

**17TH ANNUAL MEETING OF THE
CANADIAN AMPHIBIAN AND REPTILE
CONSERVATION NETWORK
RÉSEAU CANADIEN DE CONSERVATION DES
AMPHIBIENS ET DES REPTILES**



**22 to 23 September 2007
Queen's University
Kingston Ontario Canada**

This year's M.C. Escher-style logo was inspired by the vivid colouration of the five-lined skink (*Plestiodon fasciatus*). The electric blue tail of newly hatched skinks probably functions in predation avoidance, since a dropped tail can easily distract a predator's attention and allow the skink to escape. With age, skinks lose their blue tail colour and their striped bodies fade from yellow and black to bronze and brown.

The five-lined skink is eastern Canada's sole lizard species and is listed as special concern. Ontario populations are at the northern limits of the species range. They are currently threatened by poaching for the pet trade as well as habitat loss.

The logo was designed by Roslyn Dakin, who studies sexual selection and patterns of animal colouration at Queen's University.

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A Message from the CARCNET/RÉCCAR Board of Directors

The Canadian Amphibian and Reptile Conservation Network (CARCNET/RÉCCAR; www.carcnet.ca) is a registered charity dedicated to preserving Canada's wildlife in its natural habitats. An organization that has been in existence for 17 years – albeit with various names – 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 on an occasional basis; we also award an annual scholarship for student work in herpetology
- 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 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. 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, and email updates on things such as 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 contact a current board member listed above.

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CANADIAN ASSOCIATION of HERPETOLOGISTS

ASSOCIATION CANADIENNE des HERPÉTOLOGISTES

Programme

SATURDAY 22 September, 2007

- ALL DAY Posters - Biosciences Atrium
- 0730-0815 COFFEE/REGISTRATION - Biosciences Atrium
- 0815-0830 Opening Remarks BIO 1101
- **SESSION 1 - PLENARY SESSION BIO 1101**
- 0830-0930 THE LONG EVOLUTIONARY HISTORY AND CHALLENGING FUTURE FOR FROGS, SALAMANDERS AND CAECILIANS - [Dr. Robert Carroll](#)
- 0930-0950 COFFEE
- 0950-1050 AMPHIBIANS, REPTILES, AND THE CHALLENGES OF MULTIPLE ENVIRONMENTAL STRESSORS: PALEOENVIRONMENTAL APPROACHES FOR TRACKING LONG-TERM CHANGES IN AQUATIC ECOSYSTEMS - [Dr. John Smol](#)
- **1050-1110 COFFEE**
- **SESSION 2 CRITICAL HABITAT BIO 1101** - CHAIR: Briar Howes, Parks Canada
- 1110-1130 IDENTIFYING CRITICAL HABITAT FOR BLANDING'S TURTLES (*EMYDOIDEA BLANDINGII*) AT A MILITARY BASE NEAR OTTAWA - [David C. Seburn](#)
- 1130-1150 IDENTIFICATION, CHARACTERIZATION AND SUBTERRANEAN DELINEATION OF CRITICAL MASSASAUGA (*SISTRURUS CATENATUS*) HIBERNATION HABITAT IN A PARTIALLY MINED PEATLAND FOR THE PURPOSES OF SPECIES RECOVERY - [Anne R. Yagi and R. Jon Planck](#)
- 1150-1210 PREDICTING SUITABLE HABITAT FOR THE NORTHERN PRAIRIE SKINK (*PLESTIODON SEPTENTRIONALIS*) IN MANITOBA - [Pamela L. Rutherford, Nicholas A. Cairns, Andrea S. Dransfield, and Dion J. Wiseman](#)
- **1210-1330 LUNCH (not provided)**
- **SESSION 3 RESTORATION, REPATRIATION, AND RECRUITMENT BIO 1101** - CHAIR: Sara Ashpole, University of Waterloo
- 1330-1350 TRIALS AND TRIBULATIONS OF CAPTURING, SUSTAINING AND CREATING STEWARDSHIP OPPORTUNITIES FOR REMNANT SAR POPULATIONS WITHIN AN URBAN LANDSCAPE. - [Michael P. Lawton, Javier Arata, Dave Ireland, Daniella Rambaldini, Ian McIntosh, Janet Wood, and Bob Johnson](#).
- 1350-1410 PUDDLES FOR PEEPERS: A COMMUNITY RESTORATION PROJECT TO CONSTRUCT AMPHIBIAN-BREEDING HABITAT IN SOUTH OKANAGAN, BC - [Sara L. Ashpole, Christine A. Bishop, and Stephen D. Murphy](#)
- 1410-1430 TOWARDS THE REPATRIATION OF MASSASAUGAS (*SISTRURUS CATENATUS*) TO THE OJIBWAY PRAIRIE IN WINDSOR, ONTARIO. - [Deborah D. Jacobs](#)
- 1430-1450 REPATRIATION OF MASSASAUGAS (*SISTRURUS CATENATUS*) TO THE OJIBWAY PRAIRIE IN WINDSOR, ONTARIO - [Paul D. Pratt, Karen Cedar, and Tom Preney*](#)
- 1450-1510 LANDSCAPE ECOLOGY OF AN AMPHIBIAN COMMUNITY: A STUDY OF RECRUITMENT SUCCESS, SOUTHERN QUEBEC - [Marie-Pier Prairie and David M. Green](#)
- 1510-1530 NORTH AMERICAN WATERFOWL MANAGEMENT PLAN PERMANENT BASIN AS AN EFFECTIVE TOOL FOR NORTHERN LEOPARD FROG (*RANA PIPIENS*) CONSERVATION - [Daniel Pouliot and Jean-Jacques Frenette">](#)
- **1530-1550 COFFEE**
- **SESSION 4 AMPHIBIAN STRESSORS BIO 1101** - CHAIR: Tana McDaniel, Canadian Wildlife Service

