle observations along the current highway through MFN, we selected 8 priority wetlands for visual encounter and trapping surveys. At each wetland, landscape characteristics predicted to impact turtle occupancy will be measured both in situ and using ELC mapping. During the 2023 field season (up to July 27th), we captured 139 turtles of 3 species (28 recaptures, 111 new captures). These mark-recapture data will be used to quantify community metrics including richness, evenness and biomass. Our research will provide site-specific ecological data that can be used to inform decision making around protecting reptiles before, during and post development. We will combine ways of knowing while continually incorporating reciprocity into all aspects of our research.

Oral – 5 minutes

Student

A chromosome-level genome assembly for Western Chorus Frog (*Pseudacris triseriata*)

Ying Chen[1], David Lougheed[2], Stephen Lougheed[1]

[1]Queen's University, Kingston, Canada. [2]McGill University, Montreal, Canada

Abstract

The Western Chorus Frog (*Pseudacris triseriata*), as currently recognized, is a small, treefrog found in Canada and USA. Its populations are declining in many regions. While the main threat is often considered habitat loss in Canada, the causes of declines of peripheral populations and range contraction in New York remain elusive. Its evolutionary history is also complex. For example, *P. triseriata* mitotypes within Western Chorus Frogs are most closely related to Upland Chorus Frogs (*P. feriarum*), while USA *P. triseriata* populations for which we have data show nuclear DNA affinities with New Jersey Chorus Frogs (*P. kalmi*), suggesting historical hybridization. Moreover, the Boreal Chorus Frog (*P. maculata*) mitotype populations in eastern Ontario and western Quebec are more similar in nuclear DNA with Western Chorus Frog mitotype populations than the Boreal Chorus Frogs in Western Canada, also perhaps a result of a different historical hybridization event. Genomic data will be critical to examining this hypothesized reticulate evolutionary history, and also to evaluating population connectivity and local adaptation across landscapes. Here we present our plans for a chromosome-level genome assembly of the Western Chorus Frog to support this work. We collected a male frog from near Toronto, Ontario and sequenced its genome using the new PacBio HiFi Revio platform. A Dovetail Omni-C library was also sequenced with Illumina NovaSeq 6000. We will assemble the genome using HiFiasm and annotate it using publicly available transcriptome data of the Upland Chorus Frog (*P. feriarum*). This reference genome will be the first in subfamily Acrisinae.

Oral – 5 minutes

Student

Selection and validation of release sites for conservation translocations of a temperate-zone snake

Jonathan Choquette[1,2], Ali Mokdad[3], Trevor Pitcher[3], Jacqueline Litzgus[1]

[1]Laurentian University, Sudbury, Canada. [2]Wildlife Preservation Canada, Guelph, Canada. [3]University of Windsor, Windsor, Canada

Abstract

Poor habitat quality is one of the most important reasons for translocation failure with reptiles; therefore, release site suitability ought to be evaluated prior to conducting conservation translocations. In temperate zone snakes, translocations have failed due to high overwinter mortality, so practitioners have recommended that release sites be located near suitable hibernacula. The presence of a Life Zone (LZ), the underground space above the groundwater table and below the frost line, may indicate the presence of suitable hibernation habitat. In this study, our goals were to 1) identify potential Eastern Massasauga (*Sistrurus catenatus*) release sites at the Ojibway Prairie Provincial Park, in Windsor, ON, based on the presence of a LZ, and 2) to validate the suitability of those release sites by hibernating a surrogate species (Eastern Gartersnake, *Thamnophis sirtalis*) in constructed hibernacula. Four 1-ha study grids, each consisting of groundwater and frost sampling sites, were monitored from 2015 to 2019. Release sites were identified in each grid where a LZ of ≥ 10 cm was observed for ≥ 2 winters, and gartersnakes were successfully hibernated therein and at 2 reference sites over 3 winters. Overall, survival of sub-adults/adults was very high (100%; n = 20), regardless of site, whereas juvenile survival was lower (78%; n = 93). Survival of juveniles differed significantly among sites and ranged from 60% to 100%. Our results will guide the selection of release sites for Massasauga conservation translocations and will guide the development of a rigorous release site selection process for temperate zone snakes.

Oral – 5 minutes

Student

An inexpensive artificial snake hibernaculum built using readily availably plumbing supplies

Jonathan Choquette[1,2], Lincoln Savi[2], Jacqueline Litzgus[1]

[1]Laurentian University, Sudbury, Canada. [2]Wildlife Preservation Canada, Guelph, Canada

Abstract

To survive harsh winter conditions, temperate zone snakes require hibernacula that provide underground access to humid cavities at or above the groundwater table and below the frost line. Snakes may use a variety of naturally occurring features as hibernacula, including rocky crevices, tree root systems, or animal burrows. Alternatively, artificial hibernacula that replicate natural features and conditions may be intentionally created by humans for various reasons, including conservation (e.g., to enhance habitat in the wild for snakes of conservation concern), research (e.g., to observe and document behaviour or physiology of hibernating snakes), or captive breeding (e.g., to expose snakes to physiologically important conditions for the stimulation of breeding behaviour). Here we present a convenient and cost-effective design (ca. $90 ea.) for a multi-chambered artificial snake hibernaculum which can be installed by hand using a soil auger in areas with soil depths ≥ 1.50 m. Removable components allow for easy ingress and egress of snakes, and its threaded cap facilitates monitoring via borescope camera. We initially confirmed suitability of internal temperature and humidity in 4 hibernacula using small dataloggers. We then conducted hibernation trials using Eastern Gartersnakes (*Thamnophis sirtalis*) (n = 113) of all age classes over 3 winters in 18 hibernacula at the Ojibway Prairie Complex and Greater Park Ecosystem, Ontario. Pooled survival rate for all snakes was 82% (93 / 113), with 100% survival in the subsample of subadults/adults (20 / 20), attesting to the efficacy of our design for successful in situ snake hibernation.

Poster

Student

City slicker salamanders: Examining the behaviour of a widespread Plethodontid salamander across a gradient of urbanization

Joshua J.A. Christiansen, Julia L. Riley

Mount Allison University, Sackville, Canada

Abstract

In our modern era, there are a suite of environmental changes, like urbanisation, that challenge our planet's ecosystems. However, wildlife can persist and adapt to changes associated with urban expansion. For example, urban wildlife may exhibit different behavioural characteristics than non-urban conspecifics. Eastern Red-backed Salamanders (*Plethodon cinereus*) occur widely in Eastern North American forests across a gradient from highly urban to pristine natural areas. *Plethodon cinereus* are also behaviourally complex and the successful survival and persistence of urban populations may be due to adaptative behavioural change. We are studying whether the behaviour of *P. cinereus* differs between urban and natural forests by conducting repeated behavioural assays in the field to quantify three behavioural traits: tendency to explore a novel environment, boldness, and aggression toward a conspecific model. We are also collecting environmental data (e.g., temperature, relative humidity, etc.) to help us explore potential causes of behavioural differences between urban and natural populations. Fieldwork is on-going and we will present preliminary results whether salamander behavioural traits and their expression (e.g., repeatability) differ between habitat types. This work will add to our knowledge of how urban evolution is impacting amphibians. In addition, *P. cinereus* is a well-known indicator of forest health and understanding how anthropogenic activity influences their biology will also inform whether and how urbanization is impacting forest ecosystems. As the rate of urbanization continues to increase in Canada, this is critical information about how wildlife may adapt to and persist in our ever-changing world.

Poster

Student

The effects of urbanization on population health of Atlantic Canadian salamanders

Georgia Christie, Julia L. Riley

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Abstract

With a growing need for urban spaces, forests in New Brunswick and Nova Scotia are increasingly being encroached upon by expanding cities. These forests, which account for about 80% of these provinces' land area, are home to seven salamander species. Previous studies show that urbanization can affect the population size, genetic diversity, body condition and behaviour of amphibians, however the direction and magnitude of these impacts vary between species. This study seeks to understand how urbanization impacts terrestrial salamanders in the Maritimes. We predict that species richness, population size, and body condition will differ between urban parks and natural forests, and that larger and healthier communities will be found in natural forests. To test our hypothesis, we searched for salamanders in a standardized 30 m^2 circular area by flipping cover objects in 10 urban forests (those that occur within 1 km^2 of >50% hard-surface infrastructure) and 10 minimally disturbed forests (those that occur within 1 km^2 of <5% hard-surface infrastructure). These surveys aimed to quantify salamander species richness, abundance, and body condition. During each survey, we also measured soil pH, canopy cover, soil temperature and moisture, air temperature, relative humidity, and leaf litter depth. Field work for this project is ongoing, and we will present our preliminary results at CHS. These findings will contribute to our understanding of the impacts of urbanization on Eastern North American amphibians, and whether particular conditions allow terrestrial salamanders to thrive in urban parks.

Poster

Student

Windfarm and wildfire: Spatial ecology of an endangered freshwater turtle in a recovering landscape

Stéphanie Delay[1], Ori Urquhart[2], Jacqueline Litzgus[1]

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Abstract

Wind energy presents many advantages, but windfarms pose risks to wildlife and habitats. We hypothesized that habitat changes caused by the impacts of windfarm construction and wildfire would alter the spatial ecology of Spotted Turtles (*Clemmys guttata*). In a space-for-time study design, we outfitted 28 turtles with radio transmitters in 3 treatments (Control *n* = 10, Windfarm *n* = 9, Windburn (windfarm and wildfire; *n* = 9)) and located turtles every 3–5 days throughout the active season. We did not detect any significant differences in turtle body condition, home range size, minimum daily distance moved, or microhabitat selection among treatments. Macrohabitat selection differed slightly among treatments; only Windburn turtles used wet depressions on rock barrens, which may indicate that turtles exploited early successional habitats created by wildfire. Turtles did not avoid habitats near windfarm infrastructure yet did not cross service roads unless a culvert was present, highlighting the need to maintain habitat connectivity in modified landscapes. Our findings suggest that Spotted Turtles that survived the acute impacts of the wildfire and windfarm construction were able to navigate the recovering landscape, but a Before–After–Control–Impact study is required to understand the acute and long-term impacts of windfarms and wildfires on turtles.

Poster

Student

Impacts of silvicultural treatments on small fauna co-occurrence in the context of assisted tree migration.

William Devos, Mathieu Bouchard, Marc J. Mazerolle

Centre d'étude de la forêt, Département des sciences du bois et de la forêt, Faculté de foresterie, géographie et géomatique, Université Laval, Québec, Canada

Abstract

In response to climate change, the assisted migration of trees to latitudes more conducive to their growth is considered to maintain forest species diversity. However, this relocation, combined with silvicultural treatments, can alter the habitat of endemic small fauna such as amphibians and invertebrates. In this context, we aimed to assess the impact of silvicultural treatments associated with assisted tree migration on the habitat selection and co-occurrence of amphibians and invertebrates. We investigated clear-cutting and partial cutting effects on site occupancy by the Eastern Red-Backed Salamander (*Plethodon cinereus*), ground beetles (Carabidae), and springtails (Collembola). We selected 60 sites within our study area in mixedwood forest in the Portneuf wildlife reserve in central Quebec. We used artificial cover objects to sample salamanders, whereas beetles were captured with pitfall traps, and collembola were collected in soil samples. Ground beetles were categorized as salamander prey or salamander competitors based on salamander gape size. Preliminary results revealed no variation in site occupancy for salamanders and the beetles of the salamander competitor group. However, the probability of occupancy of beetles in the salamander prey group was higher in the partial cutting treatments than in either the control or total cut treatments. Beetle detection varied with precipitation level during the season. These first steps will help us develop a structural equation model linking the occupancy of salamanders, carabid, and collembola on the forest soil to assess interspecies relationship.

Poster

Ophidiomycosis (snake fungal disease) surveillance in snake populations within an urban park in Southern Ontario

Christine Drader, Donnell Gasbarrini

Toronto Zoo, Toronto, Canada

Abstract

Ophidiomycosis (snake fungal disease) is caused by the pathogen *Ophidiomyces ophiodiicola* and can cause dermal lesions, facial swelling, and, in some cases, death in infected snakes. Three established sites in Scarborough have been surveyed over 4 to 10 years using artificial cover objects to identify Eastern Milksnake (*Lampropeltis triangulum*) and other snake species within an urban park. Until 2020, there were very few Ophidiomycosis observations. Beginning in 2020, swabs were taken from snakes exhibiting symptoms and sent to Canadian Wildlife Health Cooperative (Guelph, ON) for polymerase chain reaction analysis, to detect *O. ophiodiicola*. Recently, confirmed cases of Ophidiomycosis have increased across the three sites (n=1 in 2021, n=9 in 2022). Despite observations of Eastern Gartersnakes (*Thamnophis sirtalis sirtalis*), Northern Red-bellied Snakes (*Storeria occipitomaculata occipitomaculata*), and Dekay's Brownsnakes (*Storeria dekayi*), symptoms of infection were primarily observed and solely confirmed in Eastern Milksnakes. As a result, in 2023, we swabbed all captured snakes in May and June to increase detection of Ophidiomycosis. To date, 43 swabs, including 26 from snakes presenting Ophidiomycosis symptoms, across three species (n=20 Eastern Milksnakes, n=2 Eastern Gartersnakes, n=4 Northern Red-bellied Snakes) were sent for analysis. Results are pending, and will be incorporated into a national screening effort, in addition to being used for conservation planning to identify if there is species-specific prevalence of infection, and to identify persistence of this pathogen over time. This is a first step in identifying knowledge gaps of Ophidiomycosis in this area and will provide future opportunities for research and collaboration.

