CARCNET/RÉCCAR 2005

10th Annual Meeting of the

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

16-19 September 2005
Ottawa • Ontario • Canada

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CARCNET/RÉCCAR 2005

Our logo for 2005 incorporates two of the herpetological mysteries of the Ottawa area: Does a population of Softshell Turtles (*Apalone spinifera*) persist in the Ottawa River? What is the relationship between the redback and leadback forms *of Plethodon cinereus* - both where they occur in the same population, and between the Ottawa and St Lawrence rivers where only the leadback form is found?

And those with time on their hands can also reflect on the fact that North America, as Turtle Island, is “turtles all the way down,” and that the philosophy of the yin-yang dichotomy began as the difference between the Salamanders' moist and shady yin northeast-facing slope and the Lizards' bright & warm yang southwest-facing slope.

This year's logo was produced by Aleta Karstad, from a design by Fred Schueler. Further examples of Aleta's art can be seen at http://pinicola.ca/aleta.htm

CARCNET/RÉCCAR 2005

Board of Directors of the Canadian Amphibian and Reptile Conservation Network/Réseau Canadien de Conservation des Amphibiens et des Reptiles

CARCNET/RÉCCAR 2005

A Message from the Board

The Canadian Amphibian and Reptile Conservation Network (CARCNET/RÉCCAR) is a registered charitable organization dedicated to preserving Canada's wildlife in its natural habitats. In existence for 10 years, CARCNET/RÉCCAR members are working to educate people, reverse the trends in loss of habitat and conduct research to better understand these animals and the threats they face. Among its roles, CARCNET/RÉCCAR serves as the Canadian network of the global IUCN Declining Amphibian Population Task Force and represents Canadian biologists and educators who study, protect and educate people about amphibians and reptiles. We also help to coordinate public involvement in amphibian and reptile monitoring programs across Canada.

Other organizations such as the World Wildlife Fund and Environment Canada seek advice from CARCNET/RÉCCAR on how to preserve Canadian ecosystems for frogs, toads, salamanders, turtles, snakes and lizards. The network is also developing a system to designate Important Amphibian and Reptile Areas (IMPARA) in Canada to raise awareness about the areas that are special for these animals. Most prominent amongst our activities are:

- An Annual General Meeting. Held each fall and alternating between locations in eastern and western Canada, our AGM includes a scientific conference for the presentation of herpetological research findings, plenary addresses, and interesting field trips. Also at the AGM the great Canadian Herp Quiz takes place, the Blue Racer and Silver Salamander achievement awards are presented, and cash awards for the best student talk and best student poster are given out.

- A program of publishing. This includes contributions to *Amphibians in Decline. Reports from the Canadian Declining Amphibian Populations Task Force* and helping coordinate the upcoming *Ecology, conservation and status of reptiles in Canada* and other publications.

- Maintaining a network of herpetologists. Members of CARCNET/RÉCCAR receive the Boreal Dip Net newsletter by mail, and email messages concerning significant papers in herpetology on an occasional basis

- Maintaining a website. In collaboration with the Ecological Monitoring and Assessment Network of Environment Canada, who host our website, and through the generous efforts of our webmaster Bev Horn (thanks Bev!) CARCNET/RÉCCAR has an informative website on the biology and conservation of Canadian herpetofauna and through which interested people are able to send queries to Canadian herpetologists.

- Supporting and partnering with other organizations, graduate students, and government and other agencies in amphibian and reptile conservation projects. For example, a project with Mountain Equipment Co-Op and TURTLE S.H.E.L.L. TORTUE to post turtle crossing road signs in eastern Ontario, with herpetologists conducting surveys in Québec, and with wetland construction on Pelee Island. Until recently, with with funds from Digital Frog International we awarded an annual student scholarship. We also provide letters of support for funding applications that will increase in knowledge and/or conservation of Canadian herpetofauna.

Joining CARCNET/RÉCCAR is easy and for $10 if you are a student or $20 otherwise, it`s a bargain. Membership includes our newsletter, a cost reduction on the annual meeting registration, email updates and pdfs on significant papers published on the conservation of reptiles and amphibians, and updates on conferences relating to reptiles and amphibians.

Being run by volunteers, CARCNET/RÉCCAR is always looking for new faces to join the organization. We are especially interested in recruiting new members to the Board of Directors. If you are interested in a position on the CARCNET/RÉCCAR executive, please let a current board member know.

CARCNET/RÉCCAR 2005

Acknowledgements

Local Organizing Committee:

- Grégory Bulté
- Francis Cook
- Maxine Croteau
- Oluwayemisi Dare
- Jean-François Desroches
- Sara Gagné
- Elizabeth Kilvert
- Fred Schueler
- Dave Seburn
- Michèle Steigerwald
- Wes von Papineäu

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- Laura Friis
- Roy John
- Linda Paetow
- David Rodrigue/Ecomuseum de Montreal
- Wayne Weller

Others:

- Rita Casasanta
- Jamie Dyer
- Robyn Ferguson
- Aleta Karstad
- Linda Paetow

CARCNET/RÉCCAR 2005

Friday, 16 September 2005

4:00 pm – 7:00 pm CARCNET/RÉCCAR Board of Directors Annual Meeting

6:00 pm – 11:00 pm Registration/Mixer (O'Connor Salon)
GUEST SPEAKER: Dr. Ken Storey, Carleton University,
Reptiles and amphibians in a harsh climate

Saturday, 17 September 2005

All day **Posters**

0730-0800 **COFFEE/REGISTRATION**

0800-0815 **OPENING REMARKS**

SESSION 1: AMPHIBIAN CONSERVATION

0815-0830 Amphibian conservation: Back to the future
David Lesbarrères, Mike Fowler

0830-0845 What is critical habitat? The case of the Jefferson salamander
Karine Beriault, J.P. Bogart

0845-0900 Phylogeography of stream salamanders in Quebec and Labrador
Tricia M. Markle, David Green

0900-0915 Beaver (*Castor canadensis*) as a surrogate species for conserving anuran amphibians on boreal streams
Cameron Stevens, Cynthia Paszkowski, A. Lee Foote

0915-0930 Identifying habitat features at local and landscape scales that affect the distribution and abundance of anuran amphibians in the western boreal forest
*Constance Browne, Shelley Boss, A. Lee Foote, Cynthia A Paszkowski**

0930-0945 Looking for nests to find the rare four-toed salamander (*Hemidactylium scutatum*): Technical approach and nest characterisation
*Jean-François Desroches, Daniel Pouliot**

0945-1000 How far from the nesting site should we protect the four-toed salamander (*Hemidactylium scutatum*)? A case of urban conservation.
Daniel Pouliot, Héloïse Bastien

1000-1030 **COFFEE**

SESSION 2: SNAKE BIOLOGY

1030-1045 Rattlesnake conservation in the south Okanagan Valley.
J. Brown, C.A. Bishop, B. Baptiste, M. Sarell, S. Austen, M. Holm*

1045-1100 Large body temperature fluctuations of eastern foxsnakes (*Elaphe gloydi*) during voluntary cold-water swimming in their natural habitats
Anna Lawson, Carrie A. MacKinnon, E.D. Stevens, R.J. Brooks

1100-1115 Evaluation of Eastern Racer (*Coluber constrictor*) habitat use and replacement: a cooperative effort of the Vermont Departments of Transportation and Fish and Wildlife.
Jim Andrews

1115-1130 Exploring the limits of a range: *Thamnophis sauritus* in Nova Scotia
T. Herman, R. Wassersug, J. McNeil, J. Todd, S. Bell, G. Bourque, B. Caverhill, M. Lawton, E. Newton, N. Seguin, J. Caron

1130-1215 **PLENARY ADDRESS**
Thermoregulation, habitat use, and fitness in reptiles
Gabriel Blouin-Demers

1215-1330 **LUNCH (not provided)**

SESSION 3: AMPHIBIANS, GENETICS, REPTILE CONSERVATION, RESCUE.

1330-1345 Effect of temperature on physiology and behaviour in two colour morphs of the red-backed salamander (*Plethodon cinereus*)
Daniel Reeves, Jacqueline Litzgus, David Hackett

1345-1400 The drastic decline of the Western Chorus Frog (*Pseudacris triseriata*) in southwestern Québec
Isabelle Picard, Jean-François Desroches

1400-1415 Genetic structure of the Eastern Red-backed salamander (*Plethodon cinereus*) in an urban landscape
Sarah Noël, Martin Ouellet, Patrick Galois, Françcois-Joseph Lapointe

1415-1430 The genetics of peripheral populations
Briar Howes, Stephen Lougheed

1430-1445 Ontario's conservation responsibility for reptiles: the development of a conservation responsibility index based on proportion of range and current conservation ranks
Susan Cowin, Michael Oldham, Joe Cebek

1445-1500 Update from the Kawartha Turtle Trauma Centre
Kristy McNab

1500-1530 **COFFEE**

SESSION 4: TURTLES I

1530-1545 A comparison of preferred and optimal temperatures in the common map turtle (*Graptemys geographica*)
Elad Ben-Ezra, Gregory Bulté, Gabriel Blouin-Demers

1545-1600 Quantifying age and sex specific zebra mussels predation by the common map turtle (*Graptemys geographica*) using stable carbon isotopes: Preliminary results
Gregory Bulté, Gabriel Blouin-Demers

1600-1615 Effects of commercial fishing traps on a map turtle (*Graptemys geographica*) population in Thompson's Bay, St-Lawrence River
Marie-Andree Carrière, Gabriel Blouin-Demers

1615-1630 Effects of sexual size dimorphism on diet specialization in the common map turtle (*Graptemys geographica*)
Marie-Ange Gravel, Gregory Bulté, Gabriel Blouin-Demers

1630-1645 The effect of sex ratio on sexual selection in painted turtles (*Chrysemys picta*)
Elinor Hughes, Ronald J. Brooks

1645-1700 Annual temperature variations affect clutch frequency and egg size in a northern population of painted turtles (*Chrysemys picta*)
Njal Rollinson, Ronald J. Brooks

1700-1715 Threats and limiting factors to nesting and embryo hatch success of the spiny softshell
Ryan Bolton, Ronald J. Brooks

1715-1730 Thermal ecology of overwintering wood turtles (*Glyptemys insculpta*) at the species' northern range limit
William Greaves, Jacqueline Litzgus

1730 **TO FULL HOUSE RESTAURANT AND PIANO BAR,**
337 SOMERSET Street W. (238-6734)

CARCNET/RÉCCAR 2005

SUNDAY 18 September, 2005

All day **Posters**

0730-0800 **COFFEE**

SESSION 5: IMPACTS OF ROADS AND FORESTRY ON REPTILES AND AMPHIBIANS

0800-0815 Does forest harvesting create or destroy aquatic amphibian habitat?
Elke Wind

0815-0830 Characteristics of turtle populations in small ponds along roads
Jean-François Desroches, Isabelle Picard

0830-0845 Forestry guidelines to conserve rare amphibians and reptiles: A case study from Massachusetts
Leslie Bol, Henry Woolsey

0845-0900 Why did the reptile cross the road? Landscape factors associated with road mortality of snakes and turtles in the Southeastern Georgian Bay area
Carrie A. MacKinnon, Lisa Moore, Ronald J. Brooks

0900-0915 Paved roads as barriers to amphibian movements
Mireille Gravel, Marc Mazerolle, Marc-André Villard

0915-0930 The relative effects of forested, agricultural and urban landscapes on amphibian communities in eastern Ontario
Sara Gagné, Lenore Fahrig

0930-0945 The effect of the configuration of habitat relative to roads on pond-dwelling amphibians
Felix Eigenbrod, S.J. Hecnar, L. Fahrig

0945-1000 Are Ontario reptiles on the road to extinction? Anthropogenic disturbance and reptile distributions within the province
Joe Crowley and Ronald J. Brooks

1000-1030 **COFFEE**

SESSION 6: TURTLES II

1030-1045 Survivorship and differential longevity in the spotted turtle (*Clemmys guttata*)
Jacqueline Litzgus

1045-1100 Wood Turtle (*Clemmys insculpta*) habitat requirements and movements in New Brunswick
Vanessa Roy, Graham Forbes

1100-1115 Local and regional scale habitat selection by wood turtles (*Glyptemys insculpta*) at the northern limit of their range
Pamela Wesley, Ronald J. Brooks

1115-1130 Accounting for variability in a population viability analysis of Nova Scotia's Blanding's turtle (*Emydoidea blandingii*)
Guillaume Bourque, Tom Herman, J.A. McNeil, D.D. Hurlburt

1130-1145 Linking science and stewardship through public education with the Nova Scotia Blanding's turtle (*Emydoidea blandingii*)
Brennan Caverhill and Tom Herman

1145-1230 **PLENARY ADDRESS**:
Peripheral populations and their potential conservation value.
Stephen Lougheed

1230-1345 PHOTOGRAPH AND LUNCH

SESSION 7: AMPHIBIAN TOXICOLOGY AND DISEASE

1345-1400 Assessing prevalence of chytrid fungus (*Batrachochytrium dendrobatidis*) in native amphibians and bullfrogs (*Rana catesbeiana*) on Vancouver Island, British Columbia
Purnima Govindarajulu, Trenton Garner, Bradley Anholt

1400-1415 Interactive effects of malathion exposure and ranaviral infections in wood frogs (*Rana sylvatica*).
Amanda Duffus, Craig Brunetti, Bruce Pauli, Michael Berrill

1415-1430 *Xenopus tropicalis*: a novel surrogate species for amphibian toxicology
Natacha Hogan, Vance Trudeau

1430-1445 Consequences of early UV-B exposure on amphibian development and metamorphosis
Maxine Croteau, David Lean, Vance Trudeau

1445-1500 Impacts of row crop agriculture on sexual development of anurans
Tana McDaniel, Pamela Martin, Chris Marvin, Mark McMaster, Jim Sherry

1500-1530 COFFEE

SESSION 8: TOXICOLOGY AND OTHER SUBJECTS

1530-1545 Investigation of bullfrogs in sub-watersheds of the Yamaska River: General introduction and water quality
Monique Boily, Philip Spear, Guillaume Cardin, Daniel Rivest, Phillipe Juneau, Christian DeBlois, Nathalie Dassylva, Isabelle Giroux, Denis Laliberté, Denis*

1545-1600 Investigation of bullfrogs in sub-watersheds of the Yamaska River: Health status of bullfrogs
Monique Boily, Philip Spear, Anicha Nkoua, Sylvia Ruby, Catherine Dimacacos, Michel Fournier, Harrie Salo

1600-1615 The Fowler's toad recovery plan
David Green, Anne Yagi

1615-1630 A valuable tool to assess the strength of biological hypotheses in herpetology: Akaike's Information Criterion (AIC)
Marc Mazerolle

1630-1645 Introduced American bullfrog (*Rana catesbeiana*) removal in the South Okanagan
Sara Ashpole, David C. Cunnington, Ryan Noble

1645-1700 Demographic traits of introduced common wall lizards (*Podarcis muralis*) on Vancouver Island
Patrick Gregory

1700-1715 Factors affecting amphibian distribution and community structure in Nova Scotia
Ronald Russell

1715-1745 **CARCNET BUSINESS MEETING AND STUDENT AWARDS**

1745-1800 **SILENT AUCTION WRAP-UP**

MONDAY 19 September, 2005

All day Field trip to collections building of the Canadian Museum of Nature and Gatineau Park.

CARCNET/RÉCCAR 2005

LIST OF POSTERS

Genetic Differentiation and conservation of Wood Turtle (*Glyptemys insculpta*) populations throughout their range
Marina Amato, Ronald J. Brooks, Jinzhong Fu

Development of integrated indicators for monitoring the biodiversity of the St. Lawrence wetlands
Alain Armellin, Martin Jean, Caroline Savage, Magella Pelletier

Pesticide exposure and reproductive effects in native amphibian species using agricultural habitat, South Okanagan, British Columbia (2003-2005)
Sara Ashpole, Christine A. Bishop, John Elliott

Can the timing and location of wetland habitat enhancement increase the success of the Northern Leopard Frog Recovery Project on the Creston Valley Wildlife Management Area in southeastern British Columbia?
Marc-André Beaucher, Doug Adama

Age estimation in the bullfrog using skeletochronology
*Marie-Lou Breton, Philip Spear, Marc Levasseur, Monique Boily**

Amphibian diseases in Ontario: Chytridiomycosis and ranaviral Disease
Michelle Charbonneau, Christina Fridgen, Michael Berrill, Bruce Pauli

Effects of environmentally relevant concentrations of atrazine on gonadal development of snapping turtles (*Chelydra serpentina*)
Shane de Solla, Pamela Martin, Kimberly Fernie, Brad Park, Greg Mayne

Comparison of turtle species abundance and richness in damaged and recovered lakes in Sudbury, Ontario
Crystal Demmer, Tonia Van Kempen, Jacqueline Litzgus

Testicular degeneration in adult male bullfrogs (*R. catesbeiana*) from sampling sites in the Yamaska River basin
Catherine Dimacacos, Sylvia Ruby, Pamela Giancola, Monique Boily, Philip Spear, Michel Fournier

Toxicological field studies of sexual differentiation and reproduction in *R. catesbeiana* tadpoles collected from sampling sites in the Yamaska river basin
Catherine Dimacacos, Sylvia Ruby, Pamela Giancola, Monique Boily, Philip Spear, Michel Fournier

Early exposure to 17α-ethinylestradiol alters sex ratios and gonadal morphology of developing leopard frogs (*Rana pipiens*)
Paula Duarte, Natacha Hogan, Bruce Pauli, Michael Wade, David Lean, Vance Trudeau

Behavioural thermoregulation in wood turtles, chasing the sun slowly!
Yohann Dubois, Donald Thomas, Bill Shipley

Quick identification of Ambystoma hybrids from the Jefferson salamander complex
Jeanne Dumoulin, Sarah Noël, Martin Ouellet, Patrick Galois, François-Joseph Lapointe

LIST OF POSTERS (cont'd)

Impacts of pond connectivity on amphibian life stages at Delta Marsh, Manitoba
Katarzyna Dyszy, Dale Wrubleski, John Spence

Demography and behaviour of a Georgian Bay population of the spotted turtle (*Clemmys guttata*)
Jean Enneson, Jacqueline Litzgus

Landscape and local factors associated with vertebrate roadkill in southern Ontario
Bob Farmer, Ronald J. Brooks

Assessing DNA damage in frogs from agricultural areas of southwestern Ontario.
Robyn Ferguson, Bruce Pauli, Pamela Martin, Tana McDaniel, Chris Marvin, Loren Knopper*

Chronic effects of atrazine herbicide on the development of Northern Leopard Frog (*Rana pipiens*) tadpoles
Christina Fridgen, Bruce Pauli, Michael Berrill, Ken Doe, Paula Jackman

Population dynamics of the wood turtle in the greater Kouchibouguac ecosystem, New Brunswick/Dynamique des populations de tortues des bois dans le grand écosystème de Kouchibouguac, Nouveau-Brunswick
Mireille Gravel, Éric Tremblay[2], Tom Herman[3], and Donald McAlpine[4]

Influence of water conditions on the embryonic survivorship of the Oregon spotted frog (*Rana pretiosa*).
René McKibbin, Christine A. Bishop, Russ Haycock

Excavation of freshwater turtle eggs is a non-deleterious method for obtaining fecundity and egg morphometric data.
Jason Samson, Elinor Hughes, Ronald J, Brooks*

Emergent infectious diseases in the Leopard Frog (*Rana pipiens*) in central Ontario.
Valerie St-Amour, Michael Berrill

Status of the Western Toad and its use of 'borrow pits' in the foothills of west-central Alberta
Cameron Stevens, Cynthia Paszkowski, David Stringer, Shelly Boss

Does multiple paternity increase with female size in the Common Map Turtle (*Graptemys geographica*)?: A work in progress
Carine Verly, Gregory Bulté, Gabriel Blouin-Demers

Conference Abstracts

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Linda Paetow

Conference Abstracts

AMATO

GENETIC DIFFERENTIATION AND CONSERVATION OF WOOD TURTLE (*Glyptemys insculpta*) POPULATIONS THROUGHOUT THEIR RANGE

Marina Amato, Ron J. Brooks, Jinzhong Fu

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The wood turtle (*Glyptemys insculpta*) is endemic to North America and ranges from southern Ontario and Quebec, east to New Brunswick and Nova Scotia, west to Minnesota and south to Virginia. However, this range is discontinuous and wood turtle populations within it are generally isolated. Most wood turtle populations in Canada and the United States are declining, and the few populations reported as stable are in areas with little human activity or access. The purpose of this research is to document patterns of genetic differentiation among wood turtle populations throughout their range. Mitochondrial DNA sequence data will be used to provide insight on the genetic structure, phylogeography, postglacial dispersal and conservation of *G. insculpta* in North America. Specifically, this study will aim to: (i) assess species-wide phylogeographical structure, (ii) trace the potential path wood turtles took during postglacial re-colonization, (iii) understand the taxonomic status and assist in determining conservation priorities for wood turtle populations throughout their range.