- 1550-1610 DOES CLIMATE LIMIT ANURAN DISTRIBUTIONS IN NOVA SCOTIA? - [Reid Tingley and Tom B. Herman](#)
- 1610-1630 DIRECT AND INDIRECT IMPACTS OF NUTRIENT ENRICHMENT ON AMPHIBIANS AND REPTILES - [Shane R. de Solla, Pamela A. Martin, Tana V. McDaniel, Karen E. Pettit, Christine A. Bishop, John E. Elliott, and John Struger](#)
- 1630-1650 EXPOSURE OF NORTHERN LEOPARD FROGS (*RANA PIPIENS*) TADPOLES TO AGRICULTURAL RUN-OFF IN AREAS WITH HIGH RATES OF TESTICULAR OOCYTES IN WILD FROGS - [Tana V. McDaniel, Pamela A. Martin, John Struger, Chris Marvin and Chris J.M. Kaloudas](#)
- 1650-1710 DO INTRODUCED TROUT AFFECT ABUNDANCE AND PATTERNS OF METAMORPHOSIS OF NATIVE AMPHIBIANS? - [Candra M.M. Schank, Cynthia A. Paszkowski, and William M. Tonn](#)
- 1710-1730 THE EFFECTS OF DENSITY MANIPULATION ON SIZE AND SURVIVAL OF *RANA SYLVATICA* TADPOLES: A FIELD STUDY - [Katherine Velghe and David M. Green](#)
- **1730-1900 POSTER SOCIAL Biosciences Atrium**
- **1930-2300 BANQUET Lower Ban Righ Dining Hall**

SUNDAY 23 September, 2007

- 0730-0830 COFFEE/REGISTRATION Biosciences Atrium
- 0820-0830 Opening Remarks/Announcements BIO 1101
- **SESSION 5 DIVERSITY AND GENETICS BIO 1101** - CHAIR: Stephen Lougheed, Queen's University
- 0830-0910 DIVERSITY HOTSPOTS, ALPHA, BETA AND GAMA DIVERSITY PATTERNS OF HERPERTOFAUNA FROM THE PACIFIC LOWLANDS OF WESTERN MEXICO AND THE PREDICTED EFFECTS OF GLOBAL WARMING ON AMPHIBIAN ENDEMICS - [Andrés García, Miguel A. Ortega-Huerta and Enrique Martínez-Meyer](#)
- 0910-0930 COMPARATIVE PHYLOGEOGRAPHY OF ANDEAN FROGS - [Daria Koscinski, Paul Handford and Stephen C. Lougheed](#)
- 0930-0950 PHYLOGEOGRAPHY OF THE WESTERN CHORUS FROG (*PSEUDACRIS TRISERIATA*) IN SOUTHERN QUÉBEC - [Sarah Noël, Nathalie Tessier and François-Joseph Lapointe](#)
- 0950-1010 CYTOPLASMIC VS NUCLEAR GENETIC DIVERGENCE ACROSS A HYBRID ZONE IN TOADS - [Jean-Sébastien Roy and David M. Green](#)
- **1010-1050 COFFEE + PHOTOGRAPH**

CONCURRENT SESSIONS – BIO 1101

- **SESSION 5 (cont'd) BIO 1101**
- 1050-1110 GENETIC DIVERSITY AND GENE FLOW WITHIN AND BETWEEN EASTERN FOXSNAKE (*ELAPHE GLOYDI*) POPULATIONS ACROSS ONTARIO - [Jeffrey R. Row, Anna Lawson, Carrie A. Mackinnon, Ronald J. Brooks, and Stephen C. Lougheed](#)
- 1110-1130 CONSERVATION GENETICS OF THE HIGHLY ENDANGERED PUERTO RICAN CRESTED TOAD (*PELTOPHRYNE LEMUR*) - [Kaela B. Beauclerc, Bob Johnson, and Bradley N. White](#)
- 1130-1150 GOVERNORS OF POPULATION SIZE CHANGE IN FOWLER'S TOAD, *BUFO (ANAXYRUS) FOWLERI*. - [David M. Green and Nicole Sanderson](#)