Oral – 5 minutes

Natural variation in chorus frog population size and evaluation of reintroduction techniques after restoration

Jeanne Dudemaine[1], Lyne Bouthillier[2], Emiko Wong[3], Odile Colin[3], Sophie Tessier[4], Vance Trudeau[5], Marc Mazerolle[1]

[1]Université Laval, Québec, Canada. [2]MELCCFP, Québec, Canada. [3]Biodôme de Montréal, Montréal, Canada. [4]SEPAQ, Mont-St-Bruno, Canada. [5]University of Ottawa, Ottawa, Canada

Abstract

Reintroduction methods have been developed for several amphibian species. The Great Lakes, St-Lawrence, Canadian shield populations of the Western Chorus Frog (*Pseudacris triseriata*) has become threatened due mostly to wetland habitat loss following urban expansion in the Montérégie area of southern Quebec. Our project aims to evaluate the persistence of chorus frog populations following reintroduction in restored habitat. The project has two objectives: (1) to assess the abundance and survival of individuals in reintroduced populations and compare them to natural populations and (2) to determine the impact of larval density in mesocosms on short term and long-term survival.

We conducted a capture-mark-recapture study in three natural ponds and in three constructed ponds following release of juveniles during the 2022 and 2023 breeding seasons. One of the three natural populations became extinct. The size of the two remnant populations was low in 2022 (19-35 individuals), but substantially higher in 2023 (239-363 individuals). The estimates for the constructed ponds followed the same pattern, with estimated abundances reaching 132 individuals in 2023. In 2023, 27% of adults captured in constructed ponds were metamorphs released the year before. Tadpoles were reared in mesocosms in 2022 (1 191 tadpoles) and 2023 (2 214 tadpoles) and were released after metamorphosis in the restored habitats. Tadpole survival varied between 37 to 49%, whereas size of metamorphs decreased with larval densities in mesocosms. These results in the first 2 years are promising, and we are set to develop eDNA methods to assess the persistence of introduced populations.

Poster

Student

Assisted reproductive technology implications for snake conservation in Canada

Ginger Elliott

Queen's University, Kingston, Canada. African Lion Safari, Cambridge, Canada

Abstract

Assisted Reproductive Technologies (ART) have been used in human medicine, veterinary science, and agriculture for years but have only recently been applied to wildlife conservation. However, the value of these tools is rapidly gaining recognition. The cryopreservation of gametes and tissues from threatened and genetically unique species has proven invaluable in efforts to maintain genetically diverse ex situ populations. Work to date has been biased towards charismatic megafauna and mammals; for example, the San Diego Zoo Global and Smithsonian Conservation Biology Institute successfully cloned a black-footed ferret using tissue from a deceased founder. The goals of our research are to: 1) develop safe handling and collection procedures for semen from a range of Canadian snakes, 2) develop cryopreservation protocols for the semen of at-risk snake species and 3) investigate gamete rescue from wild mortally wounded snakes.

Development of ART can help alleviate housing needs, decrease the need to transfer live animals among conservation breeding facilities or across borders, preserve distinct evolutionary lineages, and increase effectiveness of reintroduction and reinforcement plans. To date, published accounts of semen collection and artificial insemination among Canadian snakes, exist only for Thamnophis species. Since 2022, we have been able to successfully collect viable semen from nine of Canada's snake species in ex situ conditions. We are now working to develop species-specific cryopreservation protocols for two species, Grey Ratsnake (*Pantherophis spiloides*) and Eastern Massasauga Rattlesnake (*Sistrurus catenus*) as ex situ management has been identified as a potential recovery tool for their conservation in Canada.

Oral – 15 minutes

Student

The call of the Ottawa wilds: Seasonal and diel patterns in calling behaviour of Boreal Chorus Frogs (*Pseudacris maculata*)

Jeffrey P. Ethier[1], Nionta Habib[1], Marc J. Mazerolle[2], Vance L. Trudeau[1]

[1]University of Ottawa, Ottawa, Canada. [2]Université Laval, Quebec City, Canada

Abstract

Boreal Chorus Frogs (*Pseudacris maculata*) are a declining amphibian species in eastern Ontario and southern Quebec. One of the first steps to promoting species recovery is understanding the phenology of the local populations, specifically the timing of the active breeding season. For frogs and toads, this information can be obtained by recording the calling activity of males at breeding ponds as calls help females locate and select mates. We deployed acoustic recording units at three natural breeding locations in the Ottawa, Ontario region during the spring (late March to early May) of 2022 and 2023. At each location, we scored Boreal Chorus Frog calling intensity based on the standard North American Amphibian Monitoring Program index, which ranges from 0 (no calling) to 3 (continuous calling). Using ordinal logistic regression models, we found that calling intensity peaked between April 7 and April 12 and then declined later in the year, was highest between 12:00 and 14:00, and that the likelihood of highest calling intensity (level 3) increased with increasing temperature. The peak in calling activity during the early afternoon is surprising given Boreal Chorus Frogs were previously assumed to call most often in the evening/night. This information can not only inform the best timing for local population monitoring projects, but can also be used to build dynamic artificial choruses that accurately simulate natural patterns in calling activity to be used in captive breeding programs.

Oral – 15 minutes

Student

Assessing the ecohydrological impacts of wildfire on Massasauga Rattlesnake (*Sistrurus catenatus*) overwintering habitat

Taylor North[1], Chantel Markle[2], Rachel Fallas[1], Paul Moore[1], Mike Waddington[1]

[1]McMaster University, Hamilton, Canada. [2]Waterloo University, Waterloo, Canada

Abstract

Peatlands in the Eastern Georgian Bay region of Ontario provide important overwintering habitat for the Eastern Massasauga Rattlesnake (*Sistrurus catenatus*), a species considered at-risk across its North American range. Overwintering habitat is considered suitable when temperatures are above 0°C and the water table position provides moisture without risk of flooding. This combination of suitable ecohydrological conditions, also known as the resilience zone, commonly occurs in peatland hummocks which are raised microforms on the peat surface. Due to a changing climate, peatlands are at risk of increased wildfire frequency and burn severity which may threaten overwintering habitat availability and suitability through changes in peat thermal and hydrological properties. In 2018, a wildfire burned over 11,000 ha of the Eastern Georgian Bay landscape which supports critical habitat for the Massasauga. To assess the potential impact of wildfire on Massasauga overwintering habitat, we monitored water table, precipitation, and peat thermal dynamics in hummocks across a gradient in burn severity (unburned–severely burned) in three burned and three unburned peatlands from 2019–2022. We found that hummocks were able to provide unfrozen and unflooded habitat regardless of peat burn severity and that interactions between peatland surface topography and watershed-scale characteristics likely provide the greatest control on microhabitat suitability. We argue there is an urgent need to examine how upland ecohydrology influences overwintering habitat suitability and availability after wildfire in a rock barrens landscape to identify peatland ecosystems that provide resilient habitat for species at risk.

Oral – 5 minutes

Student

Restoration design and ecohydrological assessment of peatland overwintering habitat for reptiles

Chantel Markle[1], Rachel Fallas[2], Kieran Lehan[2], Paul Moore[2], Mike Waddington[2]

[1]Waterloo University, Waterloo, Canada. [2]McMaster University, Hamilton, Canada

Abstract

The primary objectives of our study were to develop and evaluate a novel restoration design for the construction of peatland overwintering habitat for reptiles in Canadian Shield landscapes by assessing the ecohydrological function of overwintering peatlands post-construction. First, we used reptile occurrence data from 115 wetlands surveyed during springtime emergence to guide our habitat restoration design. We identified wetland surface spatial complexity and cover composition as accurate discriminators of reptile overwintering assemblage, and we used these results to inform our restoration. After peatland construction, we compared two constructed sites to three natural peatlands occupied by overwintering reptiles, and three natural peatlands unconfirmed to support overwintering reptiles. We assessed overwintering habitat function by quantifying the resilience zone (the vertical space between the 0°C isotherm and water table) and calculating resilience zone metrics such as frequency and duration of resilience zone loss. Ecohydrological metrics (e.g., water table recession, snow depth, temperature stability) were also quantified to identify key drivers of resilience zone loss. The ecohydrological function of the constructed peatlands was considered initially successful if the resilience zone and ecohydrological gmetrics were comparable to the natural peatlands occupied by overwintering reptiles, recognizing that ecohydrological function will continue to evolve in the years following peatland restoration. Although specific targets for evaluating the success of overwintering habitat have yet to be developed and formally adopted, our study demonstrates an approach for assessing the ecohydrological function and performance of peatland restoration for reptile overwintering habitat using resilience zone metrics.

Poster

Student

Integrating eDNA and citizen science observations to model distribution of a temperate freshwater turtle near its northern range limit

Wenxi Feng, Stephen Lougheed

Queen's Univeristy, Kingston, Canada

Abstract

To determine species distributions and the factors underlying them, reliable occurrence data are crucial. Assembling such data can be challenging for species with cryptic life histories or that occur at low densities. We developed species-specific eDNA protocols, from sampling through data interpretation, to detect the Eastern Musk Turtle (*Sternotherus odoratus*) and tested whether eDNA occurrences change our understanding of the species distribution and the factors that shape its northern range limit. We used Species Distribution Models (SDMs) with full parameter optimization on citizen science observations of *S. odoratus* in southern Ontario alone and together with eDNA occurrences. Our eDNA protocol was robust and sensitive. SDMs built from traditional observations and those supplemented with eDNA detections were comparable in prediction accuracy. However, models with eDNA detections suggested that the distribution of *S. odoratus* in southern Ontario is underestimated, especially near its northern range limit, and that it is shaped by thermal conditions, hydrology, and elevation. Our study underscores the promise of eDNA for surveying cryptic aquatic organisms in undocumented areas, and how such insights can help us to improve our understanding of species distributions.

Oral – 15 minutes

That changed a tad(pole): Varying ecological effects of toad tadpoles with inter-annual variation

Jessica Ford[1], David Green[2]

[1]Redpath Museum, McGill University, Montreal, Canada. [2]Redpath Museum, McGill University, Montreal, Canada

Abstract

A species' ecological effect is often thought to be static, with species having fixed roles within an ecosystem. However, static ecosystems are often the exception rather than the rule. The effects of a species in an ecosystem can change due to year effects such as temperature, precipitation, droughts, and frost dates. The impact of year effects is expected to increase with climate change as extreme weather events become more common. Despite this, studies of species ecological roles and interactions are rarely repeated between years, resulting in an incomplete understanding of these complexities. To gain a better understanding of species dynamics in small pond ecosystems, we replicated an outdoor mesocosm experiment assessing the effect of toad tadpoles on their environment over three years, using Fowler's Toad (*Anaxyrus fowleri*) and American Toad (*A. americanus*) tadpoles in Long Point, Ontario. Even in semi-controlled mesocosm environments, the effect of toad tadpoles on their surrounding ecosystem varied significantly between years. Everything from the effect of toad tadpoles on their algal food sources to the outcome of interspecific competition differed between years. Although each year was different, the results were not random, with trends being consistent between mesocosms in the same experimental group within a given year. These results demonstrate the dynamic relationship that toad tadpoles have with their environment, and the impact that inter-annual variation can have on their ecological effect. These results also highlight the need for more field experiments to be replicated across years in order to capture the full scope of a species' ecological impact.

Oral – 15 minutes

Student

Population viability analysis and influence of headstarting on an urban Blanding's Turtle (*Emydoidea blandingii*) population

Rachelle Fortier, Donnell Gasbarrini, Christine Drader

Adopt-A-Pond (Toronto Zoo), Toronto, Canada

Abstract

The Blanding's Turtle (*Emydoidea blandingii*) population in the Rouge River Watershed was deemed functionally extinct in the early 2000's. In response, the Adopt-A-Pond Wetland Conservation Program at the Toronto Zoo has been managing this population through artificial incubation of eggs and headstart efforts. To provide insights into the success of these efforts so far, and to gain insights into worthwhile management adjustments, population viability analyses (PVAs) were conducted in program VORTEX. These analyses used demographic data from 2013 to 2022 to evaluate population trajectory over the next 200 years and to compare the influence of various management strategies on population growth rates, population size, and probability of extinction. Preliminary results are optimistic, with population size increasing and moderate headstart survival, demonstrating that headstarting efforts are having a positive impact on the population. Despite population size increasing as a result of headstarting efforts, results demonstrate that continued management will be necessary to avoid negative stochastic growth rates. For example, under base scenario conditions (where the population is supplemented by 50, 2-year-old headstarted turtles per year for the next 12 years), stochastic growth rate increased as years of supplementation increased. In contrast, the scenario with the highest growth rate occurred when the population was supplemented by a minimum of 200, 2-year-old headstarted turtles per year for the next 50 years. Overall, these results indicate that continued management is needed to augment this Blanding's turtle population, and further supports headstarting as a viable conservation method.

Oral – 15 minutes

Impact of imidacloprid-based chemical control for Hemlock Woolly Adelgid (*Adelges tsugae*) on the Eastern Red-backed Salamander (*Plethodon cinereus*)

David Fox[1], Christopher Edge[2], Graham Forbes[3]

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[2]Natural Resources Canada, Canadian Forest Service, Fredericton, New Brunswick, Canada.
[3]Faculty of Forestry and Environmental Management, and Faculty of Science, University of New Brunswick, Fredericton, New Brunswick, Canada

Abstract

Invasive species can result in large scale negative environmental impacts through altering various components of ecosystem structure and function. When choosing chemical control, managers face trade-offs between the negative consequences of the invasive species with those of the pesticide. Extensive research explores the impacts of chemical insecticide application on aquatic environments; however, less is known about the non-target effects on fossorial species. The Hemlock Woolly Adelgid (HWA, *Adelges tsugae*) is an invasive insect species that is causing large scale death and decline of Hemlock trees across eastern North America. In response, the neonicotinoid insecticide imidacloprid is used to control infestation, but can persist in soil and leach into surface and groundwater where it could lead to impacts on fossorial species such as salamanders, which are particularly sensitive to environmental change due to their highly permeable skin. This project investigates how Eastern Red-backed Salamander (*Plethodon cinereus*) populations within southwestern Nova Scotia's Eastern Hemlock stands are affected by HWA infestation and the application of an imidacloprid-based insecticide for HWA control. I performed visual encounter line transect surveys through two infested sites each of which consisted of 4 treated (via imidacloprid basal bark spray) and 4 untreated 1 ha stands, and 2 uninfested sites consisting of 4 mature hemlock-dominated stands. Salamanders were caught and processed for morphological measurements before release. This research will provide insight into the non-target effects of imidacloprid use to control HWA and the effects of environmental change from HWA on an often-overlooked fossorial species. Preliminary results will be presented at the conference.