Poster

Conference Abstracts

ANDREWS

EVALUATION OF EASTERN RACER (*Coluber constrictor*) HABITAT USE AND REPLACEMENT: A COOPERATIVE EFFORT OF THE VERMONT DEPARTMENTS OF TRANSPORTATION AND FISH AND WILDLIFE

James S. Andrews

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During fieldwork for the Vermont Reptile and Amphibian Atlas Project, a population of Eastern Racers was discovered in southern Vermont. This was the first documented report of the species in the state since 1985. As a result of this discovery, the species is now listed as threatened by the state of Vermont. Unfortunately, the Vermont Department of Transportation has plans to construct a truck-weighing station on the discovery site. As a result, the Departments of Transportation and Fish and Wildlife are taking a unique proactive and cooperative approach in advance of the permitting process. A study funded by the Department of Transportation (VTrans) was undertaken to determine the function and importance of the proposed development site for the Eastern Racer population. Results of the study are being used to design replacement habitat to be constructed prior to the beginning of the development. Radio tracking of two adult male snakes revealed the location of the den and facilitated the implantation of passive integrated transponders (PIT tags) into seven adult racers. In addition, the studies indicate that the site is peripheral to the core of activity but important as a foraging area and as a connecting corridor to appropriate habitat further south. Radio tracking also revealed that the population only utilizes open early-successional habitat created by the margins of a busy interstate and a power line cut. Consequently, adjacent state lands will be cleared to provide replacement foraging habitat and a connecting corridor of open land around the development site.

Platform

Conference Abstracts

ARMELLIN

DÉVELOPPEMENT D'INDICATEURS INTÉGRÉS POUR LE SUIVI DE LA BIODIVERSITÉ DES MILIEUX HUMIDES DU SAINT-LAURENT/DEVELOPMENT OF INTEGRATED INDICATORS FOR MONITORING THE BIODIVERSITY OF THE ST. LAWRENCE WETALNDS

Alain Armellin, Martin Jean, Caroline Savage and Magella Pelletier

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Les milieux humides sont considérés comme des éléments essentiels d'un écosystème fluvial. En plus de leurs nombreuses fonctions, les milieux humides contribuent grandement à la diversité tant végétale qu'animale. La végétation des milieux humides offre des habitats de qualité à la faune. Selon l'approche écosystémique, les indicateurs de la biodiversité des milieux humides doivent intégrer les informations sur la répartition spatiale des communautés végétales et sur l'abondance et la diversité de la faune, incluant autant l'herpétofaune que les macroinvertébrés dans différents paysages fluviaux. Un projet-pilote, visant à évaluer la flore et la faune à différentes échelles spatiales durant la même période, a été amorcé au lac Saint-Pierre en 2004. Pour ce projet, nous avons retenu l'analyse des communautés végétales des milieux humides et des assemblages d'anoures qui leurs sont associés, car les anoures jouent un rôle crucial dans les milieux humides à cause de leur position trophique et de leur forte biomasse.

Wetlands are considered as essential elements of a river ecosystem. In addition to their many functions, wetlands largely contribute to plant and animal diversity. Wetland vegetation supplies high-quality habitats to wildlife. According to the ecosytemic approach, indicators of wetland biodiversity should integrate information on spatial distribution of plant communities and on abundance and diversity of wildlife, including as much herpetofauna as macroinvertebrates, in various fluvial landscapes. A pilot project on the assessment of plants and wildlife on various spatial scales during the same period was initiated in Lake Saint-Pierre in 2004. For this project, we have chosen to analyse plant communities and the associated assemblages of anurans, because these animals are crucial to wetlands, due to their trophic level and their large biomass.

Poster

Conference Abstracts

ASHPOLE 1

INTRODUCED AMERICAN BULLFROG (*Rana catesbeiana*) REMOVAL IN THE SOUTH OKANAGAN

Sara L. Ashpole[1], Dave C. Cunnington[1], Ryan Noble[2]

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[2]British Columbia Conservation Corps
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In the past few years, invasive American Bullfrogs (*Rana catesbeiana*) have been detected at four locations in the South Okanagan. These populations of bullfrogs pose a great hazard to native amphibians at risk, including the COSEWIC listed Spadefoot, Tiger salamander, and Western toad. It is believed that these frogs are a remnant population originating from the food industry in the 1950s. In 2004 and 2005 physical methods of removal have included: dip-netting, hand capture, seining, electro-shocking, and modified traps. The total number of individuals removed to date, and their life stage included: 88 adults; 32 juveniles; 11,222 tadpoles; and 20 egg masses. To contain the populations and reduce the probability of bullfrog migration, a semi-permanent exclusion fence has been constructed around two infected permanent ponds. Even though, removal methods have proven successful at suppressing the adult and reproductive success of the populations, complete eradication will require continued effort and potentially more drastic measures taken. Intense surveying in the South Okanagan has not detected bullfrogs at any additional ponds. The proximity of these ponds to each other is less than a few hundred meters, with the closest pond only 300m from Lake Osoyoos and the Okanagan River system. Anecdotal accounts near Lake Osoyoos raises great concern that this species may have a much wider local distribution than currently reported.

Platform

Conference Abstracts

ASHPOLE 2

PESTICIDE EXPOSURE AND REPRODUCTIVE EFFECTS IN NATIVE AMPHIBIAN SPECIES USING AGRICULTURAL HABITAT, SOUTH OKANAGAN, BRITISH COLUMBIA (2003-2005)

Sara L. Ashpole, Christine A. Bishop, John Elliott

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The Okanagan valley in BC is an area of intensive agriculture where 80% of the natural wetlands and riparian zones have been drained or altered. In total, 64 ponds, including 23 agricultural ponds, were surveyed to determine adult breeding, larval productivity, and relative population densities (2003 – 2005). To assess the risk of amphibian populations to multiple stressor effects of pesticides, we conducted two *in situ* experiments focusing on early native amphibian stages of development. Hatching success, tadpole survival, and abnormalities were recorded. Enclosures with eggs were placed in ponds located in either conventional orchards subjected to pesticide applications (azinphos-methyl, carbaryl, diazinon, endosulfan, pirimicarb), or in organic orchards, or non-agricultural control ponds. Water samples were collected for pesticide analyses at standard times and after known spray events. Historic contaminant levels in sediments were at relatively low to non-detectable levels, with the exception of DDT and its metabolites (DDT 0.24 - 47 ng/g d.w. (dry weight); DDE 2.52 – 1938.9 ng/g d.w.; DDD 5.26-1334.4 ng/g d.w.). In 2004, Spadefoot (*Spea intermontana*) and Western Toad (*Bufo boreas*) eggs were placed in conventional (N=2) and organic orchards (N=3). In 2004, substantial mortality was observed in both species at one of our conventional sites (92% and 100%); whereas, mortality was very low at one of our organic sites (3% and 4%). Mortality among remaining sites ranged between 15% and 38%. In 2005, Spadefoot and Pacific Treefrog (*Pseudacris regilla*) eggs were placed in conventional orchards (N=3) and control ponds (N=3). Our conventional sites experienced 35 - 100% mortality; whereas our reference sites experienced less than 12% mortality.

Poster

Conference Abstracts

BEAUCHER

CAN THE TIMING AND LOCATION OF WETLAND HABITAT ENHANCEMENT INCREASE THE SUCCESS OF THE NORTHERN LEOPARD FROG RECOVERY PROJECT ON THE CRESTON VALLEY WILDLIFE MANAGEMENT AREA, IN SOUTHEASTERN BRITISH COLUMBIA?/ EST-CE QUE LE TIMING AINSI QUE LE SITE DE PROJETS D'AMÉLIORATION DES TERRES HUMIDES SUR LE CRESTON VALLEY WILDLIFE MANAGEMENT AREA PEUVENT AUGMENTER LE SUCCÈS DU PROJET DE RECOUVREMENT DE LA GRENOUILLE LÉOPARD DANS LE SUD-EST DE LA COLOMBIE-BRITANNIQUE?

Marc-André Beaucher[1] and Doug Adama[2]

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Until the spring of 2005, northern leopard frogs (*Rana pipiens*) in British Columbia were confined to a single location in the Creston Valley Wildlife Management Area (CVWMA). As part of a routine wetland management strategy to maintain waterfowl habitat in the CVWMA, approximately 45 hectares of wetland, called Leach Lake unit #4, were treated in 2004. Thick continuous stands of emergent vegetation of *Typha latifolia* and *Scirpus* sp. were reduced by mechanical mowing, baling, and tilling, and large areas of shallow water (<1 m deep) previously encroached on by emergent vegetation were opened up. In the spring of 2005, several male *R. pipiens* were heard calling in the open shallow areas created in that unit in 2004. Subsequently, three egg masses were discovered in the same area. Although *R. pipiens* likely existed in this unit in the past, there were no official records up until 2005. Two of three calling males captured during spring nocturnal surveys, turned out to be animals that had been reared in captivity in 2003 as part of the Northern Leopard Frog Recovery Project. Marked with Visual Implant Elastomer, these two frogs had been released more than 2 km away. These results suggest that recovery efforts may need to consist of more than a single approach. A habitat enhancement project is in progress in unit 2b of Corn Creek marsh (summer 2005). Will frogs released in previous years move into this area and breed?

Jusqu'au printemps de 2005, les grenouilles léopards (*Rana pipiens*) en Colombie-Britannique étaient restreintes dans une seule région soit celle du Creston Valley Wildlife Management Area (CVWMA). En 2004, dans le cours du programme d'aménagement des terres humides pour préserver l'habitat des oiseaux aquatiques sur le CVWMA, environ 45 hectares de terres humides dans l'unité Leach Lake #4 ont été traitées. Des grandes étendues de végétation, spécialement *Typha latifolia* et *Scirpus* sp. ont été éliminées par fauchage, mise en balles et ensuite enfouies par labourage. De grandes aires d'eaux peu profondes (<1 m) jusqu'alors envahies par la végétation émergente ont pu être rétablies. Au printemps de 2005, on a pu entendre le chant de plusieurs mâles *R. pipiens* dans les eaux peu profondes rétablies dans cette unité en 2004. Trois masses d'œufs furent par la suite découvertes dans cette même zone. Malgré le fait que *R. pipiens* étaient probablement présent dans cette unité auparavant, aucune mention officielle n'avait été enregistrée antérieurement à l'année 2005. Deux des trois mâles capturés lors d'une visite nocturne du site le printemps dernier se sont avérés être deux individus élevés en captivité en 2003 dans le câdre du Project de Recouvrement de la Grenouille Léopard . Portant une marque de couleur dans une des palmes arrières (Visual Implant Elastomer), ces deux grenouilles avaient été relâchées à une distance de plus de 2 km du nouveau site. Ces résultats nous portent croire que les efforts de recouvrement puissent nécessiter plus qu'une approche unique. Un project d'aménagement de terres humides est en cours dans l'unité Corn Creek 2b (été 2005). Est-ce que les grenouilles rélâchées dans les années précédentes vont s'implanter dans cette unité et se reproduire?

Poster

Conference Abstracts

BEN-EZRA

A COMPARISON OF PREFERRED AND OPTIMAL TEMPERATURES IN THE COMMON MAP TURTLE (*Graptemys geographica*)/COMPARISON DE LA TEMPERATURE PRÉFÉRENTIELLE ET DE LA TEMPERATURE OPTIMALE CHEZ LA TORTUE GÉOGRAPHIQUE (*Graptemys geographica*)

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According to the thermal coadaptation hypothesis, the preferred temperature (Tset) of ecotherms should match their optimal temperature (To) for performance. Moreover, indices of thermoregulation assume that Tset and To are the same. We tested both this prediction and assumption with male common map turtles (*Graptemys geographica*) by determining Tset and To for swimming speed and righting time. The first goal of this study is to compare Tset measured by two methods: a dry thermal gradient and an aquatic basking arena. The second goal of this study is to compare Tset obtained by these two methods to To for the two locomotory performances. Given that map turtles are highly aquatic, we predict that Tset determined in the basking arena will better represent To, since moisture may be a limiting factor in the dry gradient, resulting in lower selected temperatures. In addition to testing the thermal coadaptation hypothesis with turtles for the first time, this study also has implications for the use of thermoregulation indices to study thermoregulation in free ranging reptiles.

Selon l'hypothèse de la coadaptation thermique, la temperature prérentielle (Tset) des ectothermes devrait correspondre à leur temperature optimale (To). De surcroît, les indices de thermoregulation assument que Tset et To sont les mêmes. Nous avons testés cette prediction et présomption avec des mâles tortues géographique (*Graptemys geographica*) en déterminant Tset et To pour la vitesse natatoire et de redressement. Le but premier de cette étude est de comparer Tset mesuré avec deux methodes: un gradient thermique et un aréna aquatique de lézardage. Le but second est de comparer Tset obtenu avec ces deux methodes à la To des deux mesures de performance. Étant donné que les tortues géographiques sont particulièrement aquatique, nous présdisons que Tset determiné avec l'arena de lézardage sera plus représentatif de To puisque la faible humidité dans le gradient themique pourrait amener les tortues à selectionner des temperatures plus basses. En plus de tester l'hypothèse de la coadaption thermique pour la première fois chez un chélonien, cette étude comporte aussi des implications concernant l'utilisation des indices de thermoregulation.

Platform

WHAT IS CRITICAL HABITAT? THE CASE OF THE JEFFERSON SALAMANDER

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With the recent advent of legislation such as the Species at Risk Act (SARA; 2003), scientists and Recovery Team members have been given the thankless task of identifying and describing critical habitat for Canada's threatened and endangered wildlife. Putative habitat variables and an information-theoretic approach (AIC) to modelling have recently become popular tools used to accomplish this. I will argue that the AIC approach, regardless of its potential, can sometimes provide us with a limited amount of novel information. In 2004-2005, I used this method to describe Jefferson Salamander (*Ambystoma jeffersonianum*) habitat throughout its range in southern Ontario but got no significant results. Using my study and others, I will discuss the benefits and limitations of AIC as a method for identifying and describing critical habitat.

Platform

BLOUIN-DEMERS

THERMOREGULATION, HABITAT USE, AND FITNESS IN REPTILES

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Most physiological processes depend on temperature. Because terrestrial ectotherms do not generate their own body heat, they adjust their body temperature behaviorally (by preferential use of habitats) to maintain optimal performance. Thus, there should be a particularly tight link between thermoregulation, habitat selection and fitness in ectotherms. The cost-benefit model of thermoregulation predicts that ectotherms should invest more in thermoregulations when the costs are low, but contrary to this prediction, I showed that ectotherms invest more in thermoregulation when the costs are high. I demonstrated that snakes use habitats selectively to thermoregulate: snakes that thermoregulate more use edges more, and edges have the highest thermal quality of all available habitats. How appropriate patterns of habitat use, driven by thermoregulation, result in increased fitness remains unclear. I used operative environmental temperatures and the body temperatures of free ranging snakes to model the performance that would result from random habitat use; this allowed to estimate the benefit of thermoregulation.

Platform (Plenary Address)

Conference Abstracts

BOILY 1

ÉTUDE DES OUAOUARONS DANS LES SOUS-BASSINS VERSANTS DE LA RIVIÈRE YAMASKA: MISE EN CONTEXTE ET QUALITÉ DE L'EAU/INVESTIGATION OF BULLFROGS IN SUBWATERSHEDS OF THE YAMASKA RIVER: GENERAL INTRODUCTION AND WATER QUALITY

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L'agriculture est susceptible d'avoir plusieurs impacts sur les amphibiens en affectant, entre autres, la qualité de l'eau. Afin de préciser les caractéristiques des eaux de surface, des échantillons on été collectés en 2004 dans six sous-bassins de la rivière Yamaska qui traverse la région agricole la plus importante du Québec. Les sous-bassins représentaient différentes activités agricoles – soit faible, moyenne ou intensive. L'échantillonnage a été répété quatre fois entre juin et juillet. Chaque échantillon a été analysé pour 53 pesticides, des composés azotés et phosphorés, la biomasse des algues, la présence de cyanobactéries ainsi que des paramètres physico-chimiques standard. La qualité de l'eau a été comparée au statut physiologique d'une espèce indigène. Le ouaouaron, *Rana catesbeiana*, a été choisi principalement à cause de sa taille, sa longévité, son affinité pour l'eau et son mode d'alimentation. Les résultats démontrent que les pesticides sont davantage présents dans les sites à forte activité agricole (rivière Noire et rivière à la Barbue). Onze pesticides étaient détectés dans au moins 17 % des échantillons, les plus fortes concentrations étant associées à l'atrazine, le dicamba, le métolachlore et le bentazone. La concentration en nitrite la plus élevée, 429 μg/L, a été mesurée à la rivière à la Barbue et ce paramètre dépassait régulièrement la recommandation canadienne. Une grande variation de la biomasse algale a été observée et influencée par la concentration de nutriments et de pesticides tandis que la présence de cyanobactéries était augmentée dans les cours d'eau ayant des concentrations élevées de pesticides.

Agriculture may impact amphibian populations in many ways including changes in water quality. To investigate in detail the characteristics of surface waters, samples were collected in 2004 from six sub-watersheds of the Yamaska River which flows through the most important agricultural region of Québec. The sub-watersheds represented different levels of agricultural activity – low, moderate or intensive. Sampling was repeated four times between June and July. Each sample was analyzed for 53 pesticides, phosphate and nitrogen compounds, algal biomass, the presence of cyanobacteria and standard physico-chemical parameters. Water quality was compared with the physiological status of an indigenous species. The bullfrog, *Rana catesbeiana*, was selected mainly due to its large size, long life-span, close association to water and feeding habits. The results demonstrate that the number and concentration of pesticides are greatest in the intensive agricultural sites (rivière Noire and rivière à la Barbue). Eleven pesticides were detected in at least 17 % of the samples. Atrazine, dicamba, metolachlor and bentazone were typically highest in concentration. The highest nitrite concentration, 429 μg/L, was analyzed in a sample from the rivière à la Barbue, and this parameter often exceeded the Canadian limit. Algal biomass varied widely and was influenced by nutrient and pesticide concentrations, whereas cyanobacteria were more abundant in waters having high pesticide concentrations.

Platform

Conference Abstracts

BOILY 2

ÉTUDE DE OUAOUARONS DANS LES SOUS-BASSINS VERSANTS DE LA RIVIÈRE YAMASKA: ÉTAT DE SANTÉ DES OUAOUARONS/INVESTIGATION OF BULLFROGS IN SUB-WATERSHEDS OF THE YAMUSKA RIVER: HEALTH STATUS OF BULLFROGS

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Au cours de cette étude, de nombreux paramètres ont été mesurés pour évaluer l'état de santé des ouaouarons associés aux différents sous-bassins versants de la rivière Yamaska. En comparant les ouaouarons mâles des sites à l'étude, on observe des différences significatives selon leur appartenance à des sites de faible, moyenne ou forte activité agricole. Ainsi, les ouaouarons sont plus petits là où l'agriculture intensive domine le bassin versant ($p < 0,001$). De plus et de façon significative, les adultes de ces sites ont une activité cholinergique plus élevée, présentent une dégénérescence des testicules et voient leur contingent de rétinoïdes hépatiques altéré; ratio des esters de rétinol/rétinol ($p < 0,001$). Au niveau du système immunitaire, on remarque une baisse: de la phagocytose, de la prolifération des lymphocytes B et T au niveau de la rate, de la concentration sanguine des globules blancs et des protéines plasmatiques. Pour les têtards de ouaouarons capturés dans quatre des six sites, on observe des anomalies dans le développement des testicules pour trois de ces sites. En général, les grenouilles associées aux sites d'agriculture intensive semblent présenter un bilan de santé déficient. D'autres paramètres font également partie de l'étude : parasitologie, bactériologie, métaux, BPC, estimation de l'âge, bio-essai de différenciation cellulaire et hormones. L'ensemble des données sera évalué afin de déterminer quels sont les meilleurs biomarqueurs pouvant être testés en regard de la contamination agricole pour les ouaouarons et, possiblement, pour d'autres espèces amphibiennes.

In the course of this investigation, numerous parameters were measured in order to evaluate the health of bullfrogs in different sub-watersheds of the Yamaska River. Comparison of male bullfrogs revealed significant differences between sub-watersheds in relation to low, moderate or intensive agricultural practices. Thus, adult males are smaller where intensive agriculture predominated ($p < 0.001$). In addition, adults at these sites have elevated cholinesterase activity, testicular degeneration and an alteration of the ratio of retinyl esters /retinol in the liver ($p < 0.001$). With respect to the immune system, bullfrogs collected from the intensive agriculture sites demonstrated a diminution of phagocytosis, decreased splenic lymphocyte B and T proliferation and lower white blood cell counts. In the case of tadpoles, testicular development was impaired at three of four sites investigated. A general decrease in bullfrog health is associated with sites characterized by intensive agriculture. The study includes several other parameters: parasitology, bacteriology, metals, PCBs, age determination, bio-assay of cellular differentiation and hormones. Overall, the results will be used to identify the best biomarkers for agricultural pollution in bullfrogs and possibly for other amphibians.