- **1150-1330 LUNCH (not provided)**
- **SESSION 6 SNAKE ECOLOGY BIO 1101** - CHAIR: Jeff Row, Queen's University
- 1330-1350 MOVEMENTS OF GREAT BASIN GOPHERSNAKES IN BC'S INTERIOR - [Kathleen E. White , Karen E. Hodges and Christine Bishop](#)
- 1350-1410 PLAYING FOR OVERTIME: IMMOBILITY DEFENCES IN SNAKES - [Patrick T. Gregory](#)
- 1410-1430 EXTREME COLOUR VARIATION WITHIN POPULATIONS OF THE COMMON GARTER SNAKE, *THAMNOPHIS SIRTALIS*, IN MANITOBA, CANADA - [Randall D. Mooj, Jonathan P. Wiens and Gary S. Casper](#)
- 1430-1450 THE ELLUSIVE EASTERN RIBBON SNAKE: METHODOLOGY, MOVEMENTS, AND HABITAT USE - [Tara L. Imlay and Thomas B. Herman](#)
- 1450-1510 ALLOCATION OF OFFSPRING SIZE AND SEX BY FEMALE BLACK RATSNAKES - [Gabriel Blouin-Demers and Patrick J. Weatherhead](#)
- **1510-1530 COFFEE**
- **SESSION 7 MONITORING BIO 1101** - CHAIRS: Josh Van Wieren, Parks and Heather Andrachuk, Environment Canada
- 1530-1550 LONG-TERM MONITORING OF THE THREATENED ALLEGHENY MOUNTAIN DUSKY SALAMANDER (*DESMOGNATHUS OCHROPHAEUS*) - [Isabelle Lefebvre, Mélanie Frenette and François-Joseph Lapointe](#)
- 1550-1610 DEVELOPMENT OF A HERPETOFAUNAL MONITORING PROGRAM FOR THE LAKE SUPERIOR BASIN: PRELIMINARY DETECTION PROBABILITIES IN LAKE SUPERIOR PROVINCIAL PARK: - [Ashley E. Spenceley , Stephen J. Hecnar, Alexis L McEwan, Darlene R. Hecnar, and Gary S. Casper](#)
- 1610-1630 LIVING ON A THIN LINE: LONG-TERM TRENDS IN POINT PELEE'S FIVE-LINED SKINK POPULATION - [Stephen J. Hecnar and Darlene R. Hecnar](#)
- 1630-1650 DECLINE IN THE PROPORTION OF ROAD-KILLED TURTLES OBSERVED IN EASTERN ONTARIO SINCE 2000: HAS CONSERVATION HAD SOME EFFECT? - [Frederick W. Schueler & Aleta Karstad](#)
- 1650-1710 PARKS CANADA'S MONITORING PROTOCOL FOR ASSESSING LANDSCAPE CHANGE USING ECOLOGICALLY SCALED LANDSCAPE INDICES – AN ONTARIO EXAMPLE FOCUSING ON HERPETOFAUNA - [Paul A. Zorn and Justin J. Quirouette](#)

CONCURRENT SESSIONS – BIO 1102

- **SESSION 8 TURTLE ECOLOGY BIO 1102** - CHAIR: Jackie Litzgus, Laurentian University
- 1050-1110 REPRODUCTIVE OUTPUT DEPENDS ON BODY CONDITION IN SPOTTED TURTLES (*CLEMMYS GUTTATA*) - [Jacqueline D. Litzgus, Frances Bolton, and Albrecht I. Schulte-Hostedde](#)
- 1110-1130 EVIDENCE FOR ANOXIA-TOLERANCE DURING OVERWINTERING IN BLANDING'S TURTLES (*EMYDOIDEA BLANDINGII*) - [Christopher B. Edge , Ronald J. Brooks, and Jacqueline D. Litzgus](#)
- 1130-1150 BLANDING'S TURTLE (*EMYDOIDEA BLANDINGII*) POPULATION STATUS IN BARREN MEADOW/KEDDY BROOK: A SUB-POPULATION VITAL TO THE SURVIVAL OF A SPECIES-AT-RISK. - [José Lefebvre and Tom B. Herman](#)
- **1150-1330 LUNCH (not provided)**
- 1330-1350 SELECTION FOR CHEMICAL, THERMAL AND PHYSICAL PROPERTIES OF OVERWINTERING SITES BY WOOD TURTLES (*GLYPTEMYS INSCULPTA*) AT THE SPECIES' NORTHERN RANGE LIMIT - [William F. Greaves and Jacqueline D. Litzgus](#)