Poster

Investigating the presence of non-native Gartersnakes (*Thamnophis sirtalis)* on the island of Newfoundland

Andrea Gigeroff[1,2], Julia L. Riley[2], James Baxter-Gilbert[2], Jacqueline Litzgus[1]

[1]School of Natural Sciences, Laurentian University, Sudbury, ON, Canada. [2]Department of Biology, Mount Allison University, Sackville, NB, Canada

Abstract

Since glaciation, the island of Newfoundland has not been home to any native herpetofauna. In recent years, however, Gartersnakes (*Thamnophis sirtalis*) have been observed in Newfoundland with official reports dating as far back as 2010. The extent of the snakes' presence on the island, the source of their introductions(s), and their invasive potential (i.e., their capacity to detrimentally impact the native ecosystem) have not yet been investigated. Our objectives are to 1) identify the source of Gartersnakes on the island using genetic markers, 2) determine the diet of Newfoundland Gartersnakes using gut content analyses, and 3) compare the behaviour of the Newfoundland Gartersnakes to conspecifics in their native range using standard behavioural assays. This summer, we carried out initial investigations to determine the spatial extent of Gartersnakes on the island via field surveys and through informal discussions with local community members. We discovered reports of snakes on the island extending as far back as the 1950s, and an abundance of snake sightings on the west coast. Additionally, there appear to be low densities of snakes across Newfoundland. We conducted visual surveys and pilot behavioural assays to determine whether the snakes on Newfoundland are bolder than conspecifics in their native range, and collected specimens to determine whether the Gartersnakes are eating native species. Our goal is to undertake a comprehensive study about the natural history of non-native snakes on Newfoundland that will guide development of management practices to reduce the impact of this species on native fauna as necessary.

Poster

Student

Assessing the impacts of climate change on Gray Ratsnake geographic range in Southern Ontario

Andrea Gomez-Sanchez, Stephen C. Lougheed

QUEEN'S UNIVERSITY, KINGSTON, Canada

Abstract

Over the last decades, human-caused climate change has been a major driver of species distributional shifts and biodiversity loss. Reptiles had been disproportionally impacted by anthropogenic stressors worldwide with a high proportion of species threatened with extinction. In Canada, 77% of reptile species are at risk and most populations are at the northern limit of their geographic range, making them potentially more vulnerable to environmental change. The Gray Ratsnake (*Pantherophis spiloides*) is widely distributed in the Eastern United States and relatively abundant in the southern part of its range. However, in Canada, its current range is limited to southwestern Ontario/Niagara region (Carolinian population), where it is considered endangered, and to southeastern Ontario (Frontenac Axis), where it is classified as threatened. As the global mean temperature continues to increase, climate will likely become a key factor influencing the future of these populations. We aim to assess the impact of climate change on Gray Ratsnake geographic range using niche modelling approaches. We will use the occurrence database from the Natural Heritage Information Centre (NHIC) to investigate the relationship between climate, land use, functional habitat and species occurrences, and use this information to build future climatic models under different climate change scenarios. Our models will help us to better understand species' responses to global warming and human-related landscape changes and to inform the design and implementation of effective conservation strategies for Gray Ratsnakes.

Oral – 5 minutes

Student

Toads at the spa: Western Toad breeding activity at Liard Hot Springs

Purnima Govindarajulu[1], Jennifer Heron[2], Brian Slough[3]

[1]BC Ministry of Water Land and Resource Stewardship, Victoria, Canada. [2]B.C. Ministry of Water Land and Resource Stewardship, Victoria, Canada. [3]Independent Researcher, Whitehorse, Canada

Abstract

The Western Toad (*Anaxyrus boreas*) has a broad distribution throughout western Canada, lives in a wide range of habitats and has one of the most northly distributions of anurans in this region. The species normally breeds in late May. Here we provide natural history notes on a Western Toad population that breeds in early March in the thermal waterways within Liard River Hot Springs Provincial Park. In April 2021, we observed toads in all stages of their life cycle (amplexus, egg strings, variously sized tadpoles, metamorphs, and juveniles) within the thermal waterways of the park. The water temperature in the streams and pools varies from 15-38°C, depending on proximity to the source and distance from the edge of the pools, side channels and streams. Snow still covers the surrounding landscape. Observation in June 2023 indicated that by June all the toads had metamorphosed and left the hot spring. Winter breeding has also been observed at warm springs near Atlin, B.C., and in Utah. The observation of hot spring breeding toads raises many questions such as: What triggers breeding in the hot springs? Do toads arrive in the fall and remain active in the hot springs habitat until breeding time or are they hibernating under tufa? And most importantly, is the early thermal spring breeding site selection plastic or is there genetic segregation between winter and spring breeding toads. The many hot springs of northern B.C. and Yukon afford an interesting natural laboratory to study this behaviour in Western Toads.

Oral – 5 minutes

Saving the toads (and how we did it)

David Green

McGill University, Montreal, Canada

Abstract

Notwithstanding widespread concern over the past 30 years about declining amphibian populations and the many possible threats to their continuing existence, how can threatened amphibian populations actually be saved? Since 2010, Fowler's Toads (*Anaxyrus fowleri*) in Canada have been listed federally as an endangered species based on the small number of remaining Canadian populations and evidence of an ongoing decline in their abundance, particularly at Long Point, Ontario. Ten years ago, loss of quality breeding habitat, attributed the spread of invasive *Phragmites* reeds, was identified as a likely primary contributor to the decline in the toads' abundance at Long Point. Ponds were dug in the marshes and tadpoles were reared in mesocosms, but neither effort had much tangible effect. In recent years, however, there have been significant changes to the landscape related to high water levels in Lake Erie. Shoreline dunes have washed out, creating open sand flats and shallow, sandy pools where the toads now breed with great success. Their abundance has risen dramatically for the first time in a decade. How to save the toads? Give them what they need.

Oral – 15 minutes

Investigating the responses of turtles and snakes to *Phragmites australis* management at St. Clair National Wildlife Area

Kaitlyn Hall, Ori Urquhart

Blazing Star Environmental, Oshawa, Canada

Abstract

Blazing Star Environmental is working with Environment and Climate Change Canada – Canadian Wildlife Service (ECCC-CWS) to evaluate the outcomes of *Phragmites australis australis* management on at-risk turtle and snake species at St. Clair National Wildlife Area (SCNWA). This includes assessing variation in relative reptile abundance and habitat use before and after management action through comparison of managed and reference plots. Whether or not this invasive species has impacted habitat use of at-risk reptiles is relatively unknown in Ontario. It is unclear whether these species avoid *Phragmites*, and if they do, the mechanism driving this avoidance remains unknown.

In addition to informing *Phragmites* management, these surveys will provide ECCC-CWS with valuable information on critical habitat and will contribute to the development of action plans for Threatened and Endangered turtle and snake species at SCNWA.

SCNWA is one of the most important waterfowl staging areas in southern Ontario and provides habitat for 35 federally listed species at risk. Understanding the effects of *Phragmites* on reptile habitat use will guide management strategies and will be essential in mitigating negative impacts on species at risk in this federally significant wetland.

Oral – 15 minutes

Updates and insights from the Saving Turtles at Risk Today (START) and Conservation Action, Research, and Education about Snakes (CARES) projects in central Ontario

Jeff Hathaway, Kelsey Moxley

Scales Nature Park, Oro-Medonte, Canada

Abstract

The START and CARES projects are landscape scale conservation efforts for multiple turtle and snake species in central Ontario. Updates and insights from the last decade of work will be presented, regarding population monitoring and augmentation, threat assessment and mitigation, community engagement and research.

Oral – 15 minutes

Restructuring, rebranding, and succession planning: The past, present and future of Scales Nature Park

Jeff Hathaway, Kelsey Moxley, Sarah Jane Stanger Guy

Scales Nature Park, Oro-Medonte, Canada

Abstract

Scales Nature Park has grown and evolved since its grand opening in 2010. Beyond educating people about Canadian reptiles and amphibians, we now conduct a wide diversity of work in various locations and have spawned spin-off organizations. Coming out of the pandemic, it was clear that our operations needed restructuring in order to optimize things for the future. This process is well underway, and we'd like to share these changes to what we're doing, how we're doing it, and our plans for the future. Some of the changes may benefit the work of CHS members and other organizations.

Poster

Lessons on constructing effective breeding ponds for imperilled *Ambystoma* salamanders based on data collected from Pelee Island, Ontario

Thomas Hossie, Jordan McDonald, Dennis Murray

Trent University, Peterborough, Canada

Abstract

Wetland loss has dramatically impacted herpetofauna populations globally. The loss of these habitats in Southern Ontario has been particularly severe, jeopardizing the viability of many pond-breeding amphibians. For example, Pelee Island, Ontario experienced extensive draining in the late 1800s, which led to declines in many wetland-dependent species including the federally endangered Small-mouthed Salamander (*Ambystoma texanum*) complex. In recent decades, several ponds have been constructed to support pond-breeding amphibians, however many of these ponds fail to meet habitat requirements and are unlikely to support viable populations. Our team previously identified ways that pond construction could be improved to better support *Ambystoma* salamanders. Fortuitously, the Nature Conservancy of Canada (NCC) has been engaged in wetland restoration activities on Pelee Island and was able to use our recommendations to construct three salamander breeding ponds in 2020. We subsequently monitored these ponds by collecting habitat data, conducting dipnet surveys, and monitoring metamorph emergence. One pond was colonized in 2021 and produced viable metamorphs, while two ponds were initially too shallow but were deepened before the next breeding season. In 2022 and 2023 all three ponds were colonized and supported abundant larvae. Simultaneously monitoring of additional ponds enabled us to estimate that constructed ponds on Pelee Island take ~20-50 years to reach habitat quality analogous to natural sites. Yet, the three new NCC ponds show a habitat quality index well beyond that expected based on their age, thereby shortening the naturalization period, and showcasing the value of evidence-based habitat construction for imperilled taxa.

Oral – 15 minutes

Ex situ management stabilizes the genetic health of Canada's most endangered amphibian, the Oregon Spotted Frog (*Rana pretiosa*); but is it enough?

Briar Hunter[1], Anne-Laure Ferchaud[2,3], Eric Normandeau[3], Kendra Morgan[4], Arne Mooers[5], Gabriela Mastromonaco[6], David Lesbarrères[1,7]

[1]Laurentian University, Sudbury, Canada. [2]Parks Canada, Québec, Canada. [3]Université Laval (IBIS), Québec, Canada. [4]Ministry of Water, Land and Resource Stewardship (BC), Surrey, Canada. [5]Simon Fraser University, Burnaby, Canada. [6]Toronto Zoo, Toronto, Canada. [7]Environment and Climate Change Canada, Sudbury, Canada

Abstract

Retaining sufficient genetic variability for both short and long-term sustainability is a chief aim of *ex situ* programs for threatened species. Conservation breeding and reintroduction programs exist but oftentimes little is known about the genetic health of in situ or ex situ populations. We collected genetic samples from both wild and zoo populations of Canada's most endangered anuran, the Oregon Spotted Frog (*Rana pretiosa*), and compared their genetic diversity (observed heterozygosity (Ho), inbreeding coefficients (F), and effective population sizes (Ne)) using single-nucleotide polymorphisms (SNPs). We also assessed population structure to inform current breeding strategies. We found zoos have retained stable genetic variability despite the low diversity available in wild populations (maximum Ho = 0.155), but inbreeding levels remain high in both zoos and the wild and genetic diversity will be depleted from wild populations within 50 to 100 generations. Zoo populations were less differentiated from their wild source populations than the latter among themselves, indicating sufficient representation of wild populations in zoo populations. The patterns we uncover support continued collaboration of ex situ and in situ endeavours as supplementation will likely be required for the long-term viability of the very wild populations the zoos rely on for genetic sustainability.

Oral – 15 minutes

Student

Molecular evolution of visual opsin genes in side-neck and hidden-neck turtles

Golnar Jalilvand[1], Wali Mir[1], Rayna Bell[2], Belinda Chang[3], Ryan Schorr[1], Wali Mir[1], Angela Adjei[4]

[1]York University, Toronto, Canada. [2]California Academy of Science, San Fransisco, USA.
[3]University of Toronto, Toronto, Canada. [4]California Academy of Science, Toronto, Canada

Abstract

Visual adaptation to different light environments tends to be reflected in the opsin genes that encode the protein component of the light-sensitive visual pigments. In vertebrates, there are five classes of visual pigments found in the retinal photoreceptors, each with a distinct opsin gene that is maximally sensitive to a different portion of the light spectrum. Four of these are expressed in the bright-light sensitive photoreceptors providing vertebrates that express them all the basis for tetrachromatic colour vision, such as birds and turtles. However, our understanding of visual opsin diversity in turtles is based solely on hidden-neck turtles (Cryptodira) and we lack information from side-necked turtles (Pleurodira). Here we begin to fill this ~200 Ma evolutionary gap by investigating the molecular evolution of visual opsins from both groups using an eye transcriptome from *Pelomedusa subrufa* as well as four pleurodiran and 24 cryptodiran whole genomes. We found that *P. subrufa* expressed all five visual opsin genes, like Cryptodira species investigated to date, and that these genes were also present in all four pleurodiran genomes. To investigate how vision may have diverged between these species with different visual ecologies, we analyzed differences in spectral tuning and estimated selective pressures using models of codon evolution. Overall, we found that turtle visual opsins were remarkably conserved despite ~200 My of divergence. We also found evidence for positive selection in a subset of the opsin genes and variation in selective constraint between discrete ecological and life history categories reflecting potential functional adaptation.