Platform

Conference Abstracts

BOL

FORESTRY GUIDELINES TO CONSERVE RARE AMPHIBIANS AND REPTILES: A CASE STUDY FROM MASSACHUSETTS

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Close to 60 percent of Massachusetts consists of forested land, ranking 8th in the US in percentage of forest cover. Conversely the population density is the 3rd highest and forested habitat is constantly being lost mainly to residential development. The state has 22 listed rare amphibian and reptile species. Habitat that is important for these species is protected under the Massachusetts Endangered Species Act (MESA) and has been identified on Priority Habitat Maps developed by the Natural Heritage and Endangered Species Program (NHESP). Applicants for any project or activity that fall within Priority Habitat and could potentially result in a "take" must file with the NHESP. However, a properly filed, NHESP-approved, and implemented Forest Cutting Plan is exempt from the normal filing requirements of the MESA regulations. Currently the NHESP is developing forestry conservation management practices (CMPs) guidelines for 4 turtle species and 5 salamander species. These guidelines are being developed in collaboration with practicing foresters and forest-managing state agencies. The objective of these recommendations is to protect rare species populations and maintain rare species habitat for long-term viability while allowing for the sustainable management of forests. The CMPs will help to bring together the latest science available, improve consistency of NHESP comments on Forest Cutting Plans and will make the outcome of NHESP review of the Forest Cutting Plans more predictable to the forestry community. The process of developing the CMPs, their specific recommendations, the challenge of balancing rare species conservation with the economic need for private landowners to harvest timber, and the overall conservation benefit of private land being retained as forest will be discussed.

Platform

BOLTON

THREATS AND LIMITING FACTORS TO NESTING AND EMBRYO HATCH SUCCESS OF THE SPINY SOFTSHELL

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The Spiny Softshell (*Apalone spinifera*), a freshwater turtle, has a very limited range in Canada and is restricted to only a few primary populations and nesting sites (Rondeau Provincial Park, Thames River, Long Point NWA, and Lake Champlain). A primary limiting factor for this species' population maintenance is reproductive success. If there is no influx of hatchlings into the population then there can be no recruitment and the population will be eliminated inevitably. Spiny Softshells are primarily aquatic and emerge to nest on a handful of small beaches at Long Point, Rondeau, Thames River, and Lake Champlain. Research is currently being carried out at the Long Point nesting beach in order to provide a comprehensive examination of nesting behaviour, nest site selection including microhabitat variation of nest sites, sources and rates of nest depredation, and embryo hatch success of the Spiny Softshell. Preliminary results indicate that human recreation is a significant limiting factor of Spiny Softshell nesting activity. Correspondingly, nest site variation (nest chamber temperature, distance to shore, surrounding vegetation density, etc.) is a factor that appears to affect embryo hatch success. Another threat to this population is depredation of nests by a species of flesh fly (genus *Sarcophaga*). The flesh fly has the potential to become a serious threat to the populations of Spiny Softshell in Ontario and the severity of flesh fly depredation is also being studied at Long Point.

Platform

Conference Abstracts

BOURQUE

ACCOUNTING FOR VARIABILITY IN A POPULATION VIABILITY ANALYSIS OF NOVA SCOTIA'S BLANDING'S TURTLE (*Emydoidea blandingii*)

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In Nova Scotia, Blanding's turtle (*Emydoidea blandingii*) exists as a spatially structured population complex (with at least three distinguishable populations), which is designated both nationally and provincially as "Endangered" (respectively by COSEWIC and NSESA). This project represents Phase 2 of a Population Viability Analysis (PVA) for the species in southwest Nova Scotia. The ultimate goal is to conduct a realistic PVA for a long-lived, late maturing species that will integrate genetic, habitat and demographic parameters for the entire Nova Scotia Blanding's turtle population complex. We limit our efforts in this study to the Kejimkujik National Park and National Historic Site (KNP) population only, as fewer data are available for the other two populations in Nova Scotia. For the KNP population, we have developed a stage (age)-classified transition matrix model using primarily internal demographic data collected over a 35-year period. Uncertainty in parameter estimates and stochastic variability have been included in this model as sources of variation from the basic deterministic framework. This assessment indicates that without intervention and with the current management regime, the population of Blanding's turtle at Kejimkujik National Park will decline. Although the capacity to increase adult survival in this population is limited, the addition of management regimes that enhance the survival of early life-stages (laboratory incubation and hatchling headstarting) has the capacity to enhance long-term persistence of the population.

Platform

Conference Abstracts

BRETON

ESTIMATION DE L'ÂGE DES OUAOURONS PAR SQUELETTOCHRONOLOGIE/AGE ESTIMATION IN THE BULLFROG USING SKELETONOLOGY

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Dans le cadre des expériences sur l'impact de la contamination agricole sur le ouaouaron (*Rana catesbeiana*), des différences importantes de la taille et du poids ont été constatés. Plus particulièrement, les mâles associés à un sous-bassin de la rivière Yamaska, caractérisé par une forte activité agricole (rivière à la Barbue), sont significativement plus petits. Cet effet peut être dû à une croissance ralentie par la contamination du milieu ou encore parce que les individus de ce site sont plus jeunes. L'âge des ouaouarons devient alors un facteur déterminant. L'estimation de l'âge chez les amphibiens peut se faire en utilisant la squelettochronologie, une technique qui consiste à compter les anneaux de croissance révélés par la coloration d'une coupe transversale d'un os, le plus souvent une phalange. L'application de la technique sur les ouaouarons de notre étude a permis, dans un premier temps, d'établir des classes d'âge. Les premiers résultats tendent à démontrer que les ouaouarons de 6 ans et plus sont plus fréquents dans les sites ayant une faible activité agricole alors qu'une majorité d'individus plus jeunes (2 ans et moins) occupent les sites plus contaminés. Bien qu'aucune publication ne le confirme, la squelettochronologie appliquée au ouaouaron est controversée due au phénomène de résorption osseuse caractéristique des espèces longévives. Nous travaillons actuellement à améliorer la méthode afin d'acquérir davantage de précision: comparaison des coupes des phalanges avec des os longs, colorants, décalcifiants, etc. L'estimation de l'âge des ouaouarons va permettre une meilleure interprétation des paramètres morphométriques mesurés sur le terrain.

As part of experiments into the effects of agricultural contamination, large differences in body mass and length were observed in the bullfrog (*Rana catesbeiana*). More specifically, males collected from a sub-watershed of the Yamaska River associated with intensive agricultural practices (rivière à la Barbue) were significantly smaller than bullfrogs collected from other sites. This effect may be explained by several phenomena including a decrease in growth rate or because males at this site are younger. Establishing the bullfrogs' age is therefore a logical next step. Generally, the estimation of age for amphibians can be achieved by skeletochronology, a technique which involves counting growth rings in stained sections of transverse cuts of bone - typically taken from the toe. Applying this technique to bullfrogs in our study allowed the identification of age classes. Preliminary results indicate that bullfrogs of at least six years of age are found in sub-watersheds associated with a low level of agricultural activity. Younger bullfrogs (2 years or less) populate the moderate and intensive agricultural sites. While no scientific publication was found, skeletochronology is nonetheless thought to be unsuitable for bullfrogs due to the problem of bone resorption encountered in long-lived species. We are presently attempting to improve the method by comparing sections of the toe to those of long bones, testing stains and decalcification solutions. The data will contribute to the interpretation of morphometric variables of bullfrogs measured in-field.

Poster

BROWN

RATTLESNAKE CONSERVATION IN THE SOUTH OKANAGAN VALLEY

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Conservation of snakes, particularly Northern Pacific rattlesnakes, is now a significant focus of research by First Nations and environmental organizations who are conducting outreach to farmers, and park operators in the south Okanagan. Who would have thought 5 years ago, rattlesnakes would not only be a cornerstone of a major ecotourism centre in the south Okanagan, but that vineyards would be erecting snake friendly fencing? In 2004, the Nk'Mip Desert and Cultural Centre expanded a mark-recapture study started in 2002 on Osoyoos Indian Band lands in the southern Okanagan valley. Since its beginning they have marked over 450 individual rattlesnakes in a natural grassland site bordered by vineyards, golf course and campground. The rattlesnake is a major focus of tours and education programs and tourists really come there to see rattlers. It is an ideal area to study the impacts of various threats to rattlesnakes, in particular, the impact of translocating snakes to protect humans and yet not kill snakes. In 2005, the project identified 3 new den sites among 15 identified to date through the project, telemetry tracked a total of 33 snakes. The Centre will host several workshops for park operators to address issues around snake handling and translocation in parks. The Land Conservancy and Okanagan Similkameen Conservation Association has been working with vineyards to reduce snake mortality by creating snake friendly fencing and training agricultural workers to handle and identify snakes. This year, a particular focus will be to approach farmers for whom English is a second language by translating pamphlets on snake conservation into Punjabi and conducting on site field workshops with them.

Platform

BROWNE

IDENTIFYING HABITAT FEATURES AT LOCAL AND LANDSCAPE SCALES THAT AFFECT THE DISTRIBUTION AND ABUNDANCE OF ANURAN AMPHIBIANS IN THE WESTERN BOREAL FOREST

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Habitat alteration is recognized as the greatest threat to amphibian populations in North America, however, the habitat requirements of many species are poorly known. Habitat requirements must be identified in order to create management plans to preserve or restore amphibian populations. The goals of our study were to (1) examine relationships between the relative abundance of three anuran species and habitat features for 24 ponds in boreal Alberta, and (2) determine what spatial scale is most appropriate for predicting patterns of abundance. Our work was part of a multi-disciplinary investigation, the HEAD (Hydrology, Ecology, And Disturbance) research project. HEAD collected detailed data on the 24 study ponds with the goal of creating a GIS based Decision Support System to predict the responses of boreal wetlands to natural and man-made disturbances. Ponds were chosen to represent wetlands on three major landforms: glacial lacustrine deposits, outwash plain, and moraine. We conducted standardized visual surveys for anurans along the shoreline of each of the 24 HEAD ponds from May to August 2004. Anuran relative abundance was estimated using catch/effort data (# hand captures/time searching) for the wood frog (*Rana sylvatica*), boreal chorus frog (*Pseudacris maculata*), and western toad (*Bufo boreas*). Data on terrestrial and aquatic vegetation, invertebrate abundance, pond physical features, beaver activity, and water chemistry were used to characterize local environments. Using GIS, the percentage of different land cover types were estimated in areas 100 m, 500 m, and 2000 m around each pond to characterize the terrestrial landscape at three scales. Multivariate ordination analyses were used to determine which habitat variables were most effective at explaining patterns of anuran abundance and assemblage structure at each of the four scales. Conductivity and invertebrate biomass were significant at the local, pond-level. Proportion of closed conifer, closed deciduous, urban/agriculture, and young, post-fire stands played a significant role in the landscape-level analyses. Partitioning of variance indicated that local, pond variables and landscape variables were both important in explaining patterns of anuran species abundance. Of the three landscape scales, the nature of land cover in a zone extending 500 m around breeding ponds was more effective at explaining the structure of anuran assemblages than cover in 100 m or 2000 m zones. At a macroscale, landform also influenced the nature of wetland habitats and amphibian assemblages. Our study suggests that management strategies incorporate local and landscape scales to conserve aquatic and terrestrial habitats of amphibians in the western boreal forest.

Platform

Conference Abstracts

BULTÉ

QUANTIFYING AGE AND SEX SPECIFIC ZEBRA MUSSELS PREDATION BY THE COMMON MAP TURTLE (*Graptemys geographica*) USING STABLE CARBON ISOTOPES: PRELIMINARY RESULTS

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In common map turtles (*Graptemys geographica*), females are mollusc specialists, whereas males have a broader diet. The invasion of zebra mussels (*Dreissena polymorpha*) has disrupted the trophic structure and mollusc fauna of freshwaters ecosystems and may have altered the trophic ecology of common map turtles. We used stable carbon isotopes to investigate the trophic ecology of common map turtles in a lake severely infested by zebra mussels. The mean δ13C of zebra mussels was -29.43‰. Other prey items (Gastropoda, Trichoptera, Ephemeroptera) add a mean δ13C value of – 20.00‰. Mean δ13C values of adult males, juvenile females (overlapping in size with males), and adult females were -20.33‰, -22.26‰ and -24.86 ‰ respectively. A two-source mixing model showed that the diet of males, juvenile females and adult females was composed of pelagic prey at 5%, 24%, and 52% respectively. Our results show that zebra mussels are an important component of map turtles diet but their impact on map turtles ecology is yet to be investigated.

Chez les tortues géographiques (*Graptemys geographica*), les femelles préfèrent les mollusques alors que les mâles ont une diètes plus diversifiées. L'introduction de la moule zébrée a altérée la structure trophique et la faune de mollusques des lacs et rivières et pourrait avoir affectée l'écologie trophique des tortues géographiques. Nous avons utilisés les isotopes stables du carbone pour investiguer l'écologie trophique des tortues géographiques dans un lac infester par les moules zébrées. Le δ13C moyen des moules zébrées étaient -29.43‰ et – 20.00‰ pour les autres proies (Gastropodes, Trichoptères et Éphémeres). Le δ13C des mâles adultes, des femelles juveniles et des femelles adultes étaient de - 20.33‰, -22.26‰ et -24.86 ‰ respectivement. Un modèle de mélange démontre que la diète des mâles, des femelles juveniles et des femelles adultes est composée de moules zébrées à 5%, 24%, et 52% respectivement. Nos résultats démontrent que les moules zébrées sont une composante importante de la diète des tortues géographiques mais leur impact sur l'écologie des tortues demeure, cependant, à investiguer.

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Conference Abstracts

CARRIÈRE

EFFECTS OF COMMERCIAL FISHING TRAPS ON A MAP TURTLE (*Graptemys geograhica*) POPULATION IN THOMPSON'S BAY, ST-LAWRENCE RIVER

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A population of map turtles (*Graptemys geographica*) along Grenadier Island in the St-Lawrence River is presently being studied to determine movement patterns and habitat use. Since May 1st 2005, 175 individuals have been captured, measured, and individually marked. Of these, 12 adult females and 3 juvenile females are being tracked regularly using radio-telemetry. By mid-May the majority of the turtles had moved in Thompson's Bay on the north side of the river where 9 commercial hoop net traps were set. We tracked turtles directly to these traps on six occasions and have had 15 confirmed occurrences of map turtles within the traps. Because the nets were set in murky waters and we were forbidden by law to manipulate the traps, we cannot accurately determine the actual capture rates of turtles within the traps. These commercial hoop traps were completely submersed and this resulted in the drowning and death of the trapped turtles. A total of 15 (3 males, 12 females) dead map turtles were found along the northern shoreline near the traps, including 3 of our turtles with transmitters. In addition, 7 dead snapping turtles (*Chelydra serpentina*) and 9 dead painted turtles (*Chrysemys picta*) were also seen and we have rescued a trapped stinkpot (*Sternotherus odoratus*) from one of the traps. The typical western winds on the river likely carried away many other dead turtles into the main river system instead of washing them up on shore, which suggests that mortality numbers were probably much higher than what was recovered. These map turtle mortalities represent 8.6% of our total (175) captured individuals. Map turtles are designated as Special Concern by COSEWIC and, therefore, such high mortality rates are of serious concern to the sustainability of a population that is already in decline. This population is also affected by the additional pressure of Highway 2 that borders the north shore of Thompson's Bay. The highway poses a constant threat during the nesting season. We are presently in discussion with the local Ministry of Natural Resources about possible solutions to prevent further drowning of turtles in the area. Solutions being discussed are 1) raising of the traps to create and air space for the turtles, 2) implementation of by-catch reduction devices to the traps or 3) prohibiting further commercial fishing in the bay. Although a solution is urgently needed for the Thompson's Bay population, we are also interested in examining long-term solutions for commercial trapping in similar areas to prevent further mortalities in other regions.

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CAVERHILL

LINKING SCIENCE AND STEWARDSHIP THROUGH PUBLIC EDUCATION WITH THE NOVA SCOTIA BLANDING'S TURTLE (E*mydoidea blandingii*)

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The Nova Scotia (NS) Blanding's turtle population complex is small, disjunct, and subject to unique threats, which contribute to its nationally "Endangered" (COSEWIC) and provincially "Endangered" (NSESA) status designations. The NS complex provides a diverse array of conservation opportunities and mechanisms; of its three known populations, one occurs in a national park (Kejimkujik - KNP), one in a combined provincially and privately protected area complex (McGowan Lake - ML), and one in a working landscape dominated by small private landholdings (Pleasant River - PR). Although habitat in KNP and ML are effectively protected from direct human disturbance, PR is not, which makes it an important target for public education and stewardship activities. We broadly define *stewardship* as an ownership of responsibility on the part of all members of the public (not just landowners), while *public education* includes not only formal presentations but also random field-encounters that involve an information exchange between researchers and community members. Intensive research over the past four years (2002-2005) in Blanding's turtle habitat surrounding the rural community of Pleasant River has resulted in the convergence of science and stewardship, which has been facilitated by effective public education and outreach tactics. Providing education FOR the people has resulted in supportive stewardship action FROM the people, which has been invaluable to our science and management decisions in the area.

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CHARBONNEAU

AMPHIBIAN DISEASES IN ONTARIO: CHYTRIDIOMYCOSIS AND RANAVIRAL DISEASE

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Chytridiomycosis and ranaviral disease are two so-called emerging infective diseases (EIDs) in anuran populations that may contribute to the decline of these sensitive species. Long term monitoring of frog populations and documentation of often subtle and brief EID outbreaks is challenging. Infection with either pathogen does not guarantee mortality and symptoms of disease can manifest with a range of severity. Genetic analysis suggests recent human-influenced spread yet the range and occurrence of either disease in Ontario amphibian populations is unclear. Surveying for disease prevalence and seasonal monitoring of diseased populations are important tools in assessing the impact, local and global, of either EID on frog declines. During a survey of disease distribution in central/eastern Ontario, centered on Peterborough and the Kawartha Lakes region, we documented the presence of ranavirus and chytrid fungus in several Wood Frog (*Rana sylvatica*) and Bullfrog (*R. catesbeiana*) populations, respectively. Presence of the ranavirus pathogen was confirmed in 13 of the 21 populations of Wood Frog tadpoles surveyed in 2004 and in four additional samples from the 2002 and 2003 field seasons. As well, we confirmed the first lethal outbreak of the chytrid fungus pathogen *Batrachochytrium dendrobatidis* in Ontario. The die-off was first noticed in 2003 in a population of metamorphosing Bullfrog tadpoles at Kingscote Lake, Algonquin Park. The presence of the chytrid pathogen in the Bullfrog tadpole population was confirmed in 2004 with histology and molecular analysis using polymerase chain reaction (PCR) technology. In an associated study, because amphibians are exposed to aquatic and terrestrial doses of pesticides that are known to have an adverse effect on components of the immune system, we are testing whether pesticide-induced immunosuppression may help explain the range in severity of disease manifestation and mortality associated with amphibian EIDs.

Poster

Conference Abstracts

COWIN

ONTARIO'S CONSERVATION RESPONSIBILITY FOR REPTILES: THE DEVELOPMENT OF A CONSERVATION RESPONSIBILITY INDEX BASED ON PROPORTION OF RANGE AND CURRENT CONSERVATION RANKS

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Rare species within a jurisdiction are often targeted for conservation action. However, these species may be rare due to the fact that they are at the edge of their geographical distribution or because they have strayed across a political boundary and not due to true global rarity. Criteria other than rarity may be needed to identify species of conservation concern and we sought to develop a Conservation Responsibility Index (CRI) for all extant native reptiles in Ontario. We evaluated the relative abundance of each of these species in every geopolitical region (province or state) across its entire range to help identify those jurisdictions which are critical for the species' continued existence. Global range maps were prepared by amalgamating published range maps using the GIS software ArcMap. The Conservation Responsibility of a jurisdiction for a particular species was based on the proportion of a species' range that falls within said jurisdiction in combination with the conservation status rank for the species in that jurisdiction. The development of a CRI for Ontario reptiles allowed us to prioritise and identify species which are in need of conservation action at present, as well as species for which Ontario may have a high conservation responsibility in the future. Despite the fact that Ontario is at the northern periphery of many reptiles' ranges, the province ranks high in proportion of range as well as Conservation Responsibility for many of its snakes and turtles. At the species level it was found that the province ranks in the top ten jurisdictions for the CRI for 8 out of its 15 species of snakes and for 6 out of its 8 species of turtles.

Platform

CROTEAU

CONSEQUENCES OF EARLY UV-B ESPOSURE ON AMPHIBIAN DEVELOPMENT AND METAMORPHOSIS

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Amphibian populations have been declining worldwide since the 1960s. In some regions, it is obvious that habitat destruction and road mortalities have devastating effects. However, many populations inhabiting what appear to be pristine aquatic environments have been in decline or have been extirpated. There is evidence to suggest that endocrine disrupting chemicals and UV-B radiation may be linked to these declines. Our work shows that chronic exposure (12h/day for 8 months) of developing *Rana pipiens* tadpoles to UV-B radiation approximating ambient springtime water levels delayed development (approx. 1 month) and blocked metamorphosis. Although other studies have shown that UV-B can affect the rate of development and metamorphosis of amphibians, the mechanism(s) of action of this disruption remain unknown. Our group is presently investigating the effects of the estrogenic chemical 4-tert-octylphenol (OP) and UV-B on the thyroid system of *R. pipiens* tadpoles, the ultimate mediator of amphibian development and metamorphosis. We will examine the effects of treatments on somatic growth, development and metamorphosis in relation to thyroid histology, thyroid hormone levels and expression of deiodinase and thyroid hormone receptor genes. We speculate that a disruption in development and metamorphosis could be a contributing factor to amphibian declines in some regions. Further research is necessary to understand the molecular mechanisms behind the disruption in development and metamorphosis caused by UV-B radiation.