- 1350-1410 COMPETITION OR REPRODUCTION? EVALUATING THE ECOLOGICAL ROLE OF TROPHIC MORPHOLOGY DIMORPHISM IN THE NORTHERN MAP TURTLE (*GRAPTEMYS GEOGRAPHICA*) - [Grégory Bulté and Gabriel Blouin-Demers](#)
- 1410-1430 OPPORTUNISTIC EXPLOITATION OF TURTLE EGGS BY *TRIPANURGA IMPORTUNA* (WALKER) (DIPTERA: SARCOPHAGIDAE) - [Ryan M. Bolton , Stephen A. Marshall and Ronald J. Brooks](#)
- 1430-1450 SPATIAL ECOLOGY OF THE COMMON MAP TURTLE (*GRAPTEMYS GEOGRAPHICA*) IN ST. LAWRENCE ISLANDS NATIONAL PARK - [Marie-Andrée Carrière and Gabriel Blouin-Demers](#)
- 1450 -1710 NO TALK SCHEDULED
- **1510-1530 COFFEE**
- **SESSION 9 DISEASE BIO 1102** - CHAIR: Lenny Shirose, OVC, University of Guelph
- 1530-1550 THE CANADIAN COOPERATIVE WILDLIFE HEALTH CENTRE AND DISEASE INVESTIGATION IN AMPHIBIANS AND REPTILES - [Ian K. Barker, G. Douglas Campbell, Leonard Shirose and Stéphane Lair](#)
- 1550-1610 PERSISTENCE AND PREVALENCE OF THE CHYTRID FUNGUS (*BATRACHOCHYTRIUM DENDROBATIDIS*) AT VARYING ELEVATIONS AND STAGES OF EPIDEMIC DECLINE IN PANAMA - [Vanessa L. Kilburn , David M. Green, Roberto Ibanez, Eldredge Bermingham Oris Sanjur](#)
- 1610-1630 TESTING TWO ASSUMPTIONS OF HOST PATHOGEN THEORY USING A VIRAL PATHOGEN OF AMPHIBIANS - [Amy L. Greer and James P. Collins](#)
- 1630-1650 EVIDENCE THAT AMPHIBIAN RANAVIRUSES ARE MULTI-HOST PATHOGENS, AND WHY IT MATTERS - [Danna M. Schock, Trent K. Bollinger, V. Gregory Chinchar, James K. Jancovich, and James P. Collins](#)
- 1650-1710 ANTHROPOGENIC INFLUENCE ON THE PREVALENCE OF RANAVIRUS AND CHYTRID FUNGUS (*BATRACHOCHYTRIUM DENDROBATIDIS*) IN AMPHIBIANS - [Valerie St-Amour and David Lesbarrères](#)
- **1710 - ????? SILENT AUCTION WRAP-UP BIO 1101**

MONDAY 24 September, 2007

All day FIELD TRIP to Queen's University Biological Station

CARCNET/RÉCCAR 2007 POSTERS

SATURDAY 22 September 2007 Biosciences Atrium

EFFECTS OF HABITAT FRAGMENTATION ON NORTHERN MAP TURTLES (*GRAPTEMYS GEOGRAPHICA*) ALONG THE TRENT-SEVERN WATERWAY, ONTARIO, CANADA - [Amanda M. Bennett and Jacqueline D. Litzgus](#)

MACRO-HABITAT USE OF THE WESTERN TOAD (*BUFO BOREAS*) FOR HIBERNATION - [Constance L. Browne , Cynthia A. Paszkowski and A. Lee Foote](#)

HOW IMPORTANT ARE ZEBRA MUSSELLS IN THE DIET OF NORTHERN MAP TURTLES: INSIGHTS FROM BIOENERGETICS AND STABLE ISOTOPES - [Grégory Bulté and Gabriel Blouin-Demers](#)

HOST SPECIALIZATION OF A GENERALIST PARASITE AND SEX DIFFERENCES IN SUSCEPTIBILITY TO INFECTION - [Oluwayemisi K. Dare , Steven A. Nadler and Mark R. Forbes](#)

ALBERTA'S NORTHERN LEOPARD FROG RECOVERY PROGRAM - [Kris Kendell and Dave Prescott](#)

USING GPS LOGGERS TO TRACK THE ENDANGERED BLANDING'S TURTLE (*EMYDOIDEA BLANDINGII*) IN NOVA SCOTIA. - [Peter Kydd , Norm Green, Jeffie McNeil and Tom Herman](#)

GROWTH DYNAMICS OF NOVA SCOTIA'S ENDANGERED BLANDING'S TURTLE, (*EMYDOIDEA BLANDINGII*), AND ITS' CONSERVATION IMPLICATIONS - [Michael Lawton , Michael Brobbel and Tom Herman](#)

AN ANALYSIS OF MORPHOLOGY, GROWTH RATES AND SURVIVAL IN POPULATIONS OF EASTERN FOX SNAKES (*ELAPHE GLOYDI*) WITH DIFFERING GENETIC DIVERSITY - [Rosamond E. Lougheed , Jeffrey R. Row, Anna Lawson, Carrie A. Mackinnon, Ronald J. Brooks and Stephen C. Lougheed](#)

STATUS OF MUDPUPPY (*NECTURUS MACULOSUS*) POPULATIONS IN THE SYDENHAM RIVER SYSTEM. - [Tana McDaniel, Pamela Martin, Glenn Barrett, Kim Hughes, and Lenny Shirose](#)

THE INFLUENCE OF DATA PARTITIONING ON BAYESIAN PHYLOGENETIC INFERENCE OF THE *LITHOBATES CATESBEIANA* SPECIES GROUP - [Anita H. Melnyk and Stephen C. Lougheed](#)