Oral – 15 minutes

Student

The Canadian BioGenome Project

Samantha Jones[1], Jacqueline Litzgus[2], Pamela Rutherford[3], Sreeja Leelakumari[1], Solenne Correard[1], Maribeth Murray[4], Julie Lee-Yaw[5], Amy Chabot[6], Hesther Yueh[1], Stephen Scherer[7], Ioannis Ragoussis[8], Steven Jones[1]

[1]1. Canada's Michael Smith Genome Sciences Centre, Vancouver, Canada. [2]Laurentian University, Sudbury, Canada. [3]Brandom University, Brandon, Canada. [4]University of Calgary, Calgary, Canada. [5]University of Ottawa, Ottawa, Canada. [6]Queen's University, Kingston, Canada. [7]University of Toronto, Toronto, Canada. [8]McGill University, Montreal, Canada

Abstract

Canadian biodiversity is one of our greatest national treasures. From coast to coast to coast, Canada is home to more than 100,000 plant and animal species, in environments ranging from desert to the Arctic. Many of these species are under threat due to rapid changes in climate and other human-led impacts on our environment. The Canadian BioGenome Project seeks to better understand and conserve our natural heritage by sequencing the genomes of 400 Canadian species. The species we sequence are selected based on existing and established priorities of Indigenous peoples, federal and provincial organizations, and conservation and wildlife groups. These organization have a history of (or a strong interest in) using genomic information to develop tools and solutions for the maintenance of biodiversity, monitoring, conservation, restoration and environmental management. The data generated will be easily accessible through a user-friendly geospatial platform of metadata and genomics data.

Canada has approximately 100 reptiles and amphibians, more than half of which have been listed as endangered, threatened, or special concern by COSEWIC. As of July 2023, samples for 17 reptile and amphibian species have been collected. Sequencing data has been generated for 5 species (with an additional 4 species in the sequencing queue), and extractions and sequencing for 8 species are planned. Two genome assemblies are available on NCBI (PRJNA813333). We are seeking input of which species should be sequenced, as well as access to samples for sequencing.

Oral – 15 minutes

Highway to Hell: Estimating road-crossing hotspots and modeling mortality for endangered Jefferson Salamanders (*Ambystoma jeffersonianum*)

Justine Kaseman[1], Ryan Norris[1], Jessica Linton[2]

[1]University of Guelph, Guelph, Canada. [2]Natural Resource Solutions Inc., Waterloo, Canada

Abstract

Roads are one of largest and most widespread threats facing herpetofauna because they create barriers to migration, reduce habitat, and cause mortality through collisions with vehicles. A population of endangered Jefferson Salamanders (*Ambystoma jeffersonianum*) in southern Ontario is threatened by a major road bisecting their annual migration route between their breeding pond and overwintering habitat. Mitigation strategies for the population include closing the road during spring and fall migration and installing eco-passages at "hotspots" (areas of concentrated road crossings). However, the optimal location of where to install eco-passages to minimize mortality and the effectiveness of the road closure remains uncertain. In 2022 and 2023, we conducted 74 nightly road surveys to estimate road crossing hotspots, model how weather conditions influence movement rates, and predict how traffic volume and road closures influence mortality rates. The Mar - May spring migration hotspot was located adjacent to the breeding pond and encompassed 48% of the total breeding adults that crossed the 2 km stretch of road. During the Sept - Nov fall migration, most crossing individuals were juveniles (85%), who demonstrated a more diffuse migration, with the hotspot located further from the breeding pond than spring. Movement rates were positively related to nightly humidity and date. Using estimates of crossing speeds, we show how temporary road closures are likely to be ineffective at stemming mortality rates. Our research helps inform road mortality mitigation strategies and optimal survey design for this endangered species, both at this site and across its range.

Oral – 15 minutes

Student

Evolutionary history and geography as predictors of divergence in trilling chorus frog (*Pseudacris*) advertisement call attributes

Dylan Kaufman[1,2], Ying Chen[2], Stephen Lougheed[2]

[1]University of Toronto, Toronto, Canada. [2]Queen's University, Kingston, Canada

Abstract

Quantifying traits associated with mate recognition such as advertisement calls is a key step to understanding biological speciation. For many organisms, divergence in male vocalizations and female preference underlies speciation. Anuran vocalizations are excellent for studying mate recognition system evolution, as species-diagnostic calls are typically simple and easily characterized, and call variation is a product of morphology, physiology, and behaviour. Although ecological evidence suggests that advertisement calls serve in prezygotic reproductive isolation in anurans, growing genetic data reveal that hybridization is common among species. To better understand call evolution and speciation in anurans, we evaluated male advertisement calls in trilling chorus frogs (*Pseudacris*) across their North American range focusing on the northern species *Pseudacris maculata* and *P. triseriata*. We tested whether divergence in calls related to phylogenetic distinctiveness - with more divergent calls between species with a deeper history of divergence. For particular species pairs, we also tested whether call attributes between allopatric populations will differ less than populations in potential contact due to reproductive character displacement. We did not find greater differences within contact zones for comparisons of either *P. maculata* / *P. triseriata* or *P. brachyphona* / *P. triseriata*. Our findings are consonant with what has been found in other trilling chorus frog species, although southern *Pseudacris* contact zones demonstrated greater call differences than my contact zone analyses.

Poster

Reptilian riches of Shawanaga First Nation: Empowering communities to conserve herpetofauna diversity in eastern Georgian Bay

Steven Kell, Kyle Vincent, Jay Dertinger

Shawanaga First Nation, Nobel, Canada

Abstract

Shawanaga First Nation, located along the coast of eastern Georgian Bay, Ontario, is home to one of the highest diversities of herpetofauna anywhere in the province. In 2019, a species-at-risk program was started to help protect and conserve these species by working together with the community to develop effective management and mitigation strategies. Over the last 4 years, this program has implemented a multitude of survey methods to help understand and identify critical habitat, species distribution, and movement corridors; including yearly mark-recapture, community observations, nesting and overwintering surveys, radio telemetry and road surveys on species such as Eastern Foxsnake (*Pantherophis vulpinus*), Eastern Hognose (*Heterodon platirhinos*), Massasauga Rattlesnake (*Sistrurus catenatus*), and Blanding's Turtle (*Emydoidea blandingii*). We will be giving a brief summary of our findings to date while also touching on the crucial role that community involvement plays in this work.

Oral – 15 minutes

DNA methylation and demethylation modifications supporting anoxia tolerance and recovery in liver of wood frogs experiencing oxygen deprivation.

Panashe Kupakuwana, Kenneth Storey

Carleton University, Ottawa, Canada

Abstract

Wood Frogs (*Rana sylvatica*) are one of a very small niche of freeze-tolerant vertebrates that have evolved to withstand not only whole body freezing but also two consequences of freezing (anoxia and dehydration of tissues) when they undergo freezing during the long winters of North America. When oxygen supply is cut off by freezing and up to 65% of total body water is frozen as extracellular ice, wood frogs undergo prolonged periods of metabolic rate depression, facilitated by multiple epigenetic and enzymatic mechanisms. One adaptive mechanism used to support survival is changes to epigenetic methylation and demethylation processes that facilitate energy-expensive transcriptional repression and activation. These processes involve proteins such as DNA Methyltransferases (DNMTs), Methyl Binding Domain (MBDs) proteins, and ten-Eleven Translocases (TETs). The present data show that DNMT3A and DNMT3B levels increase significantly during a 4-hr recovery period. However, overall DNMT activity did not change suggesting the presence of some post-translational modifications that switch off enzymes from eliciting their commonly known actions of repression. TET proteins showed varying responses to anoxia, potentially because of the absence of oxygen, the main substrate required by TET action. TET3 levels decreased under anoxic conditions and TET2 showed significantly higher levels of protein expression during the 4-hr recovery. Thymine DNA Glycosylase (TDG) was downregulated under anoxia because the absence of oxygen lowered reactive oxygen species (ROS) that could damage DNA but returned to normal when thawing allowed reperfusion to reoxygenate tissues.

Poster

It's time to go: Untangling social and ecological drivers of nest emergence in turtles

Claudia Lacroix[1], Christina Davy[2], Njal Rollinson[1]

[1]University of Toronto, Toronto, Canada. [2]Carleton University, Ottawa, Canada

Abstract

At the hatchling life stage, turtles are hypothesized to coordinate digging activity to synchronize nest emergence and adjust the timing of this life history transition in response to environmental variation. However, as the social life history of non-avian reptiles remains relatively incomplete, understanding the social and ecological mechanisms behind this coordinated behaviour is imperative to elucidate the impact of forthcoming anthropogenic environmental change on species survival. We explored whether acoustic communication facilitates nest emergence by (i) quantifying emergence synchrony in hatchling Snapping Turtles (*Chelydra serpentina*) and (ii) examining how social and ecological factors interact to affect movement within the nest. Using in-situ field experiments spanning two summers, we monitored subterranean nest behaviour with acoustic recorders and emergence behaviour with wildlife cameras. Combined with environmental data (nest temperature, daily precipitation), we employed machine learning-based acoustic analyses to quantify movement and vocalizations in the nest. Although emergence from the study was not synchronous among nests, most hatchlings emerged within 24 hours of the first emergence event within a nest. Structural Equation Modelling showed that hatchling vocalizations, temperature, and time of day were the strongest drivers of movement within the nest. Overall, we provide evidence that hatchling turtles in the nest synchronize their behaviours with above-ground conditions and that vocalizations may play a role in cueing synchronized nest emergence.

Oral – 15 minutes

Student

Population genomic data to inform conservation translocations of Long-toed Salamanders in Alberta

Julie Lee-Yaw[1], Arianna Kuhn[2], Danial Hunter[3], David Weisrock[4]

[1]University of Ottawa, Ottawa, Canada. [2]Virginia Museum of Natural History, Martinsville, USA. [3]University of Lethbridge, Lethbridge, Canada. [4]University of Kentucky, Lexington, USA

Abstract

Recovery plans for amphibians and other vulnerable taxa increasingly call for conservation translocations. The incorporation of genomic data into the selection of source populations for translocations can facilitate the success of these programs by ensuring 1) that introduced individuals share genetic provenance with the original and/or any remaining wild populations, 2) that introduced individuals have sufficient genetic variation to avoid inbreeding depression, and 3) that the genotypes released into a given site are appropriately matched to local conditions. Long-toed Salamanders (*Ambystoma macrodactylum*) are the native top predator in many high-elevation lakes in Alberta but have been extirpated across much of their range in the province as a result of fish stocking for recreational purposes. Consequently, this species is of Special Concern in the province and there is interest in reintroducing individuals to high-elevation sites in protected areas in the province. In this presentation, I will discuss work that my lab is engaged in, using genomic data collected from breeding sites across different scales to help prioritize source populations for these reintroductions. In addition to this specific conservation application, our results shed new light on the distribution of populations and genetic diversity in this species and I discuss potential implications of our findings for the status of the Eastern Long-toed Salamander (*A. m. krausei*) in particular.

Oral – 15 minutes

Site specific studies to identify site specific protections: Habitat use and selection of the Blanding's Turtle in coastal Georgian Bay

Jonah Lehman[1], Patricia Chow-Fraser[2]

[1]McMaster University, Selwyn, Canada. [2]McMaster University, Hamilton, Canada

Abstract

The threatened Blanding's Turtle (*Emydoidea blandingii*) is known for using many habitat types for their critical life processes which can vary greatly throughout their geographic range. To recover imperilled populations, it is necessary for field studies to be conducted in understudied regions such as in eastern Georgian Bay of the Laurentian Great Lakes. Our study documents habitat use and selection for a population residing in the Georgian Bay archipelago, where there are both natural undisturbed habitats as well as built-up areas with moderate housing/cottage development. We used a combination of radio tracking and GPS loggers over 4 years (2019, 2021, 2022, and 2023) to study a total of 22 Blanding's Turtles (11 males, 11 females) and classified available habitat (marsh, peatland, shallow water, lake, built-up, forest, thicket swamp, and rock barren) with 2019 Pleiades satellite imagery (94.77% Accuracy). Both sexes used palustrine wetlands (peatlands, thicket swamp; marsh, shallow water) and coastal wetlands (shallow water, lake) throughout the active season and were observed using shallow water, thicket swamps, and deep open water boating channels to move between resource patches. During the nesting season, females had a relative preference for using built-up classes over rock barrens when both were available in their home ranges. This coastal population also used coastlines, docks, and deep open water more frequently during the nesting season than is reported in the literature, and this reinforces the need to establish site-specific mitigation measures to protect females near docks, marinas and roadsides during nesting travels.

Oral – 15 minutes

Student

A decade of Bsal research: Trends and perspectives

Alex Boren[1], Allie Byrne[1], David Lesbarrères[2]

[1]Department of Environmental Science, Policy & Management, University of California, Berkeley, USA. [2]Environment and Climate Change Canada, National Wildlife Research Centre, Ottawa, Canada

Abstract

The discovery of *Batrachochytrium salamandrivorans* (Bsal) in 2013 ignited a series of experimentation and field swabbing events to study the impacts and assess the spread of this new devastating chytrid fungus. Ten years later, the progression and direction of Bsal research over the course of the past decade can be more clearly analyzed. We gathered information from studies involving specimen death due to Bsal — from animals found dead in the wild and from animal death via experimentation — as well as from studies including swabbing events for Bsal. This comprehensive review of Bsal animal research has illuminated several methodological and geographic trends. We found that Bsal animal experimentation conducted in the USA is strongly focused on *Notophthalmus viridescens*, a species of newt commonly found in the eastern United States that has been repeatedly declared vulnerable to Bsal. In addition, a disproportionate amount of Bsal experiments happen in countries where Bsal has not been found and on animals that are deemed vulnerable by the IUCN red list or are in a juvenile stage of life. Documenting where studies have taken place and how animals are being used in Bsal studies brings awareness to the potential impacts of these methods and invites reflexivity for planning future research directions.