Platform

CROWLEY

ARE ONTARIO REPTILES ON THE ROAD TO EXTINCTION? ANTHROPOGENIC DISTURBANCE AND REPTILE DISTRIBUTIONS WITHIN THE PROVINCE

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The negative effects of roads on wildlife populations have been well documented and include habitat loss and fragmentation, road mortality, pollution and increased human disturbance. Reptiles are especially sensitive to many of these disturbances and have undergone drastic declines in Ontario. We hypothesized that many of the extirpations of reptile populations in Ontario are due to expanding human disturbance and therefore predicted that road density (an indicator of human disturbance) will explain the reduced and fragmented ranges of reptile species within Ontario. The location and status of populations of several Ontario reptile species were determined from historic records, the Ontario Herpetofaunal Summary Atlas and personal communications. Road density was calculated surrounding each population and compared between extant and extirpated populations. The size, location, and road density of Ontario's protected areas was also examined to determine the potential they have to act as a tool for the conservation of reptiles within the province. Road densities associated with extirpated populations were significantly higher than road densities associated with extant populations for all species examined. This supports the hypothesis that extirpations of reptile populations within Ontario are associated with areas of high human activity. Park area was positively correlated with latitude: smaller than average parks are located in southern Ontario where reptiles are most severely endangered. Road density within protected areas was positively correlated with regional road density, indicating that many of Ontario's protected areas do not eliminate the road-associated threats that endanger Ontario's reptiles.

Platform

DE SOLLA

EFFECTS OF ENVIRONMENTALLY RELEVENT CONCENTRATIONS OF ATRAZINE ON GONADAL DEVELOPMENT OF SNAPPING TURTLES (*Chelydra serpentina*)

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The herbicide atrazine has been suspected of affecting sexual development by inducing aromatase resulting in the increased conversion of androgens to estrogens. We used snapping turtles (*Chelydra serpentina*), a species whose sex is dependent on the production of estrogen through aromatase activity in a temperature-dependent manner, to investigate if environmentally relevant exposures to atrazine affected gonadal development. Eggs were incubated in soil to which atrazine was applied at a typical field application rate (3.1 L/ha atrazine), ten times this rate (31 L/ha atrazine) and a control rate (no atrazine) for the duration of embryonic development. The incubation temperature (25ºC) was selected to produce only males. Although some males with testicular oocytes and females were produced in the atrazine treated groups (3.3 to 3.7%) but not in the control group, there were no statistical differences among treatments. Furthermore, snapping turtle eggs collected from natural nests in a corn field were incubated at the pivotal temperature (27.5ºC) where both males and females would normally be produced, and there were some males with oocytes in the testes (15.4%). The presence of low numbers of males with oocytes may be a natural phenomenon, and we have limited evidence to suggest that the presence of normal males with oocytes may represent a feminizing effect of atrazine. Histological examination of the thyroid gland revealed no effect on thyroid morphology.

Poster

DEMMER

COMPARISON OF TURTLE SPECIES ABUNDANCE AND RICHNESS IN DAMAGED AND RECOVERED LAKES IN SUDBURY, ONTARIO

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The Sudbury Area has been subjected to intense environmental damage to both terrestrial and aquatic ecosystems as a result of atmospheric deposition of acid and metal pollutants during a long history of mining activities. We studied turtle species richness and abundance in two types of lakes categorized by the degree of damage, with the intent of determining a relationship between lake water chemistry and turtle population parameters. Because turtles feed on both vegetable and animal matter, and because these food sources are likely to bio-accumulate environmental toxins, turtles serve as valuable bio-indicators of environmental health. We tested the hypothesis that anthropogenic pollution would have a negative impact on turtle populations. We predicted that species richness and abundance would be lower in damaged lakes compared to recovered lakes. Over a 5 month study period, three damaged eutrophic lakes and three recovered oligotrophic lakes were sampled using Fyke net traps, dip nets and visual surveys. We found the opposite of what we predicted. Species richness was low in both lake types and included only two freshwater turtle species; the painted turtle (*Chrysemys picta*) and the common snapping turtle (*Chelydra serpentina*). Surprisingly, the abundance of both species was higher in the damaged lakes than in the recovered lakes. This ongoing study will provide baseline information for future population and turtle species assemblage research.

Poster

Conference Abstracts

DESROCHES 1

CHARACTERISTICS OF TURTLE POPULATIONS IN SMALL PONDS ALONG ROADS

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From 20 May to 20 August 2004, we studied Turtles by mark-recapture in five ponds along roads in the Outaouais region, Québec. Species, age (adult, juvenile), sex and health of all turtles caught were noted. A comparison with the number and characteristics of turtles dead on adjacent roads was made in order to evaluate the impact of this mortality on the size and sex ratio of turtle populations. Only the Painted Turtle (*Chrysemys picta*) was found in sufficient numbers to do the evaluation; the Snapping Turtle (*Chelydra serpentina*) and the Blanding's Turtle (*Emydoidea blaindingii*) were present in low density. In two ponds the number or recapture rate of Painted Turtles was too low to do an accurate population estimation (one of them seems to be a sink for the turtles' population). At one site the annual rate of mortality of turtles on roads is more than 10 % of the population; a decline is surely ccurring at that pond if no immigration is happening, and since 1997 the Blanding's Turtle has disappeared from that pond. At two ponds the population of Painted Turtles was estimated at 80.6±21.7 and 145.6±28.2 turtles. Only one turtle/year is found dead on the adjacent road, so the population seems not to be in decline. The sex ratio was always near 1:1 except for a pond where males are twice as common as females, despite very low road mortality. In Outaouais, the road mortality of turtles does locally affect some populations of Painted Turtles, but may be more important for Snapping and Blanding's Turtles that occur in smaller populations and are less productive (later maturity, lower densities of individuals) than Painted Turtles.

Du 20 mai au 20 août 2004, nous avons réalisé une étude de marquage-recapture sur les populations de tortues de cinq étangs situés le long de routes en Outaouais, au Québec. Pour chaque tortue capturée, l'espèce, l'âge (adulte, juvénile), le sexe et la santé ont été notés. Une comparaison avec le nombre et les caractéristiques des tortues trouvés mortes sur les routes adjacentes a été faite pour évaluer l'impact de cette mortalité sur la taille et le sexe ratio des populations de tortues. La Tortue peinte (*Chrysemys picta*) est la seule espèce capturée en nombre suffisant pour permettre une évaluation; la Tortue serpentine (*Chelydra serpentina*) et la Tortue mouchetée (*Emydoidea blandingii*) étaient présentes en faible densité. Dans deux étangs le nombre ou le taux de recapture des Tortues peintes s'est avéré trop bas pour permettre une estimation de population (l'une d'elles semble être un puits pour les populations de tortues). À l'un des sites le taux de mortalité annuelle sur la route est de plus de 10 % de la population; un déclin survient probablement à cet étang si aucune immigration ne s'effectue, et la Tortue mouchetée y est disparue depuis 1997. À deux des étangs étudiés la population de Tortues peintes est évaluée à 80,6±21,7 et 145,6±28,2 tortues. Une seule tortue par année est retrouvée morte sur la route adjacente dans ces cas, les populations semblent donc ne pas être menacées de déclin. Le sexe ratio est toujours près de 1 :1 sauf pour l'un des étangs où les mâles sont deux fois plus nombreux que les femelles, malgré une très faible mortalité sur les routes. En Outaouais, la mortalité routière affecte localement certaines populations de Tortues peintes, mais pourrait s'avérer plus importante pour les Tortues serpentines et mouchetées, lesquelles sont présentes sous forme de populations plus petites et sont moins productives (maturité plus tardive, densité faible).

Platform

DESROCHES 2

LOOKING FOR NESTS TO FIND THE RARE FOUR-TOED SALAMANDER (*Hemidactylium scutatum*) TECHNICAL APPROACH AND NEST CHARACTERIZATION

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The four-toed salamander, *Hemidactylium scutatum*, is a secretive species. The species is likely to be added to the threatened or vulnerable list for Quebec. The 1994 amphibians and reptiles Quebec Atlas reported only 22 observations. The distribution of the four-toed salamander is provincially spread but observations are localised, leaving huge gaps between each population. Since 2001, we begin to look for nesting habitat to find the species. The approach has permitted us to find some new populations in Outaouais, Mauricie and Quebec regions. Despite the fact that the technique is new to Quebec's herpetologists, it has been use by many American in the early 20th century. From 2002 to 2004, we characterized 191 four-toed salamander nests, in 14 locations. Nesting habitats were always in flat field or in small valley. Vegetation may vary from sites to sites but some species seem to be recurrent. Nests were mainly located in moss clumps, at a mean elevation of 12.1 cm from the water. The water below the nest was always few centimetres deep. The number of eggs by nest varied greatly. Communal nesting was observed in 5.4% or 16.7% depending of the definition of "communal nesting" that we follow. Our results are consistent with those obtained by southern herpetologists.

La salamandre à quatre orteils, *Hemidactylium scutatum*, est une espèce discrète, susceptible d'être designée menacée ou vulnérable au Québec. L'édition de 1994 de l'Atlas des amphibians et des reptiles du Québec présente seulement 22 observations. L'espèce semble être largement distribuée mais les observations sont très localisées et il existe de grands vides entre ceux-ci. Depuis 2001, la recherche des nids de l'espèce nous a permis de trouver de nouvelles populations dans les regions de l'Outaouais, de la Mauricie et de Québec. Bien que cette technique soit nouvelle pour le Québec, elle a été utilisée par quelques herpetologistes américain au début du 20e siècle. Entre 2002 et 2004 nous avons caractérisé 191 nids, répartis dans 14 populations. Les habitats de nidification étaient toujours situés en terrain plat ou encore dans de petites vallées. La végétation dominante variait d'un site à l'autre mais certaines espèces semblent récurentes. Les nids étaient la pluspart du temps dans des buttons de sphaigne, à une hauteur de l'eau moyenne de 12,1 cm. L'eau sous le nid était toujours peu profonde. Le nombre d'oeufs par nids variait beaucoup. La nidification communautaire a été observée dans 5,4 ou 16,7 % des cas, dépendament de la définition que l'on donne à l'expression de "nidification communautaire". Nos resultats sont similaires à ceux obtenus dans des régions plus au sud.

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Conference Abstracts

DIMACACOS 1

DÉGÉNÉRESCENCE DES TESTICULES CHEZ LES GRENOUILLES OUAOURONS ADULTES (*R. catesbeiana*) ÉCHANTILLONNÉES DANS LE BASSIN DE LA RIVIÈRE YAMASKA/TESTICULAR DEGENERATION IN ADULT MALE BULLFROGS (*R. catesbeiana*) FROM SAMPLING SITES IN THE YAMASKA RIVER BASIN

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L'utilisation des pesticides en milieu agricole et leurs effets potentiels sur le cycle de reproduction des grenouilles est une préoccupation croissante. Dans la présente étude, des ouaouarons mâles adultes ont été capturés dans 6 sites du bassin versant de la rivière Yamaska, représentant un gradient d'activité agricole. Deborah Stairs (site 1) et la Rivière Yamaska-Nord (site 3) sont des sites de faible activité agricole, la Rivière Pot-au-Beurre (site 2) et la Rivière Yamaska (à Farnham, site 4) sont caractérisés par une activité agricole moyenne alors que la Rivière Noire (site 5) et la Rivière à la Barbue (site 6) sont associées à une activité intensive (maïs et de soya). L'eau de ces sites a été analysée pour les pesticides. Pour les ouaouarons, les testicules ont été disséqués et préparés pour un examen qualitatif et quantitatif des tissus: normal (1), dégénérescence précoce (2) et dégénérescence sévère (3). L'examen de ces tissus révèle une dégénérescence sévère pour les mâles des sites rivière Yamaska (18,8%) et Rivière à la Barbue (26,7%) lorsque comparée au site témoin. Une dégénérescence précoce a été observée pour les sites Yamaska-Nord (50%), Yamaska (62.5%), Rivière Noire (50%) et Rivière à la Barbue (40%). Les pesticides et principalement les herbicides étaient présents en plus grandes concentrations dans les sites où la dégénérescence testiculaire était significativement élevée. Cette étude est la première au Québec à rapporter une dégénérescence testiculaire chez les mâles adultes de *R. catesbeiana*. Les résultats suggèrent que la reproduction des ouaouarons dans ces sites risque d'être compromise.

There is growing concern regarding the potential role which herbicides may play on amphibian reproductive cycles in agricultural zones. In the present study, *R. catesbeiana* male adults were collected from sites in the Yamaska River basin, Eastern Townships, Qc, Canada. Sites studied were, Deborah Stairs (Reference Site 1), Rivière Pot-au-Beurre (Site 2), Rivière Yamaska (Site 3), Rivière Yamaska-Nord (Site 4), Rivière Noire (Site 5) and Rivière à la Barbue (Site 6). Water sampling was conducted at all six sites close to the time of bullfrog collection and the concentration of 54 herbicides was determined. Testes were dissected and prepared for qualitative and quantitative histological analysis. Accordingly, testes were categorized as (1) normal, (2) testis in early testicular degeneration and (3) testis in late testicular degeneration. Results revealed statistically significant levels of late testicular degeneration in males at Site 4 and 6 relative to the Reference Site. Values were 18.8% and 26.7% for Site 4 and 6 respectively. In addition there was a statistically significant difference in early testicular degeneration at Sites 3, 4, 5 and 6 relative to the Reference Site. Values of 50%, 62.5%, 50% and 40% respectively were recorded. Herbicides were found at higher concentrations at the sites where testicular degeneration was significantly high. This is the first field study in Quebec reporting amphibian testicular degeneration among adult male *R. catesbeiana*. The results suggest that adult amphibians in the Yamaska River Basin may be at risk to irreversible reproductive effects.

Poster

Conference Abstracts

DIMACACOS 2

ÉTUDE TOXICOLOGIQUE PORTANT SUR LA DIFFÉRENCIATION SEXUELLE ET LA REPRODUCTION CHEZ LES TÊTARDS *R. catesbeiana* ÉCHANTILLONNÉS DANS LE BASSIN DE LA RIVIÈRE YAMASKA/TOXICOLOGICAL FIELD STUDIES OF SEXUAL DIFFERENTIATION AND REPRODUCTION IN *R. catesbeiana* TADPOLES COLLECTED FROM SAMPLING SITES IN THE YAMASKA RIVER BASIN

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Des études récentes ont démontré que des pesticides, notamment des herbicides, pouvaient jouer un rôle dans le déclin des amphibiens. Cette étude est la première au Québec portant sur la différenciation sexuelle et le développement des gonades chez les têtards de ouaouarons. Entre 20 et 24 têtards ont été échantillonnés dans chacun des quatre sites suivants: Deborah stairs et la rivièreYamaska-Nord, deux sites ayant une faible vocation agricole, la rivière Yamaska (Farnham), associée à une activité agricole moyenne et la rivière Noire, caractérisée par une agriculture intensive de maïs et de soya. Lors de l'échantillonnage des têtards, des échantillons d'eau ont été prélevés dans les sites pour l'analyse des pesticides. Le complexe rein-gonade a été disséqué et préparé pour un examen histologique des tissus. Des effets sur la différenciation sexuelle et la reproduction sont identifiés en comparant les tissus pour la présence et l'intégrité de certaines structures ainsi que la distinction d'étapes dans la maturation des gonades. La dégénérescence testiculaire se manifeste par un déclin de la spermatogénèse lié à la perte de kystes à l'intérieur des lobules. Un tel déclin a été observé pour les sites Yamaska (78%), Yamaska-Nord (33,3%) et Rivière Noire (50%) lorsque comparés au site témoin. Le profil de dégénérescence observé est en concordance avec les concentrations d'atrazine mesurées dans l'eau de ces sites.

Current studies have demonstrated that factors such as herbicides from agricultural areas may play a role in amphibian declines. In Canada, there are no previous toxicological field studies of sexual differentiation and gonadal development in the bullfrog tadpole *R. catesbeiana*. In this study, tadpoles were collected from four sites in the Yamaska River Basin of the Eastern Townships: Deborah Stairs (Reference Site 1), Rivière Yamaska (Site 3), Rivière Yamaska-Nord (Site 4) and Rivière Noire (Site 5). Water sampling was conducted at the sites close to the time of tadpole collection and the concentration of 54 herbicides was determined. The kidney-gonad complex was microdissected and prepared for qualitative and quantitative histological examination. Biomarkers were developed to establish if normal testicular development was occurring. Results suggest there is a statistically significant decline in new cysts of germ cells entering the cycle of spermatogenesis at Site 3. In addition, Sites 3, 4 and 5 revealed a statistically significant decline in spermatogenesis relative to the Reference Site. Testicular degeneration increased significantly at all three sites relative to the Reference Site. Values of 78%, 33.3% and 50% were recorded at Site 3, 4 and 5 respectively relative to the Reference Site. The pattern of testicular degeneration at all four sites was similar to atrazine levels recorded in water samples for these sites.

Poster

DUARTE

EARLY EXPOSURE TO 17α-ETHINYLESTRADIOL ALTERS SEX RATIOS AND GONADAL MORPHOLOGY OF DEVELOPING LEOPARD FROGS (*Rana pipiens*)

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Environmental estrogens have been shown to alter gonad development, causing sex reversal, feminization or the intersex condition in some amphibian species. Our objective was to (1) examine normal sexual differentiation during tadpole development and metamorphosis in *R. pipiens* and (2) determine if the contraceptive ethinylestradiol (EE2) can have long-term effects on gonad morphology and sex ratios at metamorphosis. Control tadpoles were exposed to acetone (0.004%) vehicle throughout the experiment. Exposure to EE2 (5nM) in water began at Gosner stage 26 (hind limb bud development). After an early, short-term exposure (STE; approximately 3 weeks) until stage 30, a subset of tadpoles was transferred to control water while a chronic exposure (CE) continued until both groups reached metamorphic climax (stage 42). Histological analysis of the gonads at stage 42 revealed that the sex ratio in the control group was 1:1 (female:male). STE shifted the sex ratio towards females and increased the incidence of intersex individuals; the female:male:intersex ratio was 1:0.1:0.2. For CE, the sex ratio was 1:0.6:0.7 which suggests that the timing and length of estrogen exposure can influence the resulting sex ratios. These results indicate that a short exposure to waterborne EE2 during the critical period of gonadal development can permanently alter sex ratios and induce intersex in a native Canadian amphibian. Supported by U-Ottawa, NSERC, Environment Canada & Health Canada.

Poster

Conference Abstracts

DUBOIS

BEHAVIOURAL THERMOREGULATION IN WOOD TURTLES, CHASING THE SUN SLOWLY!

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Almost all reptiles studied yet have an optimal temperature (Top) where the ratio between energy assimilation and expenditure is optimized, therefore maximizing the growth rate and reproduction output. Then, behavioral thermoregulation activities, such as basking and thermal habitat selection, aim to bring the body temperature (Tb) near the Top. We sampled available temperatures for turtles (Te) in 8 different available habitats with a total of 25 physical models that were randomly moved within each habitat. Simultaneously, we recorded turtle's Tb (40 days, 30 minutes interval) of 18 free ranging wood turtles (6 males, 6 juveniles and 6 females, by surgically introducing a temperature recording device (iButton, thermochron) in the backwards leg cavity and we also recorded turtle's external temperature (Text) with a thermochron fixed on the transmitter on the carapace. Habitat thermal qualities were compared using mean habitat Te in function of hours (9h to 18h) and in function of max Te (physical model fully exposed to the sun). Our results showed that habitats became thermally heterogeneous when max Te was above 30°C and that all habitats followed the same general daily variation pattern of Te, with a maximal difference of ~ 4°C between mean Te available in the warmer (~24°C) (excepted the sun habitat) and cooler habitat (~ 20°C) around 14h, representing a 50% increase in metabolism for turtles being in the warmer habitat. For every available habitats, except the one fully exposed to sun, available Te ≥ Top represented only between 0 and 2% of recorded Te in each habitat, indicating that turtles had to bask to bring there Tb close to Top. Using only the data when Te max was above 30°C, hourly Tb distributions (9h to 18h) have been individually compared to hourly null Te distribution (representing random movement among and within available habitats) for each turtle. The results of the Kolmogorov-Smirnov test demonstrated that Tb distribution was different from null Te distribution, which is the necessary (but not sufficient) condition for active thermoregulation. Our results also demonstrated that thermal habitat selection (difference between Tb and Te distributions) aimed at bring Tb closer to Top and then decreased the db value (db = |Top – Tb|) and then the observed thermal habitat selection can be viewed as behavioral thermoregulation. Finally, there was a negative correlation between our index of sun/shade shuttling behavior (∑ |Text-Tb|) and db value (|Top-Tb|), showing that turtles maintained their Tb closer to Top by using sun/shade shuttling behavior and then chased the sun slowly.