POPULATION GENETICS OF TWO WOODLAND AMPHIBIANS IN SOUTHERN QUEBEC IN RELATION TO LAND-USE HISTORY - [Shavonne J. Meyer and David M. Green](#)

THERMAL ECOLOGY OF THE STINKPOT TURTLE (*STERNOTHERUS ODORATUS*) AT THE NORTHERN OF ITS DISTRIBUTION - [Gabriel Picard and Gabriel Blouin-Demers](#)

DO DIFFERENT METHODS OF DETERMINING THERMAL PREFERENCE CHANGE INTERPRETATIONS OF THERMOREGULATORY STRATEGIES? - [Alana C. Plummer and Gabriel Blouin-Demers](#)

REPRODUCTIVE ECOLOGY OF A CENTRAL ONTARIO POPULATION OF SPOTTED TURTLES (*CLEMMYS GUTTATA*) - [Megan L. Rasmussen and Jacqueline D. Litzgus](#)

DEMOGRAPHY OF AN ISLAND POPULATION OF SPOTTED TURTLES (*CLEMMYS GUTTATA*) AT THE SPECIES' NORTHERN RANGE LIMIT - [Dan J. Reeves and Jacqueline D. Litzgus](#)

AMPHIBIANS AS INDICATORS OF CLIMATE CHANGE EFFECTS IN TERRESTRIAL WETLAND ECOSYSTEMS - [Walt Sadinski, Bruce D. Pauli, Mari Reeves, Dean G. Thompson, David Donald and Heather Andrachuk](#)

AMPHIBIANS OF THE DEHCHO AND SAHTU REGIONS OF THE NORTHWEST TERRITORIES, CANADA - [Danna M. Schock, Danny G. Allaire, Suzanne Carrière, Rob Gau, Glen Guthrie, Nicholas C. Larter, Richard Popko, Doug Tate, and Alasdair Veitch](#)

DOING THE STREETS: HERPS ON THE ROAD IN A RURAL ONTARIO VILLAGE, 2004-2006. - [Frederick W. Schueler](#)

STATUS OF SOUTHERN ONTARIO CHORUS FROGS - [Frederick W. Schueler](#)

LACK OF GEOGRAPHIC VARIATION IN SEXUAL SIZE DIMORPHISM IN PAINTED TURTLES (*CHRYSEMYD PICTA*) - [Sheila E. Smith and Jacqueline D. Litzgus](#)

ABSTRACTS

PUDDLES FOR PEEPERS: A COMMUNITY RESTORATION PROJECT TO CONSTRUCT AMPHIBIAN-BREEDING HABITAT IN THE SOUTH OKANAGAN, BC

Sara L. Ashpole^{1, 2,*}, Christine A. Bishop³, and Stephen D. Murphy⁴

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The Okanagan valley is under intensive urbanization and agricultural development, where 85% of the natural wetlands and riparian areas have been drained or altered. Intensive surveys for identified amphibian Species at Risk were conducted in the South Okanagan since 2003. Of 108 ponds inventoried, approximately 88% faced at least one impact resulting from human actions. This lowland valley landscape is offering a poor likelihood of survivorship for amphibian populations. Our goal is to establish a mosaic of fishless, non-contaminated wetlands while assuring securement through conservation agreements between private landowners and Ducks Unlimited Canada. The Puddles for Peepers has three main objectives, 1) habitat restoration and enhancement to increase the quality and quantity of habitats, 2) increased knowledge and appreciation of the species among the public and key stakeholders and increased support for and public participation in recovery action, and 3) monitoring of amphibian populations to evaluate recovery actions and success. Restoration sites were selected based on three main criteria: including close proximity to known breeding populations (< 500 m) and waterways (500 m), maximum distance from roadways (> 100 m), and maximum opportunity for public demonstration. In fall 2006, we constructed three new ponds and enhanced three existing wetlands. Ponds were located on either organic orchards (N = 2) or properties owned by Ducks Unlimited Canada (N = 4). Amphibians were detected in the spring 2007 at three of the sites, with spadefoots successfully metamorphosing at one of these sites. Over twenty community outreach events, such as native planting and BC Frogwatch training, were held to increase community stewardship. The inventory data collected to date is being modeled using

Geographical Information Systems to generate a predictive model that will identify the most suitable locations for construction of five new ponds and the enhancement of three ponds in 2007.