Oral – 15 minutes

The effect of forest harvesting practices on salamanders and their habitat

Sara Leslie[1], Julia Riley[1], Chris Edge[2]

[1]Mount Allison University, Sackville, Canada. [2]Natural Resources Canada - Canadian Forest Service, Fredericton, Canada

Abstract

In forestry, glyphosate-based herbicides are commonly used when clear-cut forests are replanted with conifers. However, the impact of this herbicide treatment on forests and wildlife is poorly understood. We conducted surveys for terrestrial salamanders and measured environmental factors in 20 clear-cut forest blocks, either treated or untreated with glyphosate-based herbicides, and 10 unharvested Acadian Forest stands. We found that unharvested stands had the highest canopy cover and soil moisture, and lowest soil temperature. In the untreated blocks, soil temperature increased and soil moisture decreased with time since harvest. We observed the opposite pattern in the herbicide-treated blocks: soil temperature decreased and soil moisture increased with time since harvest. Across sites, surveys were dominated by Eastern Red-backed Salamanders (*Plethodon cinereus*) and we focused analyses on this species. We observed the highest abundance of *P. cinereus* in unharvested stands; salamander abundance was 4 and 18 times higher than in the treated and untreated blocks, respectively. We observed 3.2 times more salamanders in treated blocks than untreated ones. We also examined individual health (e.g., body condition) and reproductive health (e.g., number of juveniles, egg masses) of *P. cinereus*. Overall, unharvested forests provide optimal environmental conditions for salamanders. However, within 26 years after clear-cutting, *P. cinereus* abundance was higher in forests treated with herbicides than in untreated forests, likely due to lower soil temperatures and wetter soil facilitated by quick conifer growth. This study provides valuable insight into the health of harvested forests and highlights the importance of protecting pristine forests on our landscape.

Oral – 15 minutes

Student

Microplastics as an Emerging Risk to the Health of Amphibians

Noah Loiselle[1], Alexandre Jardine[2], Jesse Vermaire[2], Mery Martinez[1], Jennifer Provencher[3], David Lesbarrères[1,3]

[1]School of Natural Sciences, Laurentian University, [2]Institute of Environmental Science, Carleton University, [3]Environment and Climate Change Canada, National Wildlife Research Centre, Ottawa, Canada

Abstract

Plastic production has seen steady growth since the end of World War II. Despite their ubiquitous nature in today's world, our understanding of the negative health impacts plastics may have on a wide array of animal species remains quite poor. Microplastics are challenging to study due to their small size and the non-standardized methods currently in place. To determine whether microplastic consumption levels varied between regions, we sampled five Lithobates pipiens populations in areas with low and high plastic pollution in July-August 2022. Individuals were weighed and measured, and after digestion, contents from their gastrointestinal tract were observed under a microscope. All suspected plastic particles were analyzed using Fourier-transform infrared spectroscopy to determine the presence of microplastics. While frog morphology was not related to particle abundance, the number of particles varied between site categories, highlighting the risk of ingestion in areas with higher levels of plastic pollution. The exact nature of the particles is still under investigation, but this study nonetheless confirms the need to explore mitigation strategies to tackle plastic pollution in freshwater environments.

Oral – 5 minutes

Student

Measuring the success of an innovative fence design for mitigating road mortality of Eastern Foxsnakes (*Pantherophis gloydi)* and other at-risk reptiles in eastern Georgian Bay, Ontario

Sabrina Lounsbury[1], Tianna Burke[2], Jacqueline Litzgus[1]

[1]Laurentian University, Sudbury, Canada. [2]Georgian Bay Mnidoo Gamii Biosphere, Parry Sound, Canada

Abstract

Effective mitigation efforts for reducing reptile road mortality are crucial for the conservation of many Species-At-Risk. The Eastern Foxsnake (*Pantherophis gloydi*) is listed as threatened in Canada, largely due to road mortality. Because of their large size and strong climbing ability, commonly used reptile exclusion fencing may not be effective at preventing foxsnakes from accessing roads. We are investigating the efficacy of an innovative mitigation design consisting of a concave barrier fence with curved ends to redirect snakes away from the road surface, coupled with terrestrial and aquatic ecopassages. We are using semi-weekly road surveys in a Before-After-Control-Impact experimental design to evaluate the effectiveness of the mitigation for local snakes and turtles. We are also using in-situ behavioural trials with foxsnakes to assess climbing ability, and monitoring ecopassage use with wildlife cameras. We are conducting a two-year mark-recapture study in wetlands adjacent to the impact road to evaluate the composition and size of the turtle community that is interacting with the mitigation. Preliminary results suggest that foxsnakes are not able to climb the concave barrier but may be navigating around the fence ends and onto the road. We have documented high use of all four ecopassages by a diversity of reptile species. If successful, this barrier design would also be effective for other local reptiles, amphibians, and small mammals, thus protecting animal biodiversity on a broader scale. The results of our research will contribute to Ontario's Recovery Strategy for foxsnakes which states that developing and evaluating road-mortality mitigation is of critical priority.

Poster

Student

Advancing protections for a relict population of Sharp-Tailed Snake (*Contia tenius*) through collaboration, community engagement, and Indigenous monitoring

Veronica Woodruff[1], Leslie Anthony[2]

[1]Stewardship Pemberton Society, Pemberton, Canada. [2]Independent Biologist, Whistler, Canada

Abstract

In 2011, Canada's only known mainland population of Sharp-tailed Snake (*Contia tenuis*) was found in Pemberton, B.C., an inland valley 200 km from offshore populations in B.C./Washington State, and 300 km from the nearest mainland record. This northernmost disjunct is a post-Pleistocene relict of significant taxonomic and conservation interest. Twelve years of study involving 1,000+ hrs of search effort found the species confined to suitable habitat along a 5 km transect on a single landform. Most of the ~14 sites where *C. tenuis* was found are now threatened by rapidly encroaching residential development and an explosion of recreational pressure; indeed, several sites have already disappeared. Unfortunately, gaps in Canada's species-at-risk legislation, lack of provincial levers for protection, lack of municipal capacity, and legal wrangling by developers have left this small, isolated population without inherent or pending protections. To address the population's vulnerability to multiple stressors, a local NGO with limited resources initiated collaborative partnerships that have delivered a series of positive outcomes. These include increased understanding of distribution via both expert and citizen-science monitoring, community engagement and outreach, training and capacity-building with the Lil'wat First Nation, and stakeholder actions for managing land-use and recreational impacts. Although this collaborative model appears to be the only way to address current risks to *C. tenuis* in Pemberton, its greater speed and utility vs. the limited reach and protracted timeframes of formal protections may actually present a better standard for addressing recently discovered species-at-risk.

Oral – 15 minutes

Investigating the impacts of wildfire and windfarm construction on squamate community ecology in central Ontario

Aidan Maloney[1], Ori Urquhart[2], Jacqueline Litzgus[1]

[1]Laurentian University, Sudbury, Canada. [2]Blazing Star Environmental, Oshawa, Canada

Abstract

Understanding the degree to which habitat disturbance affects biodiverse herpetological communities is critical to mitigating damage from anthropogenic and natural environmental disturbances. For example, there has been a recent increase in the frequency and intensity of wildfires across Canada that are associated, in part, with a warming climate. The threat of climate change is pushing the need for, and implementation of, renewable energy sources such as wind, but wind turbines are known to cause mortality of volitant wildlife (birds, bats). Few studies have examined how the combined disturbances of windfarms and wildfire impact squamate communities. Our ongoing study aims to quantify the abundance, diversity and health of snake individuals, populations, and assemblages, in addition to Five-lined Skink (*Plestiodon fasciatus*) distribution trends, in areas impacted by a windfarm and wildfire. Snake surveys consisted of a combination of cover-boards, natural cover, and visual encounters, in four replicated site treatments: control, wildfire, windfarm, wildfire + windfarm, (n=12 sites total). The snake data will be analyzed using various diversity, abundance, and body condition indices, and compared among treatments to look for individual and assemblage-level impacts. Our preliminary analyses indicate that the control treatment has the highest abundance of snakes, followed by the windfarm, wildfire, and that the wildfire + windfarm treatment has the lowest snake abundance and diversity. Incidental observations of skinks revealed fewer detections in the fire-affected treatments. Our findings can inform implementation of mitigation strategies for future large-scale windfarm development projects, especially in areas prone to wildfires.

Oral – 15 minutes

Student

Investigating the impacts of wildfire and windfarm construction on anuran bioacoustics in central Ontario

Aidan Maloney[1], Ori Urquhart[2], Jacqueline Litzgus[1]

[1]Laurentian University, Sudbury, Canada. [2]Blazing Star Environmental, Oshawa, Canada

Abstract

Bioacoustics play key roles in the fitness of many animal species. For example, anurans use breeding choruses to communicate and locate mates. Anthropogenic noise pollution, such as that from roads, is known to influence anuran calling behaviour and call characteristics. However, there is a lack of research about how anurans may react to noise produced by wind turbines. The low frequency noise of turbines may compete with low frequency calling species (e.g., American Bullfrog, *Lithobates catesbeianus*). Furthermore, the construction and operation of windfarms can ignite wildfires, whose effects on anuran communities is not well understood. Our ongoing study aims to quantify the diversity and call characteristics of anuran communities in areas impacted by a windfarm and wildfire. If turbines present a novel form of noise pollution, then we expect lower anuran diversity and altered call characteristics in windfarm relative to control sites. If anurans can find wet refuges during wildfire, then we expect anuran diversity to be similar between wildfire and control sites. Call data were collected using SM4 audio recorders deployed adjacent to wetlands during the breeding season in four replicated site treatments: control, wildfire, windfarm, windfarm + wildfire (n=12 total sites) and will be analyzed using Kaleidoscope Pro. Preliminary data indicate that anuran diversity does not differ among treatments; future work will examine the potential impacts on individual call characteristics of representative species. With the increasing push for wind energy, it is crucial to understand the potential impacts on at-risk animals such as amphibians.

Poster

Student

Introduction to the Canadian Eastern Massasauga Rattlesnake Recovery Implementation Group (CEMRRIG)

Hannah McCurdy-Adams[1], Aidan Maloney[2]

[1]Wildlife Preservation Canada, Guelph, Canada. [2]Laurentian University, Sudbury, Canada

Abstract

Endangered species conservation requires coordination at multiple geographic scales and participation from a variety of collaborators. The Canadian Eastern Massasauga Rattlesnake Recovery Implementation Group (CEMRRIG) was formed with a large geographic scale in mind. CEMRRIG is focused on collaboratively implementing conservation efforts for the Eastern Massasauga Rattlesnake, *Sistrurus catenatus*, in Ontario through five main objectives: 1) provide a mechanism for networking and collaboration among diverse interests in the conservation of the Eastern Massasauga Rattlesnake; 2) provide a forum to discuss active projects, the latest research, and co-ordinated approaches to threat mitigation; 3) provide expert advice, education, and outreach to organizations and individuals on Eastern Massasauga Rattlesnake conservation; 4) encourage ecosystem-based approaches to Eastern Massasauga recovery and ensure integration of in situ and ex situ efforts in a One Plan Approach; 5) encourage two-eyed seeing approaches that harmonize with many knowledge systems. CEMRRIG does not represent any one organization or government but is rather a group of experts and concerned citizens that may individually represent a particular affiliation (e.g., academia, government, first nations, non-profits, businesses, etc.). CEMRRIG will help Eastern Massasauga Rattlesnake conservation and research, occur more effectively and efficiently, and can serve as a model for inclusive recovery implementation teams for other taxa.

Oral – 5 minutes

Intra- and interspecific hibernation site selection of three sympatric snake species

Veronica McKelvey[1], Lily Ragsdale[1], Leigh Anne Isaac[2], Karl Larsen[1]

[1]Thompson Rivers University, Kamloops, Canada. [2]Ministry of Water, Land & Resource Stewardship, Kimberley, Canada

Abstract

Snakes within northern ranges rely on hibernacula to overwinter. Due to the potential scarcity of these sites at northern climes, understanding the use and selection of this habitat is significant for conservation, particularly if it facilitates the identification of communal hibernacula. We are using a community of three sympatric snake species occurring at their northern limits in southern British Columbia to explore how these species vary in their use and selection of hibernacula, while determining if there is an association between habitat features of hibernacula and the number of snakes using them. We assembled two years of radiotelemetry, den surveys, and historical records to identify and survey 28 hibernacula. Habitat data were collected at two scales for each hibernaculum and a paired random site. Snakes preferred dens with larger openings on steeper slopes with relatively shorter distances to the nearest cover rock. Great Basin Gophersnakes (*Pituophis catenifer deserticola*) selected for more cover features, while Western Yellow-bellied Racers (*Coluber constrictor mormon*) and Western Rattlesnakes (*Crotalus oreganus*) appeared to prefer an increased availability of basking features. The number of snakes at hibernacula increased with an increased area of the den mouth and smaller distances to the nearest rock. We caution against using hibernacula 'models' from certain iconic species (e.g., Common Garter Snakes and Western Rattlesnakes) to extrapolate to other species with less-well known denning habits, even within the same ecosystem. Overall, documenting intra- and interspecific variation in hibernacula selection is another important step in developing conservation plans for northern snakes.

Oral – 15 minutes

Student

Testing autonomous recording units for mapping suitable habitat for calling populations of Western Toads

Hannah Meikle[1], Jayna Bergman[1], Brandon Allen[2], Julie Lee-Yaw[1]

[1]University of Ottawa, Nepean, Canada. [2]Alberta Biodiversity Monitoring Institute, Edmonton, Canada

Abstract

The development of new methods to passively survey animal populations has the potential to improve our understanding of the distributions of many species. Autonomous recording units (ARUs) may be particularly useful for detecting species that vocalize and there is interest in using the data from these units along with spatial environmental layers to model the probability of occurrence (or habitat suitability) of at-risk species. However, several factors can impact the accuracy of species distribution models. Thus, these models, regardless of how they are generated, must be validated with independent data before they are used to inform conservation practice. The current project aims to test the ability of species distribution models generated from ARU data to predict independent data on occurrence and range limits in Calling populations of the Western Toad (*Anaxyrus boreas*). In this poster, I will present results from a preliminary species distribution model generated with ARU data from the Alberta Biodiversity Monitoring Institute and updated information on the distribution of western toads in Alberta from independent field surveys.