La plupart des reptiles étudiés à ce jour ont une température optimale (Top) à laquelle la proportion entre l'assimilation et la dépense d'énergie est optimisée, maximisant ainsi la croissance et la reproduction. Ainsi, les activités liées à la thermorégulation comportementale, tel que les bains de soleil et la sélection thermique de l'habitat, visent à rapprocher la température corporelle (Tc) de la Top. Nous avons échantillonné les températures disponibles pour les tortues (Te) dans 8 habitats différents avec un total de 25 modèles physiques qui étaient déplacés aléatoirement à l'intérieur de chaque habitat. Simultanément, nous avons enregistré les Tc (40 jours, à intervalle de 30 minutes) de 18 tortues en nature (6 mâles, 6 femelles et 6 jeunes) en implantant chirurgicalement une enregistreuse de température (iButton, thermochron) dans la cavité de la patte arrière et nous avons également enregistré la température externe des tortues (Text) à l'aide d'un thermochron fixé sur l'émetteur qui se trouvait sur la carapace. La qualité thermique des habitats fut comparée en utilisant la Te moyenne de chaque habitat en fonction de l'heure de la journée (9h à 18h) et en fonction de la Te maximale (modèle physique complètement exposé au soleil). Nos résultats indiquent que les habitats devenaient thermiquement hétérogènes lorsque la Te max était au dessus de 30°C et que tous les habitats suivaient le même patron général de variation de Te au cour de la journée, avec une différence maximale de ~ 4°C entre les températures moyennes disponibles dans l'habitat le plus chaud (~24°C) (excepté l'habitat au soleil) et l'habitat le plus froid (~20°C) vers 14h, ce qui représente une augmentation de 50% du métabolisme pour les tortues se trouvant dans l'habitat le plus chaud. Pour tous les habitats disponibles, excepté l'habitat au soleil, les Te ≥ Top représentaient seulement de 0 à 2% des Te enregistrées dans chacun des habitats, ce qui signifie que les tortues devaient prendre des bains de soleil pour élever leur Tc près de la Top. En utilisant seulement les données lorsque Te max était supérieure à 30°C, nous avons comparé les distribution des Tc, séparées par heure (de 9h à 18h), aux distributions nulles de Te (représentant un déplacement aléatoire à l'intérieur et entre les habitats) individuellement pour chaque tortue. Les résultats des tests de Kolomogorov-Smirnov ont démontré que les distributions de Tc étaient différentes des distributions nulles de Te, ce qui constitue la condition nécessaire (mais non suffisante) pour appuyer l'hypothèse de thermorégulation active. Nos résultats ont également démontré que la sélection thermique de l'habitat (différence entre les distributions de Tc et Te) visait à rapprocher la Tc de la Top et diminuait ainsi la valeur de dc (dc = |Top – Tc|) et donc la sélection thermique de l'habitat observée peut être vue comme de la thermorégulation comportementale. Finalement, il y avait une corrélation négative entre notre indice de comportement d'alternance entre soleil/ombre (∑ |Text-Tc|) et la valeur de dc (|Top-Tc|), montrant ainsi que les tortues maintiennent leur Tc près de Top en utilisant un comportement d'alternance entre le soleil/ombre et donc poursuivent lentement le soleil.

Poster

Conference Abstracts

DUFFUS

INTERACTIVE EFFECTS OF MALATHION EXPOSURE AND RANAVIRAL INFECTIONS IN WOOD FROGS (*Rana sylvatica*)

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The interaction of stressors is becoming an important avenue of research permitting us to begin to understand how anthropogenic factors interact with naturally occurring stressors. Malathion is a common pesticide used to control mosquitoes and other insects in both urban and rural areas.
Malathion is also a known immunosuppressant. Ranaviruses are a group of emerging wildlife pathogens, of which Frog Virus 3 is a member, and are credited with contributing to the global decline of amphibians. In the wild, FV3 infections, on their own, cause a high mortality rate in wood frog tadpoles. This experiment examined the interaction between malathion exposure and induced infections of the emerging amphibian disease Frog Virus 3 (FV3) in wood frog (*Rana sylvatica*) tadpoles. Animals used in this experiment were bred in the lab from parents that were collected in terrestrial amplexus in the wild. Both of the parents tested negatively for the virus. The tadpoles were exposed to a consistent amount of the virus, which is known to cause infection in wood frog tadpoles, and two different levels of the pesticide in a controlled laboratory setting. It was found that the application of a combination of a high concentration of malathion and FV3 created symptomatic viral infections after only 24 hours post exposure/inoculation and the resulting FV3 infections were confirmed by PCR analysis. When the tadpoles were exposed to both malathion and FV3 the mortality rate increased, with the higher level of malathion exposure having the greatest mortality rates. With a lower concentration of malathion and FV3, mortality also increased. PCR was used to confirm the presence/absence of the virus in all trials. This study indicates that there is a synergistic or additive interaction between malathion exposure and FV3 infections. Thus, exposure to malathion increases tadpole susceptibility to FV3 infections.

Platform

Conference Abstracts

DUMOULIN

QUICK IDENTIFICATION OF *Ambystoma* HYBRIDS FROM THE JEFFERSON SALAMDER COMPLEX/IDENTIFICATION RAPIDE DES HYBRIDES *Ambystoma* DU COMPLEXE DE LA SALAMANDRE DE JEFFERSON

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Populations of unisexual salamanders of the genus *Ambystoma* can be found in eastern North America and are mainly composed of females. These unisexual salamanders arose from ancestral hybridization events, by incorporating the nuclear genomes of four bisexual species, and show different levels of ploidy. Although bisexual species are easily differentiated morphologically, hybrids can be difficult to discriminate visually because they may possess intermediate characters, or morphological traits from either of their diploid counterparts. Therefore, identification methods based on allozyme or chromosome data are often required to tell apart hybrids from bisexual species. In the present study, we introduce a novel way to discriminate between bisexual and unisexual salamanders based on species-specific primers designed in the mitochondrial cytochrome b region. This molecular approach provides a simple, rapid, non-invasive and efficient method, using a multiplex PCR and small tissue samples that can easily be obtained from live specimens. This method allows for a quick identification of hybrid populations. Because of their reproduction mode (parthenogenesis, gynogenesis or hybridogenesis), unisexual populations are more vulnerable to the loss of genetic diversity and are therefore more susceptible to local extinction if their habitat is fragmented or altered. It is thus of primary importance to identify hybrid populations to protect their habitat.

Les populations de salamandres unisexuées du genre *Ambystoma* se retrouvent dans l'Est de l'Amérique du Nord et sont principalement composées de femelles. Ces salamandres unisexuées qui proviennent d'hybridations ancestrales, ont incorporé le génome nucléaire de quatre espèces de salamandres bisexuées et présentent différentes combinaisons de ploïdie. Alors que les espèces bisexuées sont différenciées morphologiquement sans ambiguïté, les salamandres hybrides peuvent posséder certains caractères intermédiaires ou traits phénotypiques provenant de deux espèces parentales diploïdes et être difficiles à distinguer. En effet, des méthodes d'identification avec les allozymes ou les chromosomes sont souvent requises pour différencier les hybrides des espèces parentales. Dans la présente étude, nous introduisons une nouvelle méthode pour discriminer les salamandres unisexuées et bisexuées avec des amorces spécifiques, provenant de la région du Cytochrome b de l'ADN mitochondriale. Cette approche moléculaire est simple, rapide, non invasive et utilise une RPC en multiplex avec des petits échantillons de tissus pouvant provenir d'individus vivants. Cette méthode permet une identification rapide des populations hybrides. À cause de leur différents modes de reproduction (parthénogenèse, gynogenèse ou hybridogenèse), les populations de salamandres unisexuées sont plus vulnérables à la perte de diversité génétique et donc plus susceptibles à l'extinction locale si leur habitat est fragmenté ou altéré. Il est donc primordial de pouvoir identifier les populations hybrides afin de bien protéger leur habitat.

Poster

Conference Abstracts

DYSZY

IMPACTS OF POND CONNECTIVITY ON AMPHIBIAN LIFE STAGES AT DELTA MARSH, MANITOBA

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Delta Marsh, located on the south shore of Lake Manitoba, is home to several anuran species that use the area extensively as breeding and summering grounds. Over the past 40 years, the introduction of common carp (*Cyprinus carpio*) and water level stabilization have contributed to the deterioration of those ponds connected to the main marsh while ponds isolated from the main marsh have not undergone such changes. To study the impact of pond connectivity on anuran populations, three anuran life stages were examined at Delta Marsh. Pond connectivity may play a key role in both breeding site selection and survival of anuran eggs. This data is supported with observations of reduced abundances of anuran breeding choruses and egg masses in connected sites when compared with isolated sites. Connected sites also had greater physical disturbance of artificial egg masses, suggesting where egg masses are oviposited at these sites, compounded effects from physical damage, such as from spawning common carp found exclusively at connected sites, further reduces egg mass numbers. Tadpole abundance, growth and rate of development was also examined with respect to pond connectivity, and found lower abundances of tadpoles in connected sites compared with isolated sites.

Poster

Conference Abstracts

EIGENBROD

THE EFFECT OF THE CONFIGURATION OF HABITAT RELATIVE TO ROADS ON POND-DWELLING AMPHIBIANS

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Two landscape variables have been found to be particularly important in predicting the species richness of pond-dwelling amphibians – the amount of natural habitat (forest and wetlands) and the density of paved roads present in the landscape. Many amphibians require secondary upland habitat (usually forest), and all benefit from additional breeding habitat in the landscape (wetlands and water bodies) to allow re-colonization of breeding ponds, whereas the main effect of roads is thought to be direct mortality. However, it seems likely that a road that needs to be crossed to access secondary habitat or other wetlands has a much greater negative effect than one that does not. In other words, the configuration of natural habitat relative to roads is likely very important. This is not directly measured by either habitat amount or road density. We hypothesized that the amount of natural habitat that is accessible from a breeding pond without crossing a paved road (accessible habitat amount) will be a better predictor of amphibian species richness than the combined effects of habitat amount and road density. We tested this hypothesis by looking at 30 pond dataset of species richness data. We found some evidence that accessible habitat was a better predictor of amphibian species richness than the combined effect of total habitat and road density at the 500m and 600m scale. However, above the 600m scale, total habitat and road density were highly correlated, making it impossible to tell from this dataset whether the results we found at 500m and 600m hold at higher spatial scales. While further studies are clearly needed, these results suggest that accessible habitat amount may be the best way to look at the combined effects of roads and habitat loss.

Platform

ENNESON

DEMOGRAPHY AND BEHAVIOUR OF A GEORGIAN BAY POPULATION OF THE SPOTTED TURTLE (*Clemmys guttata*)

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The spotted turtle is listed as Vulnerable by the IUCN, Endangered in Canada, and Vulnerable in Ontario. An island in eastern Georgian Bay is the site of the longest-running mark-recapture study to date of the spotted turtle. Data collection has been carried out since 1977, for a total of 27 years of study. The purpose of the current study is to continue the long-term mark-recapture study to allow examination of life history, demographic, and population size changes. From May to August of 2005, known breeding aggregations were surveyed for spotted turtles. All turtles were marked if new, measured, weighed, sexed, injuries noted, and released. Palpation was used to determine if females were gravid and X-rays were used to determine clutch size. Ten turtles were outfitted with radio transmitters, and their movements monitored using GPS. A total of 33 turtles were captured in 2005; 42.4% were females, 39.4% were males, and 18.2% were juveniles. 66.7% of female turtles captured between breeding season and nesting season were gravid (N=9). All X-rayed gravid turtles (N=3) had clutch sizes of 6 eggs. Two radio-tracked turtles nested on a neighbouring island, which was not previously known to be a spotted turtle nesting site. The data collected from this ongoing study will allow determination of individual survivorship, population size, and aspects of population demography, which will be applied in population viability analyses. Ongoing radio-tracking will provide data to allow accurate calculation of home-range size. These data will be also used to examine critical habitat shifts and breeding behaviour responses by spotted turtles to natural habitat modification (caused by beaver damming) of a primary breeding aggregation site on the island.

Poster

Conference Abstracts

FARMER

LANDSCAPE AND LOCAL FACTORS ASSOCIATED WITH VERTEBRATE ROADKILL IN SOUTHERN ONTARIO

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From mid-May until mid-October, I am surveying roads for vertebrate roadkill in the greater-park areas of Rondeau Provincial Park and Point Pelee National Park . By considering a variety of broad-scale and local variables, including landscape type, road density, road type, embankment slope, shoulder type, shoulder width, road curvature, road temperature, traffic volume, weather, time of day and season, this research will identify important determinants of roadkill for both individual and groups of species. Results will guide mitigation strategies and future construction by identifying road designs, locations and times associated with the highest collision risk.

Poster

FERGUSON

ASSESSING DNA DAMAGE IN FROGS FROM AGRICULTURAL AREAS OF SOUTHWESTERN ONTARIO, CANADA

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Genotoxicity in wildlife species as a result of non-target pesticide exposure has been reported in numerous studies. We examined whether field exposure to agricultural chemicals might result in measurable DNA damage in ranid amphibians inhabiting areas of intensive corn-soybean agriculture. To accomplish this we measured DNA damage in *Rana pipiens* (Northern leopard frogs) and *Rana clamitans* (Green frogs) collected in agricultural ponds and drainage ditches in southwestern Ontario. Blood from 72 adult frogs was collected between July and October, 2004, from 11 different sites: two control sites (without agricultural influence), one “agricultural control” site (marsh located within an agricultural area), and eight agricultural sites. Whole blood was diluted in a cryopreservant and flash frozen in vapor phase nitrogen and subsequently stored at -80°C. At a later date, blood was thawed and DNA damage (single and double DNA strand breaks) was assessed using the alkaline Comet assay. Water collected at the same sites as the frogs had measurable levels of atrazine, metolachlor, nutrients, and heavy metals in the agricultural and agricultural control sites, whereas these contaminants were very low or not detected in control sites. Because of this shared contamination, agricultural and agricultural control data were pooled and compared to control data. Measures of DNA damage using the Comet assay (tail length, % DNA in the tail) in frogs from agricultural sites was significantly greater than in frogs from control sites ($p = 0.046, 0.08$). The specific cause of the observed genotoxic damage is not known but our results suggest that frogs living in agricultural areas are exposed to genotoxins.

Poster

Conference Abstracts

FRIDGEN

CHRONIC EFFECTS OF ATRAZINE HERBICIDE ON THE DEVELOPMENT OF NORTHERN LEOPARD FROG (*Rana pipiens*) TADPOLES

Christina M. Fridgen[1], Bruce D. Pauli[2], Michael Berrill[1], Kenneth Doe[3] and Paula Jackman[3]

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Amphibians are excellent model organisms in which to observe chronic effects of contaminants. They are particularly useful to examine effects of contaminants on the thyroid and gonadal axes, because of their endocrine-mediated differentiation processes such as metamorphosis and gonadal development. Exposure of amphibians to the popular corn herbicide atrazine has been associated with abnormal development of exposed frogs, particularly demasculinization and feminization, through a proposed mechanism of induced aromatase activity levels increasing conversion of androgens to estrogens. We conducted a blinded study examining the effects of chronic atrazine exposure (0.1 and 1.8 µg/L as Aatrex Liquid 480) on the development of Northern Leopard Frog *Rana pipiens* tadpoles. Animals were exposed from the egg stage to metamorphosis. Our main objectives were to compare our results with existing data, provide information concerning sensitive stages and endpoints in Ranid amphibians, and investigate new histological methods to quantify and stage early gonad differentiation in *R. pipiens*. Atrazine exposure caused significant chronic effects on both the growth and development of tadpoles and their gonads at concentrations as low as 0.1 µg/L. Preliminary statistical analyses indicate that Gosner Stage 25 to 40 tadpoles exposed to the lowest concentration tested have significantly increased body length and mass, as well as an increased average stage of development over time, yet significantly fewer tadpoles being reared in both test concentrations reached metamorphic climax at test termination. Both atrazine concentrations induced significantly larger female gonads, increasing both the ovary length and area. In addition, preliminary histology has revealed signs of intersex, testes with large primary oocytes, and ovaries with areas of abnormal somatic tissue. Further in-depth histological analysis of gonads to examine the influence of atrazine exposure on oocyte size, gonadal differentiation rate and stages, as well as intersex incidence is being conducted.

Poster

GAGNÉ

THE RELATIVE EFFECTS OF FORESTED, AGRICULTURAL AND URBAN LANDSCAPES ON AMPHIBIAN COMMUNITIES IN EASTERN ONTARIO

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Since the early 1990s, evidence has been accumulating of the impact of landscape composition on amphibian species richness and abundance. The present study seeks to determine the relative effects of forested, agricultural and urban landscapes on anuran species richness and abundance in eastern Ontario. Six evening call surveys were conducted between April and June 2004 to assess anuran species richness and abundance at ponds surrounded by > 50% forest cover (9 ponds), > 70% open cover (10 ponds), and > 50% urban cover (11 ponds) within 1.5 km radius landscapes. Vegetation and water quality surveys were also conducted at each pond in June 2004 to measure local variables likely to affect anuran diversity. Preliminary results indicate that anuran species richness is significantly higher in forested and agricultural ponds than in urban ponds. Pond perimeter has also been identified as a significant positive predictor of anuran species richness. The effects of forested, agricultural and urban landscapes on the abundance of individual amphibian species will also be discussed.

Platform

Conference Abstracts

GOVINDARAJULU

ASSESSING PREVALENCE OF CHYTRID FUNGUS (*Batrachochytrium dendrobatidis*) IN NATIVE AMPHIBIANS AND BULLFROGS (R*ana catesbeiana*) ON VANCOUVER ISLAND, BRITISH COLUMBIA/L'ÉVALUATION DE LA PRÉDOMINANCE DU MYCÈTE DE CHYTRID (*Batrachochytrium dendrobatidis*) DANS LES AMPHIBIES INDIGÈNE ET LES OUAOUARONS (R*ana catesbeiana*) SUR L'ÎLE DE VANCOUVER, COLOMBIE BRITANNIQUE

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Emerging wildlife diseases are increasingly recognized as a great threat to global biodiversity. Recently, the amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) has been implicated in catastrophic declines of amphibians in Europe, North America, Central and South America, and Australia. In British Columbia, the distribution and level of prevalence of the chytrid fungus is poorly known. Important vectors of introduction and dispersal are thought to be to be commercially traded amphibians such as the African clawed frog (*Xenopus laevis*) and the American bullfrog (*Rana catesbeiana*). American bullfrogs have been widely introduced in the southwestern part of British Columbia and are expanding their range. In the summer of 2005, we sampled native amphibians and bullfrogs in four bullfrog and four bullfrog-free sites on southeastern Vancouver Island. Sensitive molecular techniques will be used to detect presence of the fungus from tissue samples of both the aquatic and terestrial life-stages. Up to date results from this ongoing study will be presented. This study will enable us to quantify the level of prevalence of chytrid fungus in free-ranging bullfrog populations. The level of prevalence of chytrid fungus in the non-bullfrog sites will be used to assess background levels of infection in native amphibians. Comparison of levels of prevalence of chytrid fungus in bullfrog vs. bullfrog-free sites will enable us to assess whether introduced bullfrogs were acting as vectors of spread of the disease.

Les nouvelles maladies de faune sont de plus en plus identifiées comme une des grandes menaces pour la biodiversité globale. Récemment, le mycète amphibie de chytrid (*Batrachochytrium dendrobatidis*) a été impliqué dans des déclins catastrophiques des amphibies en Europe, l'Amérique du nord, L'Amérique Centrale et Sud, et l'Australie. En Colombie Britannique, la distribution et le niveau de la prédominance du mycète de chytrid est peu connue. Des vecteurs importants de l'introduction et de la dispersion sont considerés d'être les amphibiens commercés tels que *Xenopus laevis* et les ouaouarons (*Rana catesbeiana*). Les ouaouarons ont été introduits en grand nombre au sud-ouest de Colombie Britannique et ils sont en train d'augmenter leur domaine. En été de 2005, nous avons prélevé les amphibiens indigènes et les ouaouarons dans quatre emplacements avec les ouaouarons, et les amphibiens indigènes dans quatre emplacement sans ouaouarons dans le sud-est de l'île de Vancouver. Des techniques moléculaires précises seront employées pour détecter la présence du mycète dans les échantillons de tissu tirés des specimens d'étapes aquatiques et terrestres. Les résultats le plus courant de cette étude continuelle seront presentés. Cette étude nous permettra de mesurer la fréquence du mycète de chytrid dans les populations des ouaouarons libres en Colombie Britannique. La frequence du mycète de chytrid dans les emplacements sans ouaouarons sera employé pour évaluer le niveau de reference de l'infection dans des amphibiens indigènes. La comparaison de la frequence du mycète de chytrid dans les emplacements avec ouaouarons par rapport aux emplacements sans ouaouarons nous permettra d'évaluer si les ouaouarons sont les vecteurs de la diffusion du mycète de chytrid.