PLATFORM

THE CANADIAN COOPERATIVE WILDLIFE HEALTH CENTRE AND DISEASE INVESTIGATION IN AMPHIBIANS AND REPTILES

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The Canadian Cooperative Wildlife Centre/Centre canadien coopératif de la santé de la faune (CCWHC/CCCSF; <http://wildlife1.usask.ca/>) is a national virtual centre, supported federally-provincially, under the Canadian National Wildlife Disease Strategy (http://www.cws-scf.ec.gc.ca/cnwds/index_e.cfm). Dispersed at Canada's veterinary colleges and the Centre for Coastal Health, affiliated faculty and staff deliver their programme in collaboration with federal and provincial wildlife, environmental, agricultural and public health agencies, university biologists, and the public. Surveillance for disease in free-ranging vertebrates of all taxa is a core activity. Detected by 'scanning' surveillance, incidents of wildlife mortality are investigated using gross and microscopic pathology and biological, molecular and chemical assays to identify viral, bacterial, fungal, protistan, metazoan, toxic and physical agents, to reach a diagnosis. Incidents and diagnostic outcomes are recorded in a national database, geocoded for mapping, analyzed, and communicated to managers, policymakers and the public. Unlike active surveillance, which seeks 'known' agents of disease in a population, scanning surveillance may detect unknown or emerging agents. CCWHC/CCCSF personnel have experience with diseases of fish, amphibians and reptiles, and access to an array of diagnostic modalities in regional, national and international diagnostic or reference laboratories. The cost of investigating spontaneous mortalities/outbreaks is borne by CCWHC/CCCSF. But a surveillance programme is only as good as its 'eyes and ears' in the field. Hence, we encourage amphibian and reptile biologists to develop and exploit mutually rewarding relationships with CCWHC/CCCSF regional centres.

PLATFORM

CONSERVATION GENETICS OF THE HIGHLY ENDANGERED PUERTO RICAN CRESTED TOAD (*PELTOPHRYNE LEMUR*)

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The Puerto Rican crested toad (*Peltophryne lemur*) is the only bufonid endemic to Puerto Rico. Historically found in nine scattered locations around Puerto Rico and on Virgin Gorda, it is currently represented by a single wild and two captive populations. The main factors contributing to its decline are habitat alteration, inundation of coastal breeding ponds during tropical storms, and, potentially, predation and competition by the introduced marine toad (*Bufo marinus*). Recovery efforts for this species have been extensive, including captive breeding of both northern and southern populations, reintroduction of >90 000 tadpoles, habitat restoration and construction of breeding ponds, and public outreach and education. To guide future conservation efforts, genetic variation and differentiation was assessed by profiling individuals from the three groups at the mitochondrial control region and six microsatellite loci developed for this study. Only two mitochondrial haplotypes were found (sequence divergence = 1.66%), with one localized to each of the southern and northern populations. Moderate genetic variation exists at microsatellite loci in all three groups, with no evidence of inbreeding as assessed by heterozygote deficiency. The captive southern population has not diverged substantially from the only remaining wild population on the south coast of Puerto Rico at either mitochondrial or nuclear loci ($F_{ST} = 0.028$). In contrast, qualitative and quantitative analyses of the microsatellite data suggest that northern and southern populations have been separated for some time, with little overlap in alleles at five of six loci ($F_{ST} = 0.313-0.340$). Despite this strong differentiation, the two lineages are no more divergent than many populations of other amphibian species. As the northern breeding colony is on the verge of extirpation, it is recommended that a third colony be established in which northern and southern individuals are bred together, in order to preserve any northern adaptive traits that may exist.

PLATFORM

EFFECTS OF HABITAT FRAGMENTATION ON NORTHERN MAP TURTLES (*GRAPTEMYS GEOGRAPHICA*) ALONG THE TRENT-SEVERN WATERWAY, ONTARIO, CANADA

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Freshwater turtles represent a major conservation challenge within Ontario, where six out of the eight extant species are at risk. Where anthropogenic influence has disrupted natural movements, turtle populations in smaller, less suitable habitat may face extinction. At longer time scales, isolated populations may suffer the deleterious effects of inbreeding. Although Canadian populations of Northern Map Turtles (*Graptemys geographica*) are listed as "Special Concern" by COSEWIC, little is known about their ecology or how they have been affected by extensive anthropogenic disturbances within their habitat. Information about populations along the 386 km Trent-Severn Waterway is unavailable in the published literature. The goal of our project is to determine whether the lock system along the waterway impacts turtle movements and creates a barrier to gene flow. We collected tail tips from captured turtles (N = 81) for future genetic analysis. We also attached radio transmitters to turtles in two study areas – a high lock density area on the Trent River from Trenton (Lock 1) to Frankford (Lock 6), Ontario (N = 7), and a low lock density area on the Otonabee River from Rice Lake to Peterborough, Ontario (N = 12). Lockmasters had previously reported seeing turtles in the locks; though it was unknown whether they were able to use the locks to move between reaches. Preliminary results indicate higher numbers of Northern Map Turtles in the waterway than expected. In addition, one incidence of a radioed female turtle moving past Lock 2 (Sydney) was recorded. Some high lock

density areas, though generally subject to more severe human impacts than less disturbed portions of the waterway, appear to support a large number of map turtles. Further study on these populations is critical to understanding their status and for the creation of effective conservation strategies.