Poster

Student

Don't worry, be happy: Blanding's Turtles (*Emydoidea blandingii*) living in a reference condition in Georgian Bay

Reta Lingrui Meng, Patricia Chow-Fraser

McMaster University, Hamilton, Canada

Abstract

Few areas within the Great Lakes basin are currently free from human activities, making it important to study the remaining undisturbed areas so that a baseline can be established for comparison between reference and degraded conditions in those regions. Here, we use radio telemetry to investigate habitat use, movement, and habitat selection of a population of the threatened Blanding's Turtle (*Emydoidea blandingii*, BLTU) inhabiting a mostly undisturbed archipelago located at the northern shore of Mnidoo gamii (Georgian Bay), Ontario over two active seasons (May to September 2021 and 2022). We found a mean home range of 16.21 ha for females (n = 7) and 15.10 ha for males (n = 7). Of the five habitat classes (Marsh, Open Water, Rock, Peatland, and Forest), females used all except Peatland during the nesting season, and both sexes used all habitat classes throughout both active seasons in 2021 and 2022. Disproportionate habitat use was detected at the landscape scale but not at the home range scale. This is consistent with the hypothesis that adult BLTUs residing in relatively undisturbed sites with abundant habitat use all habitat types according to their availability. We also observed the use of open, deep water by BLTU as travel corridors for nesting and mating. Effective future conservation strategies should prioritize the protection of relatively undisturbed wetlands in this region and use this study as a reference condition to compare BLTU habitat use and movement across disturbance gradients within Georgian Bay.

Oral – 15 minutes

Student

Lunch-clubs and dinner dates: Using feeding aggregations to explore freshwater turtle sociality

Caitlin Menzies, Roslyn Dakin, Christina Davy

Carleton University, Ottawa, ON, Canada

Abstract

Sociality, the degree to which individuals associate with one another in groups, decreases predation risks and reduces the search time for mates but can increase the risk of disease and parasite load. Until recently, non-avian reptiles were generally considered asocial, solitary animals. This bias has started to shift with social network studies demonstrating complex social structures of lizards, skinks, and tortoises showing that non-avian reptile communities do have social organization. Yet, there are few comprehensive studies of the organization of freshwater turtle communities. We explored aggregations of freshwater turtles around a food resource using a trapping dataset collected in a coastal marsh off Lake Erie (n = 995 turtles, 4 species). We used social network analysis and null modelling to test whether aggregations were structured non-randomly with respect to species, sex, size and individual. We found that turtles formed multi-species aggregations around a food source but were more likely to aggregate with their own species. Aggregations appeared random with respect to sex and size. The results from our study will further the scientific understanding of the social complexities of freshwater turtles, which can help clarify the evolution of sociality in Sauropsida and assist in creating effective freshwater ecosystem conservation strategies.

Oral – 15 minutes

Student

Development of assisted reproductive technologies for the conservation of *Atelopus* sp. (spumarius complex)

Renato E. Naranjo

Jambatu Center for Amphibian Research and Conservation, Quito, Ecuador

Abstract

Conservation Breeding Programs are attempting to breed some species under laboratory conditions. The incorporation of assisted reproduction technologies (ARTs) is contributing to successful these programs. In sexually mature individuals of an undescribed species of *Atelopus* (spumarius complex), we applied hormonal induction by administration of human chorionic gonadotropin (hCG) in males, and in females, the sequential administration of hCG and gonadotropin releasing hormone analogue. Furthermore, we standardized sperm cryopreservation and in vitro fertilization. We found that 10 IU/g hCG induced the release of the highest sperm concentrations, while 2.5 IU/g hCG induced the release of eggs in most treated females. Under cryopreservation conditions, the highest motility recovery rate was obtained in cryosuspensions prepared with 5% DMF and 2.5% sucrose. In most cases, our attempts of in vitro fertilization were successful. However, only ~10% of embryos were viable. Overall, our study demonstrates that ART in individuals raised in the laboratory can be successful by obtaining viable offspring through in vitro fertilization with cryopreserved sperm. Our protocols might need fine-tuning to be applicable to other species of harlequin frogs. We expect our study to establish a baseline for future efforts to conserve other endangered species.

Poster

Effect of ecopassages on Blanding's Turtle (*Emydoidea blandingii*) home range at Chalk River Nuclear Laboratories

Andrea O'Halloran, Gabriel Blouin-Demers

University of Ottawa, Ottawa, Canada

Abstract

Ecopassages are being implemented across the world in an effort to reduce road mortality though few studies have explored their success. The Canadian Nuclear Laboratories (CRL) in Chalk River, Ontario, is a large site with relatively low road density. Within the CRL site there is a small highly at-risk population of Blanding's Turtles (*Emydoidea blandingii*). In 2015, a radio-telemetry study was conducted to assess habitat use and movement patterns of this species. Seven ecopassages were installed along the main access roads as a result of this study. The purpose of my study is to determine whether the installation of ecopassages at CRL have reduced road mortality and improved habitat connectivity for the Blanding's Turtle population. Efficacy of ecopassages will be assessed through photographs documenting use while movement patterns are assessed using radio-telemetry data and map modeling. The results of this study will investigate ecopassage use, road mortality rate, and whether habitat connectivity has improved from 2015. This comparison will provide general insight into the effectiveness of ecopassages in protecting reptiles, particularly turtles. Furthermore, the results will inform future conservation projects on whether these costly structures should continue to be used to fight road mortality and species loss.

Oral – 15 minutes

Student

Do introduced Wild Turkey prey on the endangered Blue Racer on Pelee Island?

Orianne Tournayre[1], Ryan Wolfe[2], Hannah M. McCurdy-Adams[3], Amy A. Chabot[4], Stephen C. Lougheed[1]

[1]Queen's University, Kingston, Canada. [2]Natural Resource Solutions Inc., Waterloo, Canada. [3]Wildlife Preservation Canada, Guelph, Canada. [4]African Lion Safari, Cambridge, Canada

Abstract

The only population of the endangered Blue Racer (*Coluber constrictor foxii*) in Canada occurs on Pelee Island, Ontario. The species is threatened by multiple factors including habitat degradation and loss, road mortality, persecution, and potentially predation. Wild Turkeys (*Meleagris gallopavo*) were introduced to Pelee Island in 2002. Given their generalist diet including small vertebrates, it is possible that Wild Turkeys negatively impact the Pelee Island Blue Racer population by preying on juveniles. However, documenting Wild Turkey predation on Blue Racers is challenging. We designed and evaluated the performance of an environmental DNA droplet digital PCR assay that can be used on Wild Turkey feces. We validated the assay *in silico* and *in vitro* using DNA of Blue Racers and co-occurring snake species, estimated its sensitivity (limit of detection and quantification) and tested eight Wild Turkey fecal samples. Our assay is specific, can detect Blue Racer at very low levels of concentration (0.002 copies/µL) and can accurately quantify the copy number ≥0.26 copies/µL. We detected no Blue Racer DNA in any Wild Turkey fecal sample. More fecal samples collected at strategic locations during snake peak activity on Pelee Island would enable a more thorough assessment of the possibility of turkey predation. Our assay should be effective for other environmental samples and can be used for investigating other factors negatively affecting Blue Racers, for example helping to quantify Blue Racer habitat suitability and site occupancy.

Poster

Egg incubation of some squamate reptiles from the Western Ghats, India

Dikansh Parmar[1,2,3], Alkesh Shah[1,4]

[1]Veer Narmad South Gujarat University, Surat, India. [2]B.P Baria Science Institute, Navsari, India. [3]Wildlife Rescue Trust Navsari, Navsari, India. [4]B.P. Baria Science Institute, Navsari, India

Abstract

Most of the contemporary Indian herpetological literature is largely dominated by publications on diversity, evolutionary history, and the historical biogeography of the taxa of focus. However, natural history information is poorly documented for many species. Details such as reproduction and parturition are once-in-a-season occurrence that demands long-term or continual monitoring of animals, often in semi-captive conditions that enable close and recurrent observations of those same individuals studied. This necessarily challenging aspect of study translates into either opportunistic and sporadic observations on wild individuals or a well-structured and pre-designed study on captive reptiles. Here, we present our documentation on egg incubation based on observations on nine species of reptiles found in the Northern Western Ghats of India belonging to seven genera and four families i.e., *Ptyas mucosa* (Linnaeus, 1758), *Amphiesma stolatum* (Linnaeus, 1758) and *Coelognathus helena* (Daudin, 1803) from Colubridae, *Python molurus* (Linnaeus, 1758) from Pythonidae, *Hemidactylus murrayi* Gleadow, 1887, *Hemidactylus leschenaultii* Duméril & Bibron, 1836, *Hemidactylus prashadi* Smith, 1935 and *Cnemaspisis goaensis* Sharma, 1976, from Gekkonidae, and *Calotes vultuosus* (Harlan, 1825) from Agamidae. Our present study provides information on the oviposition period along with the clutch size ranging from 5–19 in snakes and 2–12 in lizards, selection of oviposition site, incubation period at 25–35 °C ranging from 49–65 days in snakes and 39–55 days in lizards, osmosis in eggs, use of various dripping methods, use of different substrates for incubation, rupturing of eggs, morphology, morphometrics, and behavior of hatchlings at birth and ecdysis period of hatchlings.

Oral – 15 minutes

Student

A biodiversity mapping and assessment tool for the amphibians and reptiles of the Prairies Ecozone of Canada

James Paterson, Lauren Bortolotti, Paige Kowal, James Devries

Institute for Wetland and Waterfowl Research, Ducks Unlimited Canada, Stonewall, Canada

Abstract

Habitat change is the largest direct driver of global biodiversity loss but often the relationships between habitat change and species occurrence are uncertain. Actors working to conserve and restore habitats require tools to assess and map variation in biodiversity related to habitat type and amount for maximizing return on investment at scales relevant to decisions. However, many tools to assess biodiversity use coarse data and are at spatial scales much larger than those used for land management decisions. Leveraging a high volume of species observation data, we incorporated habitat data into individual species distribution models to test how human-influenced landcover change has affected biodiversity, here focusing on amphibians and reptiles in the Prairies Ecozone of Canada. Our objectives were to 1) develop a biodiversity mapping and assessment tool with species distribution models at a fine spatial scale (805 m x 805 m), and 2) use the tool to provide estimates of biodiversity response to landscape change for focusing conservation efforts. The landcover variables with the largest median effects on amphibian and reptile biodiversity included the maximum patch size of native grassland, the proportion of human settlement within 10 km, the maximum patch size of water (including wetlands), and the amount of annual cropland. Our spatial predictions of biodiversity outline opportunities for conserving existing habitats in working landscapes, and the relationships between biodiversity and habitat predictors identify opportunities for restoring habitats to support more species.

Oral – 15 minutes

Beyond the visual field: Identifying shifts in selective pressures on anuran phototransduction genes across differing photic environments

Taegan JM Perez[1], Rayna C Bell[2,3], Matthew K Fujita[4], Kate N Thomas[5], David J Gower[5], Jeffery W Streicher[5], Ryan K Schott[1,2,6]

[1]Department of Biology, York University, Toronto, ON, Canada. [2]Department of Vertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA. [3]Department of Herpetology, California Academy of Sciences, San Francisco, CA, USA. [4]Department of Biology, Amphibian and Reptile Diversity Research Center, University of Texas at Arlington, Arlington, TX, USA. [5]Department of Life Sciences, The Natural History Museum, London, United Kingdom. [6]Center for Vision Research, Department of Biology, York University, Toronto, ON, Canada

Abstract

The evolution and ecological adaptation of the amphibian visual system remain relatively unexplored. Anurans (frogs and toads) display exceptional ecological diversity, inhabiting various terrestrial and aquatic environments with distinct spectral and optical characteristics, which makes them a compelling group for studying visual evolution. The phototransduction cascade, involving over 35 genes and proteins, governs the initial stages of vision and can play a critical role in the adaptation to different light environments. However, research on evolutionary and functional variation in phototransduction proteins is limited. We hypothesized that the phototransduction cascades of anurans with different ecologies are adapted to their corresponding environments and predicted that this is reflected in patterns of positive selection and shifts in selective pressure on vision genes. To test this, eye transcriptomes from 82 species were sequenced, and supplemented with available genomic data (total: 101 species, 34 families). We found that anurans possess all known vertebrate phototransduction genes. To test for evidence of positive selection and shifts in selective pressure across species' differing photic environments we implemented models of molecular evolution (PAML and HYPHY). We found evidence for shifts in selection between aquatic and terrestrial species and diurnal and nocturnal species that appears to result from variation in spectral composition across these environments. Further work is required to assess the impact of other ecological factors. This first assessment of molecular evolution of phototransduction in anurans provides an important contribution to increased understanding of the evolution of visual systems in this group.

Oral – 15 minutes

Student

Ontario Reptile and Amphibian Atlas: The power of community engagement

Jenna Quinn

Ontario Nature, Toronto, Canada

Abstract

In Ontario, 75% of reptiles and 35% of amphibians are listed as nationally and provincially at-risk. The Ontario Reptile and Amphibian Atlas (ORAA) was a community science project that tracked distributions and spatial trends of reptiles and amphibians across the province. The ORAA was adopted by Ontario Nature in 2009 to continue data collection efforts initiated by the Ontario Herpetofaunal Summary and the Eastern Ontario Herpetofaunal Atlas. From 2009 to 2019, the atlas acted as the central data repository for all herpetological observations in Ontario, receiving an average of 30,000 new observations each year and resulting in a collective database with over 480,000 records by more than 12,000 contributors. Atlas data has increased the knowledge and protection for at-risk species in Ontario and has helped contribute to reports and recovery plans, local land use planning, and habitat stewardship programs. After three years of data analyses and content creation, the ORAA publication will be released this fall in free digital format. Atlas data can offer valuable insights into population trends, distribution patterns and habitat preferences and the publication will play a key role in promoting the conservation of Ontario's reptiles and amphibians. This presentation will provide an overview of the ORAA's origins and objectives, emphasizing its collaborative nature, and include highlights and next steps for reptile and amphibian conservation in Ontario. The ORAA publication is truly a celebration of ten years of community science and would not be possible without the dedicated support of herpetologists, researchers, and community scientists!