Platform

Conference Abstracts

GRAVEL, MARIE-ANGE

EFFECTS OF SEXUAL SIZE DIMORPHISM ON DIET SPECIALIZATION IN THE COMMON MAP TURTLE (*Graptemys geographica*)

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Sexual size dimorphism may arise from sexual selection where one sex gains a reproductive advantage from being larger, or natural selection such as diet divergence, or both. In the Common Map Turtle (*Graptemys geographica*), females are much larger than males, often exceeding twice their size. Extreme female-biased sexual size dimorphism had been hypothesized to be a result of natural selection for diet divergence. The goal of our study is to test the hypothesis that male and female map turtles specialize on different prey. We assessed prey availability in our study lake (Lake Opinicon, Queen's University Biological Station). We collected fecal samples of adult and juvenile turtles of both sexes. Prey size can be reconstructed from mussel septa length and snail opercula length that are passed with the feces. The two sexes appear to be choosing different prey, as well as different prey size. Large females prey mostly on zebra mussels and snails *(Viviparous georgianus*), while juvenile females and males seem to consume smaller snails, small zebra mussels and caddisfly larva (Tricoptera). Also prey size seems to increase with body size within each sex.

Platform

Conference Abstracts

GRAVEL, MIREILLE 1

POPULATION DYNAMICS OF THE WOOD TURTLE IN THE GREATER KOUCHIBOUGUAC ECOSYSTEM, NEW BRUNSWICK/DYNAMIQUE DES POPULATIONS DE TORTUES DES BOIS DANS LE GRAND ÉCOSYSTÈME DE KOUCHIBOUGUAC, NOUVEAU-BRUNSWICK

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The wood turtle and its habitat suffer important threats, linked predominantly to human activity like major deforestation, habitat fragmentation, growing tourism and road kills, all clearly present in New Brunswick. Nevertheless, only minimal protection has been accorded in Maritime Provinces. This turtle is widely spread in New Brunswick but of unknown abundance since no formal surveys have been undertaken. Aware of the presence of this designated "species of special concern" reptile in Kouchibouguac National Park and its Greater Ecosystem, it becomes crucial to act quickly by assessing the population. The specific objectives of this project are to 1) create a preliminary map of susceptible wood turtle habitat, 2) estimate the population density, 3) investigate movements, home range and habitat selectivity and 4) elucidate reproduction events in time and space (e.g. nesting, hatching). This project began in June 2005 and therefore, results remain preliminary. Most riparian habitats in the region, potentially suitable for wood turtles, have been monitored. Although we cannot yet estimate population densities, we are currently following 5 individuals by telemetry throughout the region, most likely belonging to 4 different populations. The location of hibernating sites of these turtles will allow us to find more individuals next year and to start earlier to record reproduction events as well. By informing and implying local communities to the project, we passed from 9 wood turtle sightings to 38 for the area and we plan on maintaining this collaboration through the years.

Des perturbations majeures affectant la tortue des bois et son habitat telles que la déforestation, la fragmentation de l'habitat, le tourisme grandissant et la mortalité sur la route, sont toutes clairement présentes au Nouveau-Brunswick. Toutefois, les mesures de protection accordées à l'espèce dans les provinces maritimes demeurent minimales. Bien que cette tortue soit largement répandue au Nouveau-Brunswick, son abondance n'est pas connue puisque aucun suivi n'a été fait dans la région jusqu'à ce jour. En sachant que ce reptile, désigné "espèce préoccupante", est présent dans le Grand Écosystème de Kouchibouguac, il est impératif d'agir rapidement en inventoriant les populations. Les objectifs spécifiques de ce projet sont de 1) créer une carte préliminaire d'habitats potentiels, 2) estimer la densité des populations, 3) suivre les mouvements afin de déterminer le domaine vital et la sélectivité d'habitats et 4) identifier les événements reliés à la reproduction temporellement et spatialement (ex. nidification, éclosion). Comme le projet a débuté en juin 2005, les résultats demeurent préliminaires. Nous avons visité la majorité des habitats rivulaires de la région afin de déterminer la présence d'habitats potentiels pour l'espèce. Quoiqu'il soit encore impossible d'estimer la densité des populations, nous suivons 5 individus par télémétrie dans l'aire d'étude, appartenant possiblement à 4 populations distinctes. La localisation des sites d'hibernations de ces tortues nous permettra de trouver plus d'individus l'an prochain ainsi qu'a suivre dès avril 2006 les événements reliés à la reproduction. En informant et en impliquant les communautés locales, nous sommes passé de 9 observations de tortues des bois à 38 dans la région et nous prévoyons entretenir cette précieuse collaboration tout au long de ce projet.

Poster

Conference Abstracts

GRAVEL, MIREILLE 2

PAVED ROADS AS BARRIERS TO AMPHIBIAN MOVEMENTS/LES ROUTES ASPHALTÉES: UNE BARRIÈRE AUX MOUVEMENTS D'AMPHIBIENS?

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We investigated whether paved roads acted as barriers to amphibian movements in the vicinity of 16 roadside ponds of southeastern New Brunswick, Canada. Our study was conducted over two successive summers (April-September), and focused on three species groups: mole salamanders, toads, and ranid frogs. Using pitfall traps and drift fences placed on each side of the pond (i.e., one fence was separated from the pond by the road, the other was in continuous habitat, we examined the effects of roads, on 1) roadside adult and juvenile amphibian abundance and 2) movements across the road. We measured a number of road-associated variables such as traffic intensity, road proximity to the pond, and terrestrial habitat structure as well as others potentially influencing movements (e.g., pond size, hydroperiod). Despite considerable variation among groups, the abundance of juveniles and adults of each group was generally negatively influenced by road-associated variables for at least one of the study years. The proportion of juveniles dispersing from the pond was lowest at the roadside fence. In contrast, adult movements from the pond were highest at the roadside fence under high traffic intensities. Our results strongly suggest a barrier effect of paved roads on adult and juvenile amphibians even under low traffic densities and relatively low roadside habitat disturbances. This provides empirical evidence for deleterious effects of roads on amphibian populations and highlights the importance of accounting for roads in amphibian management.

Nous avons étudié l'effet des routes asphaltées comme potentielles barrières aux mouvements d'amphibiens en bordure de 16 étangs le long de routes dans le sud-est du Nouveau-Brunswick, Canada. Notre étude s'est déroulée pendant deux étés consécutifs (avril-septembre) et a ciblé trois groupes d'espèces: les salamandres, les crapauds et les grenouilles. En utilisant des pièges-fosses et des clôtures de dérive disposées de part et d'autre de l'étang (i.e., une clôture séparée de l'étang par une route, l'autre dans de l'habitat continu), nous avons examiné les effets de la route sur 1) l'abondance d'amphibiens adultes et juvéniles en bordure de route ainsi que 2) les déplacements impliquant une traversée de la route. Nous avons mesuré différentes variables associées à la route telles que l'intensité du trafic, la distance de la route à l'étang, la structure de l'habitat terrestre ainsi que d'autres facteurs pouvant influencer les mouvements (e.g., taille de l'étang, hydropériode). Malgré les variations considérables entre les groupes, l'abondance de juvéniles et d'adultes de différents groupes d'espèces était généralement influencée négativement par les variables associées à la route, et ce, pour au moins une des deux années de l'étude. La proportion de juvéniles en dispersion était plus faible à la clôture en bordure de la route qu'à celle située du côté de l'étang. Les mouvements des adultes étaient, au contraire, plus fréquents à la clôture en bordure de la route sur les sites ayant une grande intensité de trafic. Nos résultats suggèrent fortement un effet de barrière des routes asphaltées sur les mouvements d'amphibiens, même à faible intensité de trafic et faibles perturbations de l'habitat en bordure des routes. Cette étude fournit donc une preuve empirique des effets néfastes des routes sur les populations d'amphibiens et souligne l'importance de considérer les routes dans de futurs plans de gestion de ce taxon.

Platform

GREAVES

THERMAL ECOLOGY OF OVERWINTERING WOOD TURTLES (*Glyptemys insculpta*) AT THE SPECIES' NORTHERN RANGE LIMIT

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Seasonal variation in activity patterns of reptiles is accompanied by physiological and behavioural adjustments that influence both their ecology and life history. Over-winter survival is an important factor limiting a species' northern range extension. A northern population of wood turtles (*Glyptemys insculpta*) in the Sudbury District, Ontario was surveyed in fall 2004 and a subset of adults (N = 5) radio-tracked during the winter of 2004-2005 to examine thermal aspects of hibernation. We tested the hypothesis that hibernation sites that provide protection from freezing and predation are a limited resource in the north, thus requiring turtles to use communal hibernacula. Temperature data loggers indicated that turtle body temperatures and hibernacula temperatures remained relatively stable at -0.5°C from 2 December 2004 until 3 April 2005. During the same period, air temperature was highly variable, ranging between –40°C and 11°C (average air temperature = –9.9°C). Turtles did not use distinct structures (e.g., root hollows, logjams, and holes in the riverbank) that would protect from predation during hibernation, but instead rested relatively exposed on the riverbed at a water depth of approximately 1m and at a mean distance of 0.99 m from the riverbank. Surprisingly, turtles made small movements during winter, typically against the river current and in a direction parallel to the riverbank. Average winter home range size was 4.40 m^2. These findings contribute to a better understanding of the over-wintering ecology and thermal tolerances of *G. insculpta* at its northern limit, and are especially important because *G. insculpta* is declining in numbers, and is particularly vulnerable to increases in adult mortality (that may occur during hibernation) as a result of its bet-hedging life history.

Platform

Conference Abstracts

GREEN

THE FOWLER'S TOAD RECOVERY PLAN

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Although widespread throughout the eastern United States, Fowler's toad (Bufo fowleri) is restricted in Canada to sandy or rocky points and beaches along the northern shore of Lake Erie in Ontario. Viable populations are known from only three localities immediately adjacent to the lake: Rondeau, Long Point, and the Niagara peninsula. Assessed as "Threatened" by COSEWIC in 2000, Fowler's Toad has been legally listed under the Species at Risk Act as of 2003. Primary identified threats to the well-being of Fowler's toads in Canada include shoreline development and stabilization. Limiting factors include the animals' high mortality and short life span as well as the instability of its preferred shoreline habitats. Population size fluctuations and variable connectivity between required habitats also affect population survival. With these and other considerations in mind, the Fowler's Toad Recovery Team has crafted a recovery plan for the species based on assessment of population viability. In rank order, recruitment of juveniles into the adult population, population number, dispersal survival and, finally, adult survival are identified as the major factors affecting viability of Fowler's toad populations and, consequently, are the major components addressed in the recovery plan. The heart of the plan is contained under the headings "Not Worse (Conservation)", "Know More (Research)" and "Make Better (Amelioration and Recovery)". Outreaches to stakeholders, education, funding and reporting are also addressed as these are necessary for ensuring the plan's successful implementation. Action items include measures to protect of existing habitat, curb the number of vehicles on the beach, curtail aggressive beach maintenance, define critical habitat, pursue research to gain better knowledge of juvenile survivorship and dispersal, and increase public awareness through activities, publications, toad posters, toad stickers and more.

Platform

GREGORY

DEMOGRAPHIC TRAITS OF INTRODUCED COMMON WALL LIZARDS (*Podarcis muralis*) ON VANCOUVER ISLAND

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Non-indigenous species represent potential threats to the persistence of native species. It is therefore important to understand the ecology of introduced species in order to develop appropriate mitigation strategies when needed. Here, I describe some basic demographic attributes of common wall lizards (*Podarcis muralis*), a European species, introduced near Victoria, British Columbia, in the early 1970s. Male and female wall lizards reached similar body lengths, but males had relatively longer tails and were heavier than non-gravid females. Gravid females were found in all months from May-July, inclusive, but hatchlings did not appear in the field before late August. Thus, individual females apparently produce only one clutch per year. Growth rate was highest in small lizards and maturity probably was attained in the second full summer of life. As is generally true of injury patterns, large lizards were more likely than small lizards to have experienced tail loss prior to capture. These results suggest that *P. muralis* on southern Vancouver Island are fundamentally similar demographically to conspecifics at sites within the species' natural range in Europe. However, whether *P. muralis* on Vancouver Island is a threat to the native northern alligator lizard, *Elgaria coerulea*, remains an open question. Anecdotal observations suggest that wall lizards negatively affect alligator lizards, but both species coexist at some sites and recent studies of behavioural interactions between the two species are somewhat equivocal.

Platform

Conference Abstracts

HERMAN

EXPLORING THE LIMITS OF A RANGE: *Thamnophis sauritus* IN NOVA SCOTIA

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In Canada, the Eastern Ribbonsnake (*Thamnophis sauritus*) reaches its northeastern limit in isolated pockets of southwestern Nova Scotia. We used 1) historical records and extensive visual searching to locate populations in Nova Scotia, and 2) radio-telemetry, capture-mark-recapture and direct observation to assess abundance, activity and movement, and to locate hibernacula at one intensively sampled site in Kejimkujik National Park. At this site 105 individuals were marked in 2001, and a subset of 13 adults were implanted with radio transmitters and tracked from May until November. At the same site in 2004, 135 snakes were observed and captured, and their positions, behaviour and environmental characteristics noted. In April, newly emerged snakes were most abundant in two relatively rocky areas at the edge of a floodplain. By mid-May all snakes were immediately adjacent to the nearest body of water. In September snakes concentrated in a grassy area several meters from water. One presumed mating aggregation of 10+ snakes in <5 m radius was observed at this time. By mid-October most snakes were again in rocky areas away from water. Snakes were rarely observed basking fully exposed. Based on 11 observations of feeding on anurans (Ranidae) and fish (Cyprinidae), the species appears to be a sedentary ambush predator. Radio telemetry yielded only one hibernaculum, but spring and fall concentrations suggest that snakes hibernate in rocky areas near the water table. Our extensive searches have confirmed the species' presence on three watersheds in southwestern Nova Scotia. However, success of these labour-intensive efforts has been limited by the apparently patchy distribution of the species in space and time, its cryptic nature and the high density of vegetative cover in its preferred habitats.

Platform

HOGAN

***Xenopus tropicalis*: A NOVEL SURROGATE SPECIES FOR AMPHIBIAN TOXICOLOGY**

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With the development of standardized toxicity testing protocols, amphibians are becoming a favoured model animal for evaluating the effects of environmental compounds. As with fish, individual amphibian species have unique characteristics that make them suitable for measuring specific endpoints. Size of larvae and adults, developmental rate, animal husbandry and ease of rearing are some factors to consider when choosing a species model. *Xenopus laevis* has long been exploited as a laboratory animal for studying early vertebrate development and more recently as a surrogate species for amphibian toxicity testing. However, *X. tropicalis* also presents unique opportunities to study how aquatic pollutants affect vertebrate development. *X. tropicalis* has a shorter generation time of 4-6 months and the adults are significantly smaller than X. laevis. In addition to these rearing advantages, *X. tropicalis* has one of the smallest genomes among amphibians (20 chromosomes, half the size of *X. laevis*) and is a diploid species. In fact, a genome sequencing initiative for *X. tropicalis* is underway and near completion (consult: http://genome.jgi-psf.org/Xentr3/Xentr3.home.html). We have established a colony of *X. tropicalis* and are currently optimizing conditions for tadpole rearing. In this presentation, we will describe some of our current work using *X. tropicalis* in comparative toxicity testing, along with future projects involving the characterisation of sexual development and assessment of endocrine disruption using thyroid-response assays.

Platform

HOWES

THE GENETICS OF PERIPHERAL POPULATIONS

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All species, no matter how endemic or broadly distributed, have ranges that are geographically circumscribed. Evolutionary hypotheses suggest that a species' range is limited because geographically peripheral populations do not adequately adapt to their local conditions and continue range expansion. It has been suggested that peripheral populations lack the genetic variation needed to adapt to different conditions beyond the species' range, or that local adaptation in peripheral populations is precluded because of asymmetrical gene flow from more geographically central populations. We test these hypotheses using genetic data (mtDNA and microsatellites) from 52 populations across the range of the five-lined skink (*Eumeces fasciatus*). Specifically, we examine how post-glacial dynamics and historical range fragmentation may have shaped intraspecific diversity, whether "soft" peripheral populations (populations which are not bordered by an obvious physical boundary) and "hard" peripheral populations (populations which are bordered by an obviously inhospitable boundary) display different patterns of intrapopulation genetic diversity, and evaluate whether immigration significantly exceeds emigration in peripheral populations of this species. Our results shed light on the genetic factors involved in the maintenance of a species range and help us to understand the forces acting on our own northern peripheral populations of eastern Canada's only lizard species.

Platform

THE EFFECT OF SEX RATIO ON SEXUAL SELECTION IN PAINTED TURTLES (*Chrysemys picta*)/L'EFFET DU RAPPORT DE SEXE SUR LA SÉLECTION SEXUELLE CHEZ LES TORTUES PEINTES (*Chrysemys picta*)

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Sexual selection models predict that in systems based on female mate choice, the intensity of sexual selection on male traits will increase as the sex ratio becomes more male-biased. I am investigating the influence of sex ratio on sexual selection in two populations of painted turtle (*Chrysemys picta*): one female-biased and one male-biased. Painted turtle mating is based on female choice; male painted turtles are much smaller than females (making coercion unlikely) and males court females by displaying with highly elongated foreclaws. Copulation is not limited by gametogenesis in painted turtles and models indicate that variation in male mating success is small when there is little limitation on mating opportunities. Hence, I hypothesize that sex ratio will not influence sexual selection in painted turtles. I will investigate three main questions. First, are sexually dimorphic traits in male painted turtles maintained in the population by female mate choice and do these traits truly signal male quality? Second, are there other factors that influence sexual selection in painted turtles? Third, is sexual selection influenced by the sex ratio of the population? By answering these questions, I will be able to create a sexual selection model for pond turtles that could be used to further our understanding of sexual trait divergence. Financed by an NSERC grant to R.J. Brooks.

Les modèles de sélection sexuelle prévoient que dans les systèmes où la femelle possède le choix d'accouplement, l'intensité de la sélection sur les traits masculins augmentera comme le rapport de sexe devient plus biaisé vers les mâles. J'étudie l'influence du rapport de sexe sur la sélection sexuelle dans deux populations de tortues peintes (*Chrysemys picta*) avec les rapport de sexe ci-contre. L'accouplement chez les tortues peintes est basé sur le choix de la femelle. Les tortues peintes mâles sont plus petits que les femelles, rendant la coercition peu probable, et les mâles courtisent les femelles avec leurs griffes de main élongées. La copulation n'est pas limitée par la gamétogenèse, et les modèles indiquent que le succès reproductif chez les mâles possède peu de variation lorsque les opportunités d'accouplement ne sont pas limitées. Donc, je suppose que le rapport de sexe n'influence pas la sélection sexuelle chez les tortues peintes. J'étudierai trois questions: si le dimorphism des traits chez les tortues peintes mâles est maintenu dans la population par le choix d'accouplement des femelles et si ces traits signalent vraiment la qualité masculine, s'il y a d'autres facteurs qui influencent la sélection sexuelle chez les tortues peintes et si la sélection sexuelle est influencée par le rapport de sexe pour la population. Puis, je développerai un modèle de sélection sexuelle pour les tortues qui pourra enrichir notre compréhension de la divergence des traits sexuels. Financé par une allocation de CRSNG à R.J. Brooks.

Platform

Conference Abstracts

LAWSON

LARGE BODY TEMPERATURE FLUCTUATIONS OF EASTERN FOXSNAKES (*Elaphe gloydi*) DURING VOLUNTARY COLD-WATER SWIMMING IN THEIR NATURAL HABITATS

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We examined thermal biology of free-ranging terrestrial foxsnakes (*Elaphe gloydi*), voluntarily swimming in cold water during spring, in Georgian Bay, Canada. Using temperature-sensitive radio-telemetry, we recorded body temperatures of foxsnakes during 12 cold-water swims, and subsequent warming on shore. During these swims, water temperatures ranged from 11-22ºC and distances of 85-1330 m were travelled. Snakes that were in cold water long enough equilibrated with water temperature and did not maintain a body temperature above ambient. The largest observed drop in body temperature was 22.6ºC (over 11 min) and the largest increase was 23ºC (over 66 min). Such large, rapid temperature fluctuations have not previously been reported in detail from snakes in the field. Twice as many telemetry observations as expected occurred between 12:00 and 14:00, suggesting snakes chose to swim midday. Additionally, our results suggest that foxsnakes bask to raise their temperature prior to swimming in cold water. We compared swimming speed and the coefficient of temperature change among foxsnakes and other snake species. Swimming speed was positively correlated with water temperature.

Platform

Conference Abstracts

LESBARRÈRES

AMPHIBIAN CONSERVATION: BACK TO THE FUTURE

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The success of many pond restorations is not well documented. Following a highway construction, a restoration begun in 1999 in western France allowing the assessment of restoration efforts and changes through time. A survey was carried out on the amphibian community of eight ponds before they were destroyed. Substitutive ponds were created according to precise floristic and pedological criteria, following the old pond characteristics and taking into account the species attending them. Data are presented on species richness and ecological factors for the new ponds and compared to the initial levels. Presence of amphibian species was recorded every year during the breeding period. Species richness and abundance declined during the two years consecutive to the construction of the substitutive ponds but they increased thereafter, recovering in most of the cases to the initial levels. Fauna and flora indexes were correlated until a threshold after which over vegetation had negative effects on the establishment of amphibian populations. Likewise, an increase in the number of vegetation strata was positively correlated with species richness. Population models were used, incorporating landscape characteristics to assess current and long term population viability. The success of the restoration is specific and amphibian species present different colonisation capacities, improving our understanding of the maintenance of species richness in aquatic environments.