POSTER

ALLOCATION OF OFFSPRING SIZE AND SEX BY FEMALE BLACK RATSNAKES

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How females allocate resources to each offspring and how they allocate the sex of their offspring are two powerful potential avenues by which mothers can affect offspring fitness. Previous research has focussed extensively on mean offspring size, with much less attention given to variance in offspring size. Here we focussed on variation in offspring size in black ratsnakes (*Elaphe obsoleta*). We collected and hatched 105 clutches (1283 eggs) over 9 years. We predicted that females should lay larger eggs, or more variable eggs, when the environment is less predictable. We also predicted that females laying early or laying larger eggs should produce mostly sons because adult males are larger than adult female ratsnakes. The largest hatchling was more than twice the length and almost four times the mass of the smallest hatchling. Variation in offspring size was itself highly variable, with CVs in offspring mass among clutches ranging from 1% to 25%. With one exception, the variables we expected should influence variation in offspring size had little effect. We found that clutch size increased with maternal size and that egg size decreased with clutch size, but we found no evidence that variance in egg size among clutches increased as the season progressed or that females increased the mean size of their offspring the later in the season they laid their eggs. Females in better condition after they finish laying their eggs did produce larger eggs. There was no relationship between within-clutch variation in egg size and laying date or mean egg size. Finally, sex ratio did not vary with mean egg size or hatching date. Given evidence that offspring size in snakes affects survival, selection should reduce variation in offspring size unless that variance enhances maternal fitness and yet we found little support for hypothesized advantages of varying offspring size.

PLATFORM

OPPORTUNISTIC EXPLOITATION OF TURTLE EGGS BY *TRIPANURGA IMPORTUNA* (WALKER) (DIPTERA: SARCOPHAGIDAE)

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Tripanurga importuna (Walker, 1849) is a sarcophagid fly whose larvae often occur in nests of freshwater turtles. We investigated this sarcophagid fly to determine whether it is an opportunistic scavenger or a potential predator of eggs, embryos, and hatchlings of the spiny softshell (*Apalone spinifera* LeSueur, 1827). Fly infestation of spiny softshell nests can occur at any time between oviposition and hatching, but estimates based on larval size and development time, along with observations of adult fly activity, suggest that female sarcophagids deposit larvae over the nest primarily during hatching. Observed temperature variance within the turtle clutch mass and physiological/developmental differences among eggs may result in asynchronous hatching and chemical cues associated with early hatching may attract adult flies. Egg position within the nest affects embryo hatching success independent of fly infestation while also affecting fly infestation. *Tripanurga importuna* is a habitat specialist able to find and develop in carrion buried in sand, but it is a food opportunist able to develop on other buried carrion as well as turtle eggs. *Tripanurga importuna* maggots in turtle nests preferentially scavenge necrotic tissue including damaged turtle eggs but will opportunistically prey upon live embryos and hatchlings under some circumstances.

PLATFORM

MACRO-HABITAT USE OF THE WESTERN TOAD (*BUFO BOREAS*) FOR HIBERNATION

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Protecting hibernation sites is an important step to protecting western toad (*Bufo boreas*) populations. The province of Alberta is developing guidelines for industrial activities near toad hibernation sites. However, locating hibernation sites remains a challenge. Many companies fail to locate hibernation sites and no protection is provided. A simple method for identifying potential hibernation sites is needed. Our objective was to determine the macro-habitat selection for hibernation by western toads. We radio-tracked 38 western toads to their hibernation sites at two study areas (one in the aspen parkland eco-region and the other in the boreal forest) in 2004 to 2006 and recorded the habitat types used. Available habitat was calculated from land-cover maps that we created from aerial photographs using ArcMap 9. We created a resource selection function that compared the proportion of habitat used to that available to determine macro-habitat selection by western toads within each of our study areas. Conifer stands appear to be very important for hibernation sites for western toads. The majority of toads hibernated in conifer stands in both the aspen parkland (53 %) and boreal (79 %) sites. The affinity for conifer stands likely reflects microhabitats that toads were selecting within these stands - mossy peat hummocks, red squirrel burrows, and cavities under spruce trees. Our model needs refinement before it can be used effectively, but provides clues to areas to survey for toads preparing for winter. We hope this study will begin to help managers identify and select suitable areas for protection.

POSTER

COMPETITION OR REPRODUCTION? EVALUATING THE ECOLOGICAL ROLE OF TROPHIC MORPHOLOGY DIMORPHISM IN THE NORTHERN MAP TURTLE (*GRAPTEMYS GEOGRAPHICA*)

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Female-biased sexual size dimorphism (SSD) and trophic morphology dimorphism (TMD) regularly co-occur in animals. While fertility selection usually explains female-biased SSD, the competition hypothesis and the reproductive role hypothesis have both been used to explain TMD. According to the reproductive role hypothesis, TMD evolved to increase energy intake in females to accommodate their greater reproductive allocation. In this study, we tested whether the competition hypothesis or the reproductive role hypothesis could explain TMD in the common map turtle, a durophagous species exhibiting strong female-biased SSD and TMD. We determined the importance of intersexual competition and the role of trophic morphology on energy acquisition and reproductive allocation. We used prey hardness reconstruction and stable isotope analysis to evaluate intersexual competition and found broadly overlapping trophic niches between males and females. However, we found that maximum hardness of consumed prey increased with head width (HW) in females but not in males. We also found that in females HW corrected for body size explains 28% of the variation in body condition and 9 % of the variation in mean hatchling mass. In contrast, in males HW corrected for body size explained only 12 % of the variation in body condition. We interpret these results as evidence that TMD has evolved in map turtles to increase energy intake in females in response to fertility selection favouring larger (and thus more energetically costly) body size. We conclude that in our population TMD is more consistent with the reproductive role hypothesis than with the competition hypothesis.