Oral – 15 minutes

Studying the effect of a short-distance mitigation-translocation on Great Basin Gophersnake movement behaviour.

Lily Ragsdale, Veronica McKelvey

Thompson Rivers University, Kamloops, Canada

Abstract

The Southern Interior of British Columbia is the northern range limit for several species of North American grassland adapted snakes (COSEWIC, 2013, 2015). Urban and industrial development in grasslands threatens the Great Basin Gophersnake (*Pituophis catenifer deserticola*) and the Western Yellow-bellied Racer (*Coluber constrictor mormon*) (COSEWIC 2013, 2015). In 2020, three interspecific snake dens were disturbed in a protected grassland in BC. Subsequently, over 50 Gophersnakes and over 60 racers were removed from the site, artificially overwintered, and translocated to a new den the following spring. This event created a unique opportunity to study the movement, site fidelity, and survival of a large population of snakes following a translocation event. To assess the efficacy of mitigation-driven translocation, I will compare the movement, site fidelity, and survival of the translocated snakes with a reference population of conspecific snakes. In the 2021 summer season, I radio-tracked a sample population of 32 Gophersnakes (average of 117 days tracked) and 19 Racers (average of 60 days tracked). In 2022, I will track another 20 Gophersnakes and seven racers during the summer active season. I will present my results on the total active season movement, tortuosity, and site fidelity, and survival of translocated and reference snakes during the 2021 and 2022 field seasons.

Oral – 15 minutes

Student

Assessing the impacts of climate change on breeding phenology of temperate anurans

Alyssa Reynolds, Stephen Lougheed

Queen's University, Kingston, Canada

Abstract

Climate change is irrevocably altering biological systems, causing shifts in species distributions, facilitating spread of pathogens, and increasing frequencies of drought and flooding, among other outcomes. For temperate anurans, among the many possible outcomes of climate change are phenological shifts in emergence and breeding. We test for shifts in calling in 9 anuran species under increasingly warmer winter and spring temperatures. For 15 years, we have maintained an array of automated acoustic recorders at up to 27 marshes, ponds, and vernal pools across a swath of eastern Ontario centered on the Queen's University Biological Station — 3 wetlands have been maintained continuously across this span. The recorder's programs are set to record one hour 15 minutes after sunset every day from early March to September. We will use machine learning to determine first date of calling and peak date of calling for each species at each site using Kaleidoscope Pro Analysis Software. Using these data in combination with historic climate data taken from both on-site air and water HOBO Pro temperature loggers and the Government of Canada Historical Climate Data database, we will test whether local frog and toad species initiate advertisement calling earlier in years with warmer winters. We will also test whether there have been shifts in the onset of calling coincident with shifts in mean temperatures and spring precipitation. Our study will provide insights on how anuran breeding phenology can change because of climate-mediated temperature changes across species, habitat, and populations in eastern Ontario.

Oral – 5 minutes

Using environmental DNA to map the contact zone of *Pseudacris maculata* and *Pseudacris triseriata* in southwestern Ontario

Madeleine Robitaille, Ying Chen, Stephen Lougheed

Queen's University, Kingston, Canada

Abstract

Contact zones facilitate the study of dynamics between diverging evolutionary lineages in primary (evolved *in situ*) or secondary (evolved in allopatry) contact; outcomes of contact zone dynamics have implications for species range limits, can clarify questions regarding species delineation and speciation itself, and may be important in conservation prioritization. Chorus frog populations within Ontario and Quebec (currently collectively classified as *Pseudacris triseriata*) possess distinct mitochondrial haplotypes representing Boreal (*P. maculata*) and Western Chorus Frogs (*P. triseriata*) that comprise two designatable units. These diverging mitochondrial lineages are in probable secondary contact in Southwestern Ontario, yet the exact location of contact is uncertain, lying somewhere between Toronto and southern Georgian Bay (a linear span of ~150km). We used environmental DNA (eDNA) from water sampled from ~50 chorus frog breeding ponds to better delineate the chorus frog contact zone. eDNA facilitates extensive geographic sampling, allows us to identify single wetlands that might be admixed, and is less invasive than tissue sampling (e.g., toe clipping, buccal swabbing). We used droplet digital PCR with custom primer-probe mitochondrial *cytochrome b* sets that target each lineage (one primer-probe set for each lineage). Our data refine the location of the contact zone and identify at least three ponds with both lineages present. Our findings set the stage for future work in hybridization and speciation, and also have implications for conservation and COSEWIC designations.

Oral – 15 minutes

Student

Drawdowns of doom: Bio(herpeto)diversity impacts of water level management in impoundments

Fred Schueler

Fragile Inheritance, Bishops Mills, Ontario, Canada

Abstract

Triggered by a late fall movement of Northern Leopard Frogs (*Lithobates pipiens*) downstream from the impounded Kemptville Creek in Oxford Mills, Grenville County, Ontario, after the logs had been removed from the dam for the winter drawdown, I will discuss consequences of this practice of lowering water levels in the winter.

Oral – 5 minutes

“We have done so much, for so long, with so little, that we are now qualified to do anything with nothing” — Postal cards from field parties to the Herpetology Section of the National Museum of Natural Sciences, 1976-1986

Fred Schueler, Aleta Karstad

Fragile Inheritance, Bishops Mills, Ontario, Canada

Abstract

We present, from his files, post- and Christmas cards we & Frank Ross sent from the field to Francis Cook, in the course of several expeditions.

Poster

Expeditions of Canada's National Herpetology Collection

Fred Schueler[1], Howard Huynh[2], Madelaine Empey[3], Stéphanie Tessier[2], Kamal Khidas[2]

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Abstract

We begin a modern assessment of the herpetological collection compiled by the late Francis Cook, at the Canadian Museum of Nature, by classifying the collections into 'expeditions,' which can be exploratory trips, research projects, or collections from around a residence or institution. This is a beginning of bringing the significance of this resource to modern notice. Francis' goal was for the collection was to document the distribution and geographic variation of the Canadian herpetofauna, and we anticipate that a modern evaluation and release of data will be invaluable in providing baseline data for monitoring changes in populations and occurrences.

Poster

Freshwater turtle climbing abilities: Implications for the design and use of shoreline erosion control structures

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Abstract

Freshwater shoreline modifications can reduce connectivity between aquatic and terrestrial habitats, contributing to the decline of freshwater biodiversity. Freshwater turtles may be particularly vulnerable to shoreline modifications because they must access land for essential life history traits. Here, we tested the clinging abilities of three freshwater turtle species (i.e., Painted Turtles, *Chrysemys picta*; Eastern Musk Turtles, *Sternotherus odoratus*; and Northern Map Turtles, *Graptemys geographica*) to inform design criteria for mitigating the impacts of shoreline modifications. We tested clinging behaviour with smooth and rough concrete ramps to find the maximum clinging angle for all three species. We found that Painted Turtles were the weakest at clinging, averaging a maximum clinging angle of 37° on a smooth ramp and 73° on a rough ramp. Eastern Musk Turtles had an average maximum clinging angle of 45° on a smooth ramp and 87° on a rough ramp. Northern Map Turtles had an average maximum clinging angle of 41° on a smooth ramp and 87° on a rough ramp. Surface type had significant effects upon maximum clinging angles, and mass was also statistically significant in affecting the clinging of Eastern Musk and Northern Map Turtles. Because of their ubiquitous presence and weak clinging abilities, Painted Turtles were used to validate the clinging trials through volitional climbing tests. Successful climbs on the smooth ramps peaked at 35° and 40° for the rough ramps. To maintain turtle accessibility in areas with these species, future shoreline modifications should be textured and not have slopes that exceed 40°.

Oral – 15 minutes

Assessing injury rates in Northern Map Turtles (*Graptemys geographica*) from motorboats using iNaturalist Canada

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Abstract

Many freshwater turtles live in waterways where motorboats are common, and propeller strikes from boats can injure or kill turtles. Injury rates can be high in some areas, but few studies have examined the threat across a broad area. We made use of community science data from iNaturalist Canada to assess carapace injuries in Northern Map Turtles (*Graptemys geographica*) across the Canadian range of the species. The injury rate varied from 2.1–7.0% across regions, and overall, 4.0% of Northern Map Turtles had injuries consistent with propeller strikes. Injured turtles occurred across the Canadian range of the species and the median distance from an uninjured turtle to an injured one was only 5.3 km (range, 0–114.8 km). Injured Northern Map Turtles were observed within eight of 16 protected areas with observations of the species. Females were more apt to be injured than males. Our results suggest that boat strikes are a widespread threat to Northern Map Turtles and that community science is an effective tool for assessing injury rates in turtles that commonly bask.

Oral – 15 minutes

Vernal pool amphibian inventories: Can environmental DNA replace traditional methods?

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Abstract

Amphibian populations have been globally following a downward trend since at least 1990. Effective monitoring and management of these organisms rely on accurate knowledge of their spatiotemporal distributions and abundance, which is often expensive to collect due to the amount of fieldwork required to conduct inventories. In this study, we aimed to test whether eDNA metabarcoding, a non-invasive and field cost effective approach, could identify the same amphibian communities as traditional inventory protocols. We targeted two fragments of the CO1 mitochondrial gene to be amplified from filtered freshwater samples collected in twelve vernal pools in the spring of 2019. At each pool, three traditional amphibian inventory methods were used in conjunction with eDNA metabarcoding in May and June 2019: call surveys using acoustic recorders, capture of live animals using steel mesh Gee traps, and active search surveys. In total, 13 amphibian species were detected, most of them being detected by both eDNA and traditional methods. When comparing the results of eDNA with traditional methods, we found that species ecology and behavior are key factors of its detectability by a specific method. As eDNA metabarcoding is comparatively inexpensive and presents a higher repeatability, we conclude that eDNA sampling should be considered for integration as a standard monitoring tool, after an initial assessment of amphibian diversity.

Oral – 15 minutes

Investigating sexual dichromatism in a central Ontario population of Spotted Turtles (*Clemmys guttata*)

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Abstract

Colourful females are uncommon in the animal kingdom; typically, males are the more brightly coloured sex. Spotted Turtles (*Clemmys guttata*) display sexual dichromatism: males present dark brown chins and eyes while females present bright orange chins and eyes. This may be an example of a sex-role reversal in which males choose a mate among competing females. We will test this hypothesis using visual models and behavioural trials. We predict that males will exhibit reproductive behaviours most frequently in response to the female models with the brightest sexually dichromatic traits. Models were 3D-printed and painted to resemble male (control) and female (effect) spotted turtles and used for in situ behaviour trials. Male turtles were individually exposed to models with differing intensities of orange chins, and their choices scored; trials occurred during the spring of 2023 and are planned to continue during fall 2023 and spring 2024. Ethograms will be created based on recordings of the trials and behaviour frequencies will be analyzed through a logistic regression. Ours is the first study to elucidate the functional role of sexual dichromatism in spotted turtles and will contribute to understanding the evolution of this phenomenon in other turtle species. Our work could also reveal a novel aspect to the threat of poaching: if our prediction is supported, this suggests that removing brighter-coloured females, which could be targeted for their beauty by poachers, would coincidentally remove the most fit females from the population, potentially exacerbating population declines of this globally endangered species.

Oral – 5 minutes

Student

Body scoring for Musk Turtle (*Sternotherus odoratus*): Using in situ data to inform ex situ management

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Abstract

When managing ex situ populations, animal welfare - encompassing an animals' right to adequate shelter, food, water, health care, express species-specific behaviours, and breed – is of the utmost importance. Body scoring tools support veterinarians and animal managers caring for species in captivity (ex situ). For species which are held temporarily in ex situ to support in situ conservation actions, knowledge of in situ growth trends will provide valuable insights. For example, turtle head starting programs will benefit from information on growth rates which will directly impact decisions to release individuals back into the wild, especially in Canada where many species reach their Northern range limits. Body scoring and growth rate tools have been developed for a range of species from big cats to crocodiles, however, to date no similar tools have been developed for Canadian turtle species.

Using data collected in a long-term research project on Musk Turtle (*Sternotherus odoratus*) in the Frontenac region of Southern Ontario, we developed a scale of in situ (wild population) growth using five standard measurements - mass, plastron length, carapace length, carapace width and carapace height. This tool can be used by ex situ managers of this species to identify individuals that may be over- or underweight relative to in situ individuals. We collected data from three separate captive populations in Southern Ontario which were compared to the scale of in situ (wild population) growth using body weight (mass in grams) and size as an indicator of health.

Oral – 15 minutes

A decision-tree framework for conservation genomics: Lessons from the Eastern Massasauga Rattlesnake

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Abstract

In December 2022, the Kunming-Montreal Biodiversity Framework Agreement was adopted outlining the measures necessary for addressing biodiversity loss and ecosystem restoration, including 8 Action Targets specifically addressing species conservation. Achieving these Action Targets will benefit many species, but a substantial number of threatened species will continue to decline without additional recovery actions. In recognition of this, Target 4 (Intensive Management), was created, which specifically aims to ensure active management actions to enable the recovery and conservation of species, including ex situ actions. There are a variety of ex situ management options and roles which can contribute to conservation efforts at different stages in a species' declining status, from addressing the causes of primary threats and offsetting threat impact, to restoring wild populations. Often, these options require that a small population be established under human care. These populations can benefit from the integration of genomic resources. We developed a workshop-based process based on the IUCN Conservation Planning Specialist Group's Principles and Steps and the IUCN Threat Classification Scheme. During the workshop, focused on the Eastern Massasauga Rattlesnake (*Sistrurus catenatus*), managers, and other partners where species conservation efforts involve ex situ populations were guided through a decision-making process on how genomics could benefit the conservation of this critically endangered species. We piloted the process in collaboration with the Canada BioGenome Project and the Canadian Eastern Massasauga Rattlesnake Recovery Implementation Group (CEMRRIG) in February 2023. We present our framework and a summary of the outcome of the pilot workshop.