Le succès des projets de restauration de mares est mal documenté. A la suite de la construction d'une autoroute, un projet de restauration a débuté en 1999 dans l'ouest de la France permettant l'évaluation de ce type de projet ainsi que la dynamique des populations d'amphibiens concernées. Une étude a été menée sur les communautés d'amphibiens de huit mares avant que celles-ci ne soient détruites. Des mares de substitution ont été créées en suivant les caractéristiques écologiques des anciennes mares et des espèces observées jusqu'alors. La présence des espèces a été mesurée chaque année lors de la période de reproduction. La richesse spécifique et l'abondance ont diminué durant les deux années qui ont suivi la construction des nouvelles mares mais ces valeurs ont augmenté par la suite, retrouvant leurs valeurs initiales dans la plupart des cas. Une corrélation a été observée entre des indices de faune et de flore jusqu'à un seuil au-delà duquel un surplus de végétation a un effet négatif sur l'établissement des populations d'amphibiens. De la même manière, l'augmentation du nombre de strates végétales est positivement associée avec la richesse spécifique. Des modèles populationnels incorporant les caractéristiques écologiques des mares ont ensuite été utilisés pour estimer la viabilité présente et à long terme des populations. Nous avons montré que le succès du projet de restauration est spécifique et que les espèces présentent différentes capacités de colonisation, améliorant notre compréhension du maintien de la richesse spécifique en milieu aquatique.

Platform

Conference Abstracts

LITZGUS

SURVIVORSHIP AND DIFFERENTIAL LONGEVITY IN THE SPOTTED TURTLE (*Clemmys guttata*)

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Turtles are in decline world-wide, and few studies have collected the long-term, age-specific demographic data needed to construct life tables and thus identify the life history stages critical to population viability and conservation. Here I report estimates of survivorship and longevity of the spotted turtle *(Clemmys guttata*) using modified logarithmic decay equations and 24 years of mark-recapture data collected from a population at the northern extreme of the species' range in Ontario. Spotted turtle survivorship and longevity estimates are among the highest values reported for any animal species, and females are substantially more long-lived than males. Minimum annual adult female survivorship is 96.5%, maximum longevity is 110 years, and age at maturity is 12 years. Minimum male survivorship is 94.2%, maximum longevity is 65 years, and age at maturity is 11 years. The greater longevity of females may have evolved as a compensatory mechanism to offset delayed sexual maturity and low annual clutch frequency in the north. The selective pressure on males for extended longevity may not be as great because their fitness can be ensured in a shorter timeframe through the species' promiscuous mating system. Alternatively, males may live shorter lives as a result of a greater cost of reproduction (e.g., sperm production, courtship, copulation). This ongoing study is the longest-running on the spotted turtle, yet insufficient age-specific data have been gathered to construct a life table, particularly because egg and hatchling survival rates remain unknown; future work should specifically focus on gathering such data. The results of the current study have important management implications when considering which life history stages to protect for maintenance of population viability of long-lived vertebrates.

Platform

LOUGHEED

PERIPHERAL POPULATIONS AND THEIR POTENTIAL CONSERVATION VALUE

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Canada is depauperate in herpetofaunal diversity compared to most other countries. Moreover, for many of the approximately 86 Canadian amphibian and reptile species, the bulk of their ranges occur in the continental USA. Thus, many herpetofaunal species in Canada (and almost all that are of conservation concern) are represented by northern, geographically peripheral populations only. Peripheral populations may have conservation value because they tend to be diverged genetically and phenotypically from core populations, and because they may represent future sites of speciation (i.e. Mayr's peripatric model of speciation). As such it has been argued that peripheral populations should receive conservation priority both because they are repositories of unique aspects of intraspecific diversity that may be important in changing environmental circumstances and because they may generate future diversity. Comprehensive empirical support for these suggestions is lacking especially for amphibians and reptiles. An additional complication is that we still do not know why range boundaries exist, and thus what precludes peripheral populations from adapting to local environmental circumstances and continuing range expansion. In my talk I will briefly quantify and summarize the degree of peripherality of Canadian herpetofauna, explore the notion that peripheral populations have disproportionate conservation value, and present a suite of hypotheses that have been proposed (but seldom adequately tested) to explain range limits. I will argue that Canadian conservation strategies for species at risk would derive great benefit from a coordinated research effort to address these key knowledge deficits.

Platform (Plenary address)

Conference Abstracts

MACKINNON

WHY DID THE REPTILE CROSS THE ROAD? LANDSCAPE FACTORS ASSOCIATED WITH ROAD MORTALITY OF SNAKES AND TURTLES IN THE SOUTH EASTERN GEORGIAN BAY AREA

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Road mortality is believed to contribute to population declines in snakes and turtles, but there have been few attempts to quantify landscape features associated with road mortality in these taxa. A secondary road near Georgian Bay, Ontario (45 52'N, 80 50'W) was surveyed daily by automobile between April and October, 2003 and 2004. We measured landscape factors associated with roadkill of reptiles using multivariate statistics and a geographic information system (GIS). A total of 340 road crossings were analyzed (269 snakes, 71 turtles; 91% dead on the road), 44 of which involved species at risk in Canada. Snake crossings peaked during August, whereas turtle crossings peaked during June. Multiple regressions were performed to assess the relative importance of the measured landscape factors using 1) total reptile, 2) snake and 3) turtle crossing counts for buffered, equal-length road segments as output variables. The following landscape variables explained much ($R^2 = 0.354$) of the distribution of reptiles killed along this road: distance from Georgian Bay, driveways, buildings, road intersections, adjacent wetlands, and water crossings. Roadkill tended to be closer to Georgian Bay and further from driveways. Factors contributing to roadkill for species at risk should be considered prior to planning roadway expansion.

Platform

MARKLE

PHYLOGEOGRAPHY OF STREAM SALAMANDERS IN QUEBEC AND LABRADOR

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The Northern Two-lined, *Eurycea bislineata*, and the Northern Dusky, *Desmognathus fuscus*, are both small stream dwelling salamanders commonly found throughout eastern North America. In Canada, *E. bislineata* has an extensive northern range whereas *D. fuscus* is restricted to southern Quebec and a single site in the Niagara Gorge of Ontario. What determines the northern range limits of these salamanders is unknown. However, if the St. Lawrence River acts as a barrier to gene flow, then isolated populations of *E. bislineata* on the north shore may have had the opportunity to adapt to local conditions and expand their range accordingly. *Desmognathus fuscus* may not have had the same opportunity, and may be restricted to the south if populations on the northern periphery of the range are swamped by genes adapted to more southern conditions. Accordingly, phylogeographic patterns throughout the Canadian ranges of these salamanders were investigated in 58 populations of *E. bislineata*, including new populations in northern Quebec and Labrador, and 11 populations of *D. fuscus*. The range of *E. bislineata* was found to be far more extensive in northern Canada than previously recorded. Sequence variation in the mitochondrial cytochrome b gene of *E. bislineata* populations revealed a genetically distinct group of four adjacent populations on the north shore of the St. Lawrence River. Indications are that an isolated population near Trois-Rivieres underwent a genetic change and spread northward. Although molecular analysis did not reveal any differences between Labrador and Quebec groups, morphometric analysis of individuals from all the populations revealed a distinct Labrador morphotype. For *D. fuscus* populations, no genetic or morphometric differences were found.

Platform

MAZEROLLE

A VALUABLE TOOL TO ASSESS THE STRENGTH OF BIOLOGICAL HYPOTHESES IN HERPETOLOGY: AKAIKE'S INFORMATION CRITERION (AIC)

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Herpetologists frequently use observational studies to explain a given pattern, such as the number of individuals in a habitat patch, with a large number of explanatory (i.e., independent) variables. To elucidate such relationships, we have long relied on hypothesis testing to include or exclude variables in regression models, although the conclusions often depend on the approach used (e.g., forward, backward, stepwise selection). Akaike's Information Criterion (AIC) is remarkably superior in model selection (i.e., variable selection) than hypothesis-based approaches. It it is simple to compute and easy to understand, but more importantly, for a given data set, it provides a measure of the strength of evidence for each model that represents a plausible biological hypothesis relative to the entire set of models considered. Using this approach, one can then compute a weighted average of the estimate and precision for any given variable of interest across all the models considered. This procedure, termed model-averaging or multimodel inference, yields precise and robust estimates. In this paper, I illustrate how these techniques can be used in the conservation of amphibians and reptiles. The AIC and measures derived from it is should be routinely adopted by herpetologists, particularly those conducting field studies.

Les herpétologistes utilisent fréquemment des études d'observation sur le terrain dans le but d'expliquer des patrons, tels que le nombre d'individus dans une parcelle d'habitat, à l'aide de plusieurs variables explicatives (indépendantes). Afin d'élucider ce genre de relations, nous avons utilisé pendant longtemps les tests d'hypothèses afin d'inclure ou d'exclure des variables dans des modèles de régression, bien que les conclusions dépendent souvent de l'approche utilisée (e.g., sélection ascendante, descendante, pas à pas). Le critère d'information d'Akaike (AIC) est remarquablement supérieur aux tests d'hypothèses pour la sélection de modèles (i.e., sélection de variables). En plus d'être facile à calculer et à comprendre, l'AIC procure une mesure du degré d'évidence de chaque modèle qui représente une hypothèse biologique parmi l'ensemble des modèles considérés. En utilisant cette approche, on peut également calculer une moyenne pondérée de l'estimé et de la précision d'une variable d'intérêt pour l'ensemble des modèles considérés. Cette procédure, nommée pondération de modèle ou inférence multi-modèle, donne des estimés précis et robustes. J'illustre comment ces techniques peuvent être utilisées dans les travaux de conservation des amphibiens et des reptiles. Les herpétologistes, particulièrement ceux menant des études de terrain, devraient adopter l'AIC et les mesures qui en découlent.

Platform

MCDANIEL

IMPACTS OF ROW CROP AGRICULTURE ON SEXUAL DEVELOPMENT OF ANURANS

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Intensive row crop agriculture featuring corn and soybean production, is predominant in southwestern Ontario where the two crops account for over 50% of the total acreage of crops grown. This form of agriculture relies heavily on pesticide and nutrient inputs for continued success under conventional systems. The corn herbicides atrazine and metolachlor, are the two most heavily applied pesticides in Ontario and are routinely detected in tributaries draining agricultural watersheds. Field and laboratory studies have indicated exposure to atrazine may disrupt normal sexual development in male anurans, causing reductions in testosterone levels, laryngeal muscle diameter, and abnormal testes development. Pesticide levels and water quality data was collected from 33 farm ponds and agricultural drains in southwestern Ontario, two agricultural reference sites as well as four non-agricultural reference sites in August and September, 2003 and monthly from April through August in 2004. Atrazine and metolachlor were detectable in most samples, exceeding 1 µg/L at some sites. Blood samples were obtained from leopard and green frogs for analysis of sex hormones, and vitellogenin. Gonads were excised for histomorphological assessment. Analysis of frogs from late summer 2003, revealed that circulating testosterone levels were negatively correlated with atrazine concentrations in pond water in juvenile male leopard frogs ($r = 0.74$; $p = 0.014$) and adult female leopard frogs ($r = 0.59$; $p < 0.008$). No relationship was found between sex steroid levels in frog plasma and concentrations of atrazine and metolachlor in the water in 2004, contrary to results from 2003. This may be due to lower concentrations of atrazine and metolachlor in 2004. Agricultural sites, particularly those in Chatham exhibited a high percentage of males with ova-testes (45%), as compared to control sites (10%).

Platform

Conference Abstracts

MCKIBBIN

INFLUENCE OF WATER CONDITIONS ON THE EMBRYONIC SURVIVORSHIP OF THE OREGON SPOTTED FROG (*Rana pretiosa*)

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The Oregon spotted frog (*Rana pretiosa*) was listed as endangered in an emergency listing in 1999 by the Committee on the Status of Endangered Wildlife in Canada [COSEWIC]. There are only three known locations of the subpopulation in Canada. These known subpopulations are located in isolated sites in the extreme southwest corner of British Columbia. One of the populations has shown a steady decline since 1997. At present, the cause of poor fecundity and embryonic survivorship at one of the sub sites at the Aldergrove site is not known but indicates the need to obtain an understanding of embryonic survivorship in the context of population viability research. This research examined the question of whether water conditions influence the embryonic survivorship at two subpopulations located at Seabird Island and Aldergrove, BC. A sub-sample of 15-30 eggs per clutch was transferred into Nytex holding cages and development monitored in-situ using Gosner staging tables. Free swimming hatchlings were released at the site where the eggs were oviposited. Water conditions at each site were assessed by collecting water samples for trace metal analysis, fecal and total coliform and water chemistry. Water temperature was also recorded. At Aldergrove embryonic survivorship varied between 0.09 and 0.45 at sub site A and 0.71 and 0.96 at sub site B. At Seabird Island embryonic survivorship was between 0.67 and 0.86. Initial analyses indicate that no extreme water quality conditions occur at any of the two study sites and most likely do not contribute to poor embryonic survivorship at Aldergrove.

Poster

Conference Abstracts

MCNAB

UPDATE FROM THE KAWARTHA TURTLE TRAUMA CENTRE

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The Kawartha Turtle Trauma Centre in Peterborough, Ontario, has been treating road injured turtles for four seasons and is receiving turtles from across the province, often from other wildlife rehabilitators. Painted, Snapping and Blanding's turtles are the three species most often admitted to the centre. Snapping turtles have a high incidence of skull and jaw fractures and carapace shearing, and Painted turtles are usually admitted for shell fractures. Blanding's turtles are often treated for carapace, bridge and jaw fractures. Of great concern is the prevalence of eye injury in Blanding's turtles; severe visual impairment has prevented the release of several Blanding's turtles. The method of fracture fixation most commonly used is orthopedic wire. Oesophagostomy feeding tubes are often placed and may be used for months before patients begin to eat on their own. Antibiotic therapy is being refined and the use of pain medication is increasing, the standard being that every patient recieves at least short term analgesia. Field triage and first aid may increase treatment success and release. Most important in first aid is to keep the injured animal hydrated either through soaking or the use of subcutaneous fluids. Heat stress can be treated by placing wet towels or gauze on the turtle. Mobile shell fractures can be stabilized with tape. For Blanding's turtles we encourage the use of tear gel or wet gauze lightly draped over the head to prevent further eye injury through dessication. The Centre has received its third cohort of Wood turtles to headstart. Wood turtles are being raised at the Centre for release into an endangerd population. Weights of 250g or more were reached after 20 months at the Centre. Individuals attaining sufficient size will be equipped with transmitters and released. We hope that the expertise developed in captive rearing will be potentially used for other captive rearing initiatives.

Platform

Conference Abstracts

NOËL

GENETIC STRUCTURE OF THE EASTERN RED-BACKED SALAMANDER (*Plethodon cinereus*) IN AN URBAN LANDSCAPE

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The Mont Royal, located in the heart of Montréal, represents an important reservoir of biodiversity in the urban landscape. However, it has been gradually fragmented by anthropogenic activities since the arrival of the first European settlers more than 350 years ago. Nowadays the Mont Royal presents a mosaic of forested patches isolated by roads, graveyards and buildings, into which four Eastern Red-backed Salamander (*Plethodon cinereus*) populations are still found. To evaluate the effect of this habitat fragmentation, genetic diversity and population differentiation were assessed with microsatellite loci and compared to the genetic structure of four populations situated in a continuous habitat, the Mont Mégantic. Results indicate that allelic richness and heterozygosity are lower in the fragmented populations. Exact differentiation tests and pairwise FST showed that the four populations from Mont Royal could be differentiated, whether populations from Mont Mégantic were non-differentiated. These results indicate that urbanization of the Mont Royal has significantly changed the genetic structure of the Eastern Red-backed Salamander and raise conservation concerns for these isolated populations.

Le Mont Royal, situé au coeur de Montréal, constitue un site important pour la biodiversité dans le paysage urbain. Toutefois, cette montagne a été graduellement fragmentée par les activités anthropiques depuis l'arrivée des premiers colons il y a plus de 350 ans. Aujourd'hui, le Mont Royal présente une mosaïque d'îlots forestiers isolés par des édifices, des cimetières, et des routes, parmi lesquels on retrouve quatre populations de salamandre cendrée (*Plethodon cinereus*). Afin d'évaluer les effets de cette fragmentation d'habitat, la diversité génétique et la différentiation des populations ont été évaluées à l'aide de marqueurs microsatelllites et comparées à la structure génétique de quatre populations situées dans un habitat non-fragmenté, le Mont Mégantic. Les résultats indiquent que la richesse allélique et l'hétérozygotie sont plus faibles pour les populations fragmentées. Les tests exacts de différentiation et les valeurs de Fst montrent que les quatre populations du Mont Royal sont différentes les unes des autres alors que les populations du Mont Mégantic sont similaires entre elles. Ces résultats indiquent clairement que la fragmentation du Mont Royal a modifié la structure génétique des populations de salamandres cendrées et sont inquiétants pour la survie de ces populations isolées.

Platform

PICARD

THE DRASTIC DECLINE OF THE WESTERN CHORUS FROG (*Pseudacris triseriata*) IN SOUTHWESTERN QUÉBEC

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The Western Chorus Frog (*Pseudacris triseriata*) has undergone a drastic decline in southwestern Québec over the past 50 years; the species is now absent from about 90 % of its historical range. In April 2004, an exhaustive survey of Chorus Frog populations was made throughout its present range, with auditory monitoring at breeding ponds, in order to locate these ponds precisely and evaluate more precisely the status of this frog. A total of 803 breeding ponds dispersed in 9 metapopulations and 7 isolated populations were located. Most of these are highly at risk of destruction by residential developments. The Western Chorus Frog was not found at 4 sites where it occurred recently. Declines are observed in 5 of the 9 present metapopulations. A second survey of the breeding ponds later in the summer showed that at least 5 % of them were destroyed, and it up to 25 % in some areas. Despite the fact that the species was officially designated 'vulnerable' in Québec in 2000, the destruction of its habitats continues and at this rate the Western Chorus Frog may be extirpated from southwestern Québec in 10 to 25 years.

La Rainette faux-grillon de l'Ouest (*Pseudacris triseriata*) a subi un important déclin dans le sud-ouest du Québec depuis 50 ans; l'espèce est maintenant absente dans environ 90 % de son aire historique. En avril 2004, un inventaire exhaustif des populations de Rainettes faux-grillon a été réalisé dans son aire actuelle, à l'aide de l'écoute des chants, dans le but de localiser précisément les étangs de reproduction et d'évaluer de façon plus précise le statut de cette rainette. Au total, 803 étangs de reproduction répartis dans 9 métapopulations et 7 populations isolées ont été recensés, dont la plupart sont menacées par le développement résidentiel. La Rainette faux-grillon de l'Ouest est disparue de 4 sites où elle était présente récemment. Des déclins ont été observés dans 5 des 9 métapopulations actuelles. Un deuxième inventaire des étangs de reproduction réalisé plus tard dans l'été 2004 a démontré que pas moins de 5 % de ceux-ci avaient été détruits, et ce chiffre atteint 25 % dans certains secteurs. Malgré le fait que l'espèce ait été officiellement désignée 'vulnérable' au Québec en 2000, la destruction de ses habitats continue et à ce rythme la Rainette faux-grillon de l'Ouest pourrait disparaître du sud-ouest du Québec dans 10 à 25 ans.

Platform

Conference Abstracts

POULIOT

HOW FAR FROM THE NESTING SITE SHOULD WE PROTECT THE FOUR-TOED SALAMANDER (*Hemidactylium scutatum*)? A CASE OF URBAN CONSERVATION

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Shortly after the discovery in 1999, of a four-toed salamander (*Hemidactylium scutatum*) population in the periphery of Quebec City, the modification and destruction of the forest surrounding the nesting site began. To minimize the damages to this rare species population by the residential development, we investigated the distance from the nesting site, in the terrestrial habitat, use by the four-toed salamander outside the nesting time. Our results proposed that the four-toed salamander doesn't go farther than 50 meters from the nesting site. The "Centre de données sur le patrimoine naturel du Québec" proposed a buffer zone of 150 meters. We feature that the 150 meters buffer zone should be view as two areas. Any activities or development, neither hiking trail, should be planned in the first 50m from the nesting site. Only hiking trail could be managed in the 50 to 150 meters from the nesting site. Moreover, special attention should be done to possible hydrologic modifications consequent of habitat modification outside the 150 meters buffer zone.

Peu après la découverte en 1999, d'une population de salamandres à quatre orteils (*Hemidactylium scutatum*) dans la banlieue de la ville de Québec, la modification et la destruction de l'habitat forestier entourant le site de ponte débuta. De manière à minimiser l'impact du développement résidentiel, nous avons cherché à quantifier la distance du site de ponte, dans l'habitat terrestre, utilisée par la salamandre à quatre orteils, en-dehors de la période de ponte. Nos résultats suggèrent que la salamandre à quatre orteils ne s'éloignent pas à plus de 50 mètres du site de ponte. Le Centre de données sur le patrimoine naturel du Québec propose une zone tampon de 150 mètres. Nous soulignons que cette zone devrait-être considérée comme deux aires distinctes. Aucune activités ou dévelopment, pas même des sentiers de randonnée pédestre, ne devrait être prévues dans les premiers 50 mètres du site de ponte. Uniquement des sentiers pédestres devrait-être tolérés dans la zone de 50 à 150 mètres du site de ponte. De plus, une attention toute particulière doit-être portée à d'éventuelles modifications des conditions hydrologiques du milieu, engendrés par des travaux réalisés au delà de la zone tampon de 150 mètres.

Platform

REEVES

EFFECT OF TEMPERATURE ON PHYSIOLOGY AND BEHAVIOUR IN TWO COLOUR MORPHS OF THE RED-BACKED SALAMANDER (*Plethodon cinereus*)

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Colour polymorphisms are common in amphibians and are often viewed as adaptations to specific ecological conditions. The terrestrial eastern red-backed salamander (*Plethodon cinereus*) is widely distributed in forests of eastern North America, and displays colour polymorphism. Populations usually exhibit two colour morphs – a red-backed morph and a lead-backed morph, and the proportion of each morph in a population is correlated with climate. The purpose of the current study was to investigate the effect of temperature on physiological (metabolic rate) and behavioural differences between the two morphs. We hypothesised that: 1) temperature affects metabolic rate differently between the two morphs; 2) the two morphs differ in agonistic behaviour when paired against con-specifics; and 3) temperature affects the degree of agonistic behaviour. With respect to the first hypothesis, we found a trend for a difference in metabolic rate between the morphs; however, the difference was not statistically significantly at our sample size. The second and third hypotheses were supported. In agonistic trials at the warmer temperature (20°C), resident red-backed morphs exhibited more aggressive behaviours and fewer submissive behaviours than lead-backed intruders. In contrast, resident lead-back morphs were not more aggressive than red-backed intruders. At the cooler temperature (9°C), the proportion of aggressive and submissive behaviours did not differ between the morphs regardless of who was the resident. In general, salamanders exhibited more aggressive behaviours at higher temperatures than at lower temperatures. We discuss our findings in light of the species' distribution and frequencies of each colour morph in wild populations.

Platform

ROLLINSON

ANNUAL TEMPERATURE VARIATIONS AFFECT CLUTCH FREQUENCY AND EGG SIZE IN A NORTHERN POPULATION OF PAINTED TURTLES (*Chrysemys picta*)

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Annual variations in clutch frequency (CF) and mean egg size (ES) have been clearly documented in several populations of *Chrysemys picta*. Although it has been suggested that these annual differences are temperature-mediated, previous efforts to relate variations in CF and ES to temperature have been largely unsuccessful. We investigated the relationship between annual temperature variation and CF and ES over 12 years in Algonquin Provincial Park. We predicted that warmer temperatures during the summer and fall prior to nesting and during the following spring would be associated with an increase in CF and a decrease in egg mass (EM) and egg length (EL). EM and EL were not related to fall or spring temperatures; however, an a-posteriori analysis revealed that both these parameters were negatively related to temperatures just prior to nesting season onset (r^2 = 0.60-0.75, 9-13 years analyzed). We further investigated the effect of individual thermal regimes on ES by attaching Thermochron iButtons to the shells of ~50 females over two field seasons. Preliminary analyses appear to support the idea that temperature and ES are inversely related. We argue that, if temperature acts as a constraint on ES, then these findings support optimal egg size theory. Preliminary analyses further indicate that a strong relationship exists between the temperature of the previous summer and CF.

Platform

WOOD TURTLE (*Clemmys insculpta*) HABITAT REQUIREMENTS AND MOVEMENTS IN NEW BRUNSWICK

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In Canada, the Wood Turtle is listed as a species of concern by COSEWIC. Efforts are being undertaken to protect the remaining populations within the country. A two-year habitat selection study of Wood Turtles was undertaken by UNB from May to August 2003-2004, within the military training area of CFB Gagetown in New Brunswick. A limited number of studies have quantitatively measured habitat selection in Wood Turtles in the northern extent of their range. These studies suggest that proximity to water, low canopy cover and non-forested locations such as alder stands are selected habitat features. We hypothesize that male habitat selection is due largely to their search for females and competition with males. Two person visual searches of selected waterways along with radio-telemetry of 30 turtles were conducted over two seasons. Habitat characteristics were measured at each capture site and a corresponding random site. Conditional Logistic Regression was used to determine habitat selection models. A total of 115 individual turtles were captured over two seasons. Although non-forested locations were favoured overall, forested locations did see a significant increase in use later in the season. Distance to water varied throughout the season. The majority of observations of Wood Turtles were noted within 300 m, several individuals were also noted at further distances than recorded in previous studies. Habitat use was highly variable between individuals and throughout the active season. An initial observation of the data does not suggest a difference between the sexes.

Platform

RUSSELL

FACTORS AFFECTING AMPHIBIAN DISTRIBUTION AND COMMUNITY STRUCTURE IN NOVA SCOTIA

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Nova Scotia wetlands were surveyed for amphibians from 2002 to 2005. Wetlands on game reserves, parks, coastal barrens, and developed areas were included. Species richness in these wetlands was stable over the four study years, however there was substantial species turnover between years. Water chemistry was generally not useful in predicting amphibian species richness. Acidic wetlands with pH less than 4 were not used by amphibians. Wetland hydroperiod and presence of fish predators were major factors affecting species richness. Additionally, distance from human disturbance was a significant factor in determining amphibian species richness in ponds. Community structure was assessed using stable isotope ratios of N and C. Preliminary data indicate potential competitive relationships between wood frog and spring peeper tadpoles and identified predatory invertebrates in amphibian communities.

Platform

Conference Abstracts

SAMSON

EXCAVATION OF FRESHWATER TURTLE EGGS IS A NON-DELETERIOUS METHOD FOR OBTAINING FECUNDITY AND EGG MORPHOMETRIC DATA

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It has been suggested, and verified in artificial conditions, that handling eggs of various turtle species can be deleterious to embryos. However, excavating turtle nests remains an ideal method for obtaining accurate fecundity and egg morphometric data. We tested the hypothesis that handling turtle eggs decreases embryo survival in a population of midland painted turtle (*Chrysemys picta marginata*) that has been extensively studied since 1978 and where more than 2300 nests have been excavated since 1983. We compared embryo survival in handled and non-handled natural nests during the summers of 2002, 2003 and 2004. All nests were protected from mammalian predators. Upon excavation of the nests in the following springs, we did not find differences in survival between the two treatments, suggesting that the benefits in knowledge gained from nest excavation far outweigh the possibility of a small increase in mortality that could arise from handling the eggs. Moreover, we propose that excavating nests is beneficial for the management of endangered turtle species because the eggs can subsequently be relocated, protected, or incubated for headstarting programs when needed.

Poster

Conference Abstracts

ST-AMOUR

EMERGENT INFECTIOUS DISEASES IN THE LEOPARD FROG (*Rana pipiens*) IN CENTRAL ONTARIO

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Emergent infectious diseases (EID's) are one of the most pressing issues of amphibian conservation. They have been linked to several amphibian declines and are continually being discovered in new areas and species. Two of the most serious diseases, Ranavirus and chytrid fungus have recently been found in Ontario. Ranavirus was found both in woodfrog (*Rana sylvatica*) and leopard frog (*R. pipiens*) populations while chytrid was present in the bullfrog (*R. catesbeiana*). Leopard frogs are currently sold and distributed across Ontario as bait and may be contributing to the spread of EID's. Using genetic analysis and histological methods, wild, captive and bait shop samples of R.. pipiens were analyzed to test the hypothesis that Ranavirus and chytrid were present in these Ontario populations. Local bait shops were sampled to determine if infected frogs are being transported around Ontario through the recreational sale of bait frogs. Wild samples were also used to gain a better idea of the range of the virus in central Ontario. Captive populations were kept to determine if the virus spread in captive situations due to the immune suppression caused by stress. Chytrid was searched for in the wild samples to determine if it is playing a part in amphibian declines in this region. Ranavirus was discovered in one of the six wild populations, in the bait shops and in all of the captive populations. Chytrid was also present in several of the samples. For this reason the commercial harvesting of bait frogs should be stopped immediately.

Les maladies infectieuses émergentes sont un des plus importants problèmes dans la conservation des amphibiens. Elles sont responsables du déclin de nombreuses populations et sont continuellement observées chez de nouvelles espèces. Deux de ces maladies, Ranavirus et le champignon chytride ont récemment été découvertes en Ontario. Ranavirus a été observé chez la grenouille des bois (*Rana sylvatica*) et la grenouille léopard du nord (*R. pipiens*) alors que le chytride fut observé chez le ouaouaron (*R. catesbeiana*). La grenouille léopard est vendue et distribuée à travers l'Ontario en tant qu'appât et potentiellement contribue à la diffusion de ces maladies. Grâce à des analyses génétiques et histologiques, des grenouilles léopard ont été testées pour ces deux maladies. Des magasins de pêche ont été échantillonnés pour déterminer si des grenouilles infectées traversent l'Ontario au travers de l'activité de pêche à l'appât. L'étude de populations sauvages a permis de déterminer l'expansion du virus dans le centre de la province. Enfin, des individus tenus en captivité ont également été analysés pour identifier une possible diffusion du virus due à l'altération des défenses immunitaires en situation de stress. Le chytride a été recherche dans les populations sauvages pour évaluer son rôle dans le déclin des amphibiens dans la région. Ranavirus a été découvert dans une des six populations sauvages analysées, dans les magasins de pêche et dans toutes les populations captives. Le chytride était présent dans de nombreux échantillons. Pour cette raison, la distribution commerciale de grenouille en tant qu'appât devrait cesser immédiatement.

Poster

Conference Abstracts

BEAVER (*Castor canadensis*) AS A SURROGATE SPECIES FOR CONSERVING ANURAN AMPHIBIANS ON BOREAL STREAMS

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We explored the use of beaver (*Castor canadensis*) as a surrogate species for amphibian conservation on small (1st-4th order) streams in the Boreal Foothills of west-central Alberta. First, we examined if the presence of beaver affected the abundance of anurans amphibians using call surveys and pitfall trapping on unobstructed streams and beaver ponds. We also characterized the distribution of beaver ponds and the potential effects of landscape features, road construction and forest harvesting on beaver pond occupancy of streams using a novel combination of a digital elevation model and vegetation inventory data in GIS. Call surveys clearly suggested that beaver create breeding habitat for the boreal chorus frog (*Pseudacris maculata*), wood frog (*Rana sylvatica*) and western toad (*Bufo boreas*). No calling males of any species were recorded on unobstructed streams. Pitfall trapping showed that the wood frog exhibit high rates of juvenile recruitment on beaver ponds given that more individuals were captured on beaver ponds versus unobstructed streams and that young-of year represented the majority of wood frog captures (84%). A strong correlation between percent landscape occupied with beaver ponds and abundance of young-of-year wood frogs on unobstructed stream suggests that anurans captured along streams originated from beaver ponds. Using a generalized linear mixed-effect model, we found that the probability of beaver pond occurrence on streams was positively associated with elevation and stream order but unrelated to riparian forest height and distance to nearest road. In addition, proximity of streams to cutblocks reduced the probability of beaver pond occupancy even if *Populus* spp. was regenerating in the logged area. The high number and area of beaver ponds relative to basin (i.e., non-beaver) ponds in the Boreal Foothills suggests that beaver can play a key role in maintaining regional populations of amphibians. Beaver food requirements and dam-building patterns should be incorporated in management strategies as part of a surrogate species approach to amphibian conservation.

Platform

STEVENS 2

STATUS OF THE WESTERN TOAD AND ITS USE OF 'BORROW PITS' IN THE FOOTHILLS OF WEST-CENTRAL ALBERTA

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Populations of western toad (*Bufo boreas*) have declined or disappeared from much of the species southern range in the U.S. To assess distributions and densities of the western toad in the foothills of west-central Alberta, Canada we conducted visual surveys of 130 natural waterbodies in watersheds of the Pembina and North Saskatchewan Rivers in early and late summer 2000. Encounter rates were consistently low throughout the study area (0.2-0.3 toads/hr), one-tenth the rate for the co-occurring wood frog (*Rana sylvatica*), and nearly one-third the value reported in the literature for a toad population in south-western British Columbia during the late 1970s. Large-scale pitfall trapping of breeding and non-breeding sites during 2001 and 2002 showed differing age structures between wood frog and western toad populations, and that recruitment of age-0 juveniles in western toad populations was low. On potential breeding ponds, more age-1+ toads were captured than age-0 toads, and the difference in numbers between age classes was greater on 'borrow pits' (human-created roadside ponds) compared to beaver ponds indicating that borrow pits might be ecological sinks providing poor larval habitat. Borrow pits had either dried prior to juvenile emergence or had oligotrophic to mesotrophic waters compared to eutrophic states in beaver ponds. Pond creation as a management strategy or product of road construction may put western toad populations at risk of decline in the foothills of Alberta.

Poster

Conference Abstracts

VERLY

DOES MULTIPLE PATERNITY INCREASE WITH FEMALE SIZE IN THE COMMON MAP TURTLE (*Graptemys geographica*)?: A WORK IN PROGRESS

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In general, larger females can produce more and/or bigger offspring. It has also been shown that larger offspring survive better. Therefore, larger female map turtles should be more attractive to males. If males incur non-trivial costs of mating, such as missed opportunities or sperm limitation, they should mate preferentially with large females. Accordingly, multiple paternity should be more common in larger females. To test this prediction, we captured 34 gravid females spanning the full size range of reproductive females and induced egg laying with oxytocin. We then collected blood samples from > 250 hatchlings for paternity analyses (the number of sires will be deducted from the paternal alleles at 5 microsatellite loci). Results will be compared to other turtle species for which multiple paternity has been assessed, in light of their mating systems.

En général, les plus grosses femelles produisent plus et/ou de plus gros rejetons. Il a également été démontré que les plus gros rejetons ont une meilleure chance de survie. Pour ces raisons, les mâles Tortues Géographiques devraient être plus attirés par les plus grosses femelles. Si les mâles encourent des coûts de reproduction élevés, tels des pertes d'opportunités d'accouplement ou une limitation dans la spermatogénèse, ils devraient s'accoupler préférentiellement avec de plus grosses femelles. Par consequent, la paternité multiple devrait être observée plus fréquement dans les couvées pondues par des grosses femelles. Nous avons capturés 34 femelles gravides pour tester cette prédiction. La ponte à été induite en laboratoire à l'aide d'oxytocine et nous avons prélevé des échantillons sanguins sur plus de 250 rejetons pour effectuer des analyses de paternité (le nombres d'allèles présents à 5 loci de microsatellites permettront de déduire le nombre de pères par couvée). Les résultats seront comparés aux autres espèces de tortues chez lesquelles des études de paternités multiples ont été effectuées et ce en lumière de leur système de reproduction.

Poster

Conference Abstracts

WESLEY

LOCAL AND REGIONAL SCALE HABITAT SELECTION BY WOOD TURTLES (*Glyptemys insculpta*) AT THE NORTHERN LIMIT OF THEIR RANGE/SÉLECTION D`HABITATS PAR LA TORTUE DES BOIS (*Glyptemys insculpta*) SUR L`ÉCHELLE LOCALE ET RÉGIONALE AU NORD DE SON AIRE DE RÉPARTITION

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Wood turtles (*Glyptemys insculpta*) are declining throughout their range, largely as a result of habitat loss. Previous research has focused predominantly on studying movement patterns and habitat use/selection by wood turtles on the "local" scale. This study aims to identify "local" and "regional" scale habitat features selected by wood turtles at the northern limit of their range, as well as to determine the most relevant scale(s) of consideration with respect to resource management for wood turtle conservation. Local scale habitat selection by individual turtles during their active season is investigated by means of radio-telemetry. Regional scale habitat selection by wood turtle populations is studied through surveys of inhabited and uninhabited stream reaches. Logistic regression and Akaike's Information Criterion (AIC) will be used to develop and evaluate a number of potential habitat selection models at both scales. Beyond identifying environmental features significant to the wood turtle, successful models resulting from the landscape scale study may also be used to map potential wood turtle habitat that has not yet been identified.

La tortue des bois (*Glyptemys insculpta*) décline à travers son aire de répartition, en grande partie dû à la perte de son habitat. Jusqu'à présent, la recherche s'est concentrée sur les patrons de mouvement et sur l'utilisation ou la sélection d'habitats sur l'échelle locale. Cette étude a pour but d'identifier les caractéristiques d'habitat choisies par la tortue des bois sur l'échelle locale ainsi que sur l'échelle régionale. De plus, cette étude vise à déterminer la/les échelle(s) pertinente(s) à la gestion des ressources par rapport à la conservation de la tortue des bois. La sélection d'habitats par des individus à l'échelle locale a été étudié par moyens de radio-télémétrie, tandis que la sélection d`habitats à l'échelle régionale a été étudié par moyens de recherches faites sur des cours d'eau habités et inhabités par des populations de tortues des bois. La régression logistique et «Akaike`s Information Criterion» seront utilisés afin de développer et d'évaluer plusieurs models sur chaque échelle. En plus de pouvoir identifier les caractéristiques d'habitat de valeur à la tortue des bois, les models pourront être utilisés afin d'identifier de nouvelles régions (non connues) composées d`habitat convenable à cette espèce.

Platform

WIND

DOES FOREST HARVESTING CREATE OR DESTROY AQUATIC AMPHIBIAN HABITAT?

Elke Wind

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Amphibians utilize a variety of lentic habitats for breeding, including small, seasonal ponds. However, current legislation in British Columbia does not provide protective measures for small wetland habitats less than 0.25 to 1 ha, depending on their location within the province. Island Timberlands (formerly Weyerhaeuser) utilizes variable retention harvesting methods so that small tree patches are often retained around small, ephemeral ponds. As part of the Forest Project, we initiated a pre- and post-harvest study in 2004 to investigate the effectiveness of retaining buffers around small ponds at three forest sites containing 70+ ponds. The three treatments included: normal buffer width (1 tree width), double buffer width (2 tree widths), and unbuffered. At all ponds, the hydroperiod, drying rate, and amphibian species presence and larval development were recorded regularly. In Year One (2004), all sites and ponds were unharvested. In Year Two (2005), one site was harvested using patch retention methods and two remained forested but roads were put in. In Year Three (2006), the remaining two sites will be also be harvested. The ponds were highly variable in their water depths, hydroperiods, vegetative cover, searchability, and presence of amphibian species. In 2004, all ponds dried by late July as it was a dry spring and summer. In contrast, spring 2005 was wet and the ponds retained water until late August, especially those in the harvested site where water levels rose significantly. All three amphibian species returned to breed in ponds at the harvested site in 2005 (Long-toed salamander, Red-legged frog, and Pacific Chorus frog). Evidence suggests that Pacific Chorus frogs may be attracted to more open canopy ponds, potentially using roads as dispersal corridors, as they were common throughout the harvested site in 2005 and frequently observed breeding at ponds near roads in the two unharvested sites in 2005. Metamorphosis was confirmed at more sites in 2005 than in 2004.

Platform

10th Annual Meeting of CARCNET/RÉCCAR
Ottawa, Ontario
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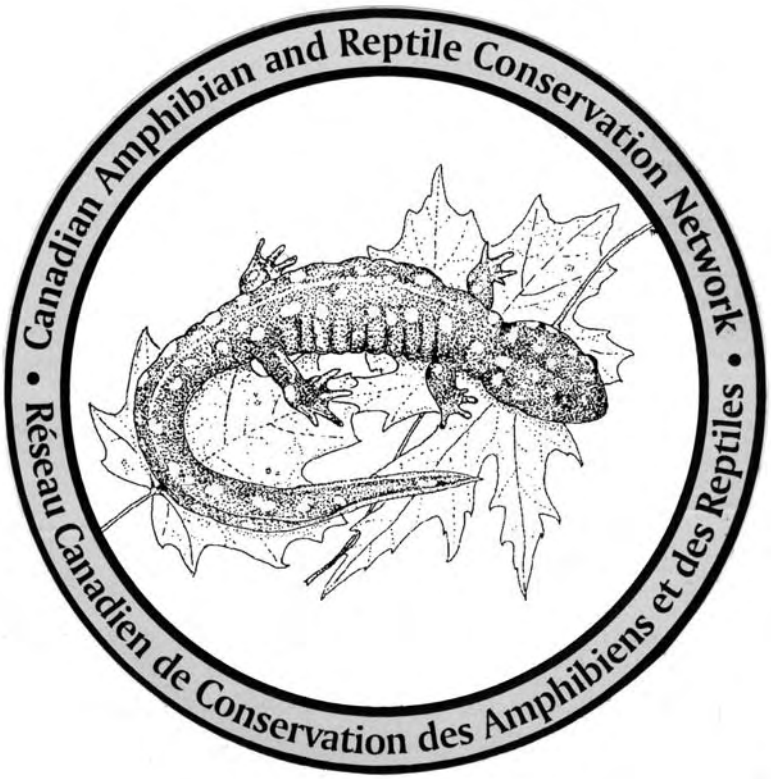

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