Poster

A novel loop-mediated isothermal amplification (LAMP) assay for highly specific field detection and identification of the Boreal Chorus Frog (*Pseudacris maculata*)

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Abstract

Detecting and identifying species at risk (SAR) is essential for defining range limits and phenology, which is critical to effective conservation policy. Some amphibian SAR can be difficult to non-intrusively survey or morphologically difficult to distinguish with co-occurring related species. Environmental DNA (eDNA) is an emerging technique for species detection and biomonitoring, but the most common techniques for analyzing eDNA, quantitative PCR and metabarcoding require significant apparatus/expertise and are not suitable for use outside a lab setting. Loop mediated isothermal amplification (LAMP) is an alternative molecular technique for amplifying and detecting DNA that has been applied to great success in human health, such as in over-the-counter genetic assays for SARS-CoV-2. As LAMP does not require thermal cycling, is resistant to many PCR inhibitors, and is highly specific due to using 4-6 primers, LAMP may be an ideal technique for in-field, community science-friendly eDNA detection or swab-based identification of amphibian SAR. In this study, we designed and validated a LAMP assay for the Boreal Chorus Frog (*Pseudacris maculata*). We tested seven candidate primer sets, evaluating them in silico and in vitro for specificity and in vitro for sensitivity. The best performing primer set was tested for specificity and performance with synthetic plasmid DNA, extracted genomic DNA, crude lysate, and on eDNA samples validated through ddPCR and expert opinion. We demonstrate the potential of this assay for thermal cycling-free identification.

Poster

Student

Reptile road mortality at the Ojibway Prairie Complex, an ongoing threat at a future National Urban Park

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Abstract

Home to endangered Massasuga Rattlesnake (*Sistrurus catenatus*) and Butler's Gartersnake (*Thamnophis butleri*), the Ojibway Prairie Complex (OPC) and greater park ecosystem is one of few tallgrass prairie ecosystems remaining in Ontario. Purposed to become a National Urban Park and surrounded by a network of roads and a major highway, road impacts have threatened the OPC for many years. We studied reptile road mortality before and after two lengths of barrier fences were installed on each side of the Ojibway Prairie Provincial Park (ca.525 m total, installed on a single side of two separate roads). Using alternating daily barrier fence and bicycle surveys between September and November of 2019-2022, we compared the length of Siriema roadkill hotspots, rate of mortality, and cumulative mortality using generalized linear models. We found up to a 52% reduction in mortality hotspot length on Malden Road after fence mitigation compared to before, but no change in hotspot length on Matchette Road. Cumulative and rate of mortality results showed no difference in mortality on either road post mitigation compared to control sites. Barrier fence surveys found significantly fewer snakes on the road side of fences compared to the conservation side, suggesting the fencing was intercepting snakes attempting to access the road right of way. However, roadkill hotspots at the fence ends suggests animals might bypass the fences. Our results suggest the current barrier fences on only the park side of the roads may keep reptiles in a protected area, but that additional mitigation is required to effectively reduce road mortality.

Poster

Effects of water pH and salinity on frog skin pH

Einstein Nkwonta[1], Karen Vanderwolf[2], Tyler Ambeau[1], Samuel Davison[1], April Kowalchuk-Reid[1], James Paterson[3], Christina Davy[4]

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Abstract

Amphibians face global declines linked to anthropogenic environmental change, including modifications to freshwater habitats. Human impacts on water chemistry, such as acid rain and road salt run-off into wetlands, may affect the physiology of amphibians that rely on access to clean water. For example, water pH affects amphibian development, behavior, and physiology. In this study, we explored the ability of amphibians to maintain homeostasis across a range of pH and salinity levels in freshwater environments. We sampled at 20 wetlands around Peterborough, Ontario, recording water pH, water salinity, and the ventral skin pH of Northern Leopard Frogs (*Lithobates pipiens*; n = 141) and Green Frogs (*L. clamitans*; n = 329). We found that water pH increased with salinity but not day of year. For a 1 unit increase in water pH, *L. pipiens* skin pH increased by 0.38 while *L. clamitans* increased by 0.12. We observed differences in responses to water chemistry between the two species; skin pH of *L. pipiens* varied with demographic group and body size, but skin pH of *L. clamitans* did not. Changes in skin pH affect the activity of enzymes on the skin, including those involved in antimicrobial functions. The ability of *L. clamitans* to buffer skin pH across a greater range of water pH may provide this species with a relative advantage over *L. pipiens* as human effects on wetland chemistry alter factors such as water pH.

Oral – 15 minutes

Identifying Eastern Foxsnake (*Pantherophis vulpinus*) critical habitat along the eastern coast of Georgian Bay at Shawanaga First Nation

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Abstract

Shawanaga First Nation (SFN) is home to many species at risk reptiles, including the endangered Eastern Foxsnake (*Pantherophis vulpinus*). Since 2019, the Lands department at SFN has worked to understand species-at-risk reptile population sizes, spatial ecologies, threats, and to develop effective management and mitigation strategies. Yearly mark-recapture surveys, along with opportunistic community observations have begun to reveal Eastern Foxsnake population distributions at SFN, however, the locations of critical overwintering, oviposition, and movement corridors are still poorly understood. As these habitat features are critical to population persistence, we aim to augment conservation efforts by creating and monitoring artificial oviposition sites, continuing mark-recapture surveys, and conducting a radio telemetry study of Eastern Foxsnakes at SFN. As we continue to see human induced mortality of Eastern Foxsnakes, understanding seasonal habitat use will be critical to preventing further population declines, and will allow the SFN lands department to make informed land-use decisions to protect critical habitats and movement corridors. Preliminary results of mark-recapture surveys and future research methods and goals will be presented.

Poster

Student

Status of turtle populations in Point Pelee National Park: A 21-year update

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Abstract

Despite surviving at least two major extinction events while thriving for over 200 million years Testudines are now one of the most at-risk vertebrate orders. All Ontario species are at-risk with a federal status ranging from Special Concern to Extirpated. We are currently studying the turtle populations in Point Pelee National Park which historically had the greatest turtle diversity in Canada. With the Spotted Turtle (*Clemmys guttata*) not observed since 1994, PPNP is currently home to five species (a sixth can use the beaches for nesting). In 2001-2002 Browne and Hecnar conducted the most extensive study of the PPNP turtle populations. This study indicated top-heavy age structures and declining CPUE's. High rates of nest predation were also observed and a nest protection program that has helped protect over 850 nests to date was started. Our team is working towards providing a snapshot in time examining the current status of the turtle populations and the efficacy of the nest protection program. Individuals are primarily captured using hoop and basking traps and released following standard measurements and marking. We have over 2300 total captures across 8 sites (2022-2023). Early results suggest increased juvenile recruitment for Snapping (*Chelydra serpentina*) and Painted Turtles (*Chrysemys picta*) and increased CPUE for Snapping Turtles. Age structure and CPUE of Blanding's Turtles (*Emydoidea blandingii*) remain a concern along with nest predation and road mortality. Additional highlights include a Blanding's individual that had three clutches in two years and predator surveys. In 2022 predator surveys indicated increased Raccoons (*Procyon lotor*), however 2023 predator sightings have plummeted.

Oral – 15 minutes

Student

Demographic assessment of a freshwater turtle assemblage in an urban protected area in the context of ongoing threats and mass mortality events

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Abstract

Chronic threats and mass-mortality events in urban areas impact wildlife and can disproportionately affect turtle populations because their slow life history limits population recovery. Demographic studies of urban turtles are important, especially where ongoing conservation efforts (e.g., headstarting) occur and historical data on species status are absent. Our study focused on a community of headstarted Blanding's *(Emydoidea blandingii*), Painted (*Chrysemys picta*), and Snapping (*Chelydra serpentina*) Turtles, inhabiting a highly fragmented wetland complex in Toronto, Ontario. We assessed demography (abundance, survival, sex ratio, body-size distribution), biomass, and community diversity in three wetlands within the complex using mark-recapture data collected 2018–2021. Abundance estimates were highest for Painted Turtles, followed by Blanding's and Snapping Turtles. Survival estimates varied depending on the species, and sex ratios were equal except for painted turtles in one wetland where we observed a female-biased sex ratio. The Blanding's Turtle population was juvenile-biased which is not surprising, as they are part of an ongoing headstarting program, whereas the Painted and Snapping Turtle populations were adult-biased. Biomass of Snapping Turtles was the highest despite low abundance. We incidentally captured five (2M:3F) Red-eared Sliders (*Trachemys scripta elegans*) with high body mass, suggesting they may outcompete native turtles if they become fully established. Community diversity was highest at the headstart release site, but evenness was highest where only wild turtles occur. Our findings indicate that headstarting may affect community evenness but that turtle communities can persist in urban habitats; however, ongoing threats and catastrophes may limit population persistence.

Oral – 15 minutes

Student

In the belly of the beast: Examining the diet of a domestic invasive amphibian to gain insight into its impact and the mechanisms that promoted its success

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Abstract

The island of Newfoundland, Canada, has no native amphibians or reptiles. Since colonization, however, six species have been introduced. The Eastern Red-backed Salamander (*Plethodon cinereus*) is the most recently described of these non-native herptiles, with a self-sustaining population occurring in Conception Bay South. Little is known about their origins, invasion history, or invasive ecology. The introduction of species to novel environments outside of their native range can lead to detrimental ecological changes. This is particularly possible for species, like *P. cinereus*, that reach high biomass and drive energy flow within ecosystems. We posit that this salamander's successful establishment and proliferation may have been mediated by pre-existing invasive prey communities (i.e., the Invasional Meltdown hypothesis). We will test this hypothesis by examining the stomach contents of *P. cinereus* from Newfoundland and identifying what invertebrates this introduced predator is feeding on. Stomach contents from 133 salamanders were obtained through dissection and flushing, and then prey items were identified using a microscope to the lowest possible taxonomic level using keys, field guides, and crowd-sourced iNaturalist consultation. Here we will present preliminary results on the diet of this introduced salamander population. We plan to combine this data with a systematic literature review of the diet of *P. cinereus* across their native range to determine whether it differs between populations. This work will help us begin to understand the footprint of this novel invertebrate predator in Newfoundland and inform invasion biology theory regarding how previously introduced species may bolster the invasion potential of others.

Poster

Student

Understanding the effectiveness of mitigation translocation for Columbia Spotted Frogs (*Rana luteiventris*) in British Columbia, Canada

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Abstract

Mitigation translocation is a common practice in British Columbia (BC) used to protect herpetofauna from the negative impacts of human-caused habitat alteration or destruction. However, despite its widespread use, the effectiveness of this approach to conserve amphibians remains uncertain, particularly when compared to other types of translocations. The Columbia Spotted Frog (*Rana luteiventris*) is notably impacted by mitigation translocation projects in BC and serves as the focus of this study. The study aims to assess the post-translocation survival and movement of Columbia Spotted Frogs that have been moved to one of three treatments: 1) a control group, 2) a wetland that is a short distance (< 1km) away, and 3) a wetland that is a long distance (> 5km) away from the control. The study will use passive integrated transponder (PIT) tags and capture-mark-recapture methods over a two-year period. In addition, a subset of the frogs will be fitted with radio transmitters in year one and tracked over three weeks in July and August to understand if movement patterns change post-translocation. The preliminary results from this study will be discussed.

Oral – 5 minutes

Student

Using long-term data to simulate extinction risk for two Massasauga (*Sistrurus catenatus*) populations in Ontario, Killbear Provincial Park and Wainfleet Bog

Katharine Yagi, Anne Yagi

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Abstract

The Massasauga Rattlesnake (*Sistrurus catenatus*) exists in two designatable units (DU) in Canada, the threatened Great Lakes St. Lawrence DU includes populations surrounding Georgian Bay, the Bruce Peninsula and Manitoulin Island whereas the majority of the endangered Carolinian DU now exists in the Wainfleet Bog. These two DUs reside in different habitat types and planning development circumstances, and therefore experience different threats. Using the long-term data collected from Killbear Provincial Park and the long-term data collected from Wainfleet, two age-based survival matrices were constructed, with calculated fecundity rates. A sensitivity analysis was conducted on each matrix to determine targeted ages for recovery action. We then compared different threat scenarios for both populations to determine which threats would lead to population decline or increased extinction risk. Results from this analysis can shed much light on which conservation efforts would make the biggest impacts and benefits to the two Massasauga DUs in Ontario.

Oral – 15 minutes

The do's and don'ts of environmental consulting: A case study of an Eastern Foxsnake (*Pantherophis gloydi*) population in southwestern Ontario

Anne Yagi

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Abstract

The Endangered Species Act (ESA) protects endangered and threatened species and their habitat except under certain circumstances. Permission to harm species and destroy habitat can be granted by the Minister in a C-Permit, if the Minister is of the opinion that an overall benefit to the species will be achieved within a reasonable time through the requirement of conditions or the applicant agrees to pay funds to the agency. Environmental consulting reports usually form the basis of the Minister's decision to approve a C-Permit application. We used publicly available data and reports to investigate the approval process used for large-scale development on an island in the Detroit River. In fact, this small island was occupied by a large Eastern Foxsnake (*Panterophis gloydi*) population, which was first confirmed after 148 snakes (all sizes and age classes) were captured during a C-Permit salvage operation in 2021. Further investigation revealed mark-recapture studies that were completed in 2012 and 2013 and reports from a Lands Tribunal Hearing. Several untested observations, unsubstantiated assumptions, and conclusions formed the basis of the development planning and C-Permit approvals. These assumptions were never challenged. This study presents an objective critique of the ESA process as a learning opportunity, in the hope that future C-Permit applications are met with proper scrutiny and oversight.

Oral – 15 minutes

Map of Carleton University Campus