PLATFORM

HOW IMPORTANT ARE ZEBRA MUSSELS IN THE DIET OF NORTHERN MAP TURTLES: INSIGHTS FROM BIOENERGETICS AND STABLE ISOTOPES.

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In several lakes and rivers, zebra mussels have become the most abundant invertebrate. Northern map turtles possess trophic specializations to feed on mollusks and they consume zebra mussels. However, the importance of this new prey item in the diet of the Northern map turtle is unknown. In this study, we used stable isotopes analyses 1) to quantify the flow of energy from zebra mussels to northern map turtles and 2) to infer the contribution of zebra mussels to map turtle biomass. We then build a bioenergetic model to estimate the annual intake of zebra mussels by common map turtles in Lake Opinicon, Ontario, Canada. Stable isotopes analyses revealed that zebra mussels support 38 % of the map turtle biomass. We estimated that map turtles consume between 0.44 and 4.75 tons of zebra mussels annually. Females are responsible for 95% of the zebra mussel biomass ingested. To investigate potential demographic impacts of zebra mussels on map turtles, we compared the mean mass

of hatchlings produced by females from Lake Opinicon prior to the invasion of zebra mussels (1978) to the mean mass of hatchlings from 2005, but found no difference. Our study shows that zebra mussels are an important energy source for the northern map turtle. The impacts of this diet shift on northern map turtles remain to be investigated.

POSTER

SPATIAL ECOLOGY OF THE COMMON MAP TURTLE (*GRAPTEMYS GEOGRAPHICA*) IN ST. LAWRENCE ISLANDS NATIONAL PARK

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Understanding the spatial ecology and habitat use of declining species is essential for their management and successful recovery. I examined movement patterns and habitat selection of map turtles (*Graptemys geographica*), a species designated as Special Concern by COSEWIC, in St. Lawrence Islands National Park. Using radio-telemetry, 31 map turtles were tracked regularly from May to September in 2005 and in 2006. Movement patterns and home range size were examined using location data. Adult females moved longer distances and had larger home ranges than juvenile females and males. The longest distances moved by adult females occurred during nesting excursions. Examining movements allowed for portions of the critical habitat to be located (nesting sites, hibernacula). The data on movements will allow St. Lawrence Islands National Park to mitigate development plans and regulate visitor impacts on these sites. In addition, habitat selection at both the microhabitat and macrohabitat scales was investigated. Since conservation of declining species directly entails habitat management, understanding the relationship between these animals and their habitat becomes the first step for their successful recovery. Map turtles generally avoided deep water (>2 m) and selected home ranges in waters <1 m deep with significantly more natural than developed shoreline. Adult females used deep water more often and males preferred areas with surface cover. Management effort should implement regulations concerning further shoreline development.

PLATFORM

THE LONG EVOLUTIONARY HISTORY AND CHALLENGING FUTURE FOR FROGS, SALAMANDERS AND CAECILIANS

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Among the longest standing problems involving the evolution of terrestrial vertebrates are the ancestry and interrelationships of frogs, salamanders, and caecilians. Recent discoveries involving developmental similarities between salamanders and the larvae of Paleozoic amphibians, the ears of frogs and labyrinthodonts, and Lower Jurassic caecilians with legs help to establish their affinities with Palaeozoic families. The fossil record also demonstrates the capacity of these animals to survive the most cataclysmic periods of extinction in the history of terrestrial vertebrates.

PLENARY

HOST SPECIALIZATION OF A GENERALIST PARASITE AND SEX DIFFERENCES IN SUSCEPTIBILITY TO INFECTION.

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Host specialization by parasites and host tradeoffs in investment in immune defence are two major sources of variation in patterns of parasitism. For parasites with access to few host species, preferences for one host species over another can lead to better establishment and reproductive success of specialized parasites. Host specialization can lead to the development of host races or sibling species. As well, different life history strategies adopted by sexes can produce differential tradeoffs between investment in immune function and growth/development, thereby leading to variation in parasite infection. We examine the relationship between parasite specialization and host sex under controlled experimental conditions. Metamorphs of Northern Leopard frogs (*Lithobates pipiens*) were reared in outdoor mesocosms and exposed to infections from two host species sources (*L. pipiens*-conspecific and Wood Frogs, *L. sylvaticus*-heterospecific). Both prevalence and mean abundance of infection in metamorphs exposed to worms from different host species sources were higher in metamorphs exposed to worms from conspecific hosts; this was observed in both male and female metamorphs. Furthermore, adult female worms were larger if they originated from *L. pipiens* hosts. Together, the observed higher establishment and reproductive output point towards the development of host specificity in *R. ranae*. Preliminary examination of rDNA sequences support the existence of sibling species in these two hosts. Male *L. pipiens* metamorphs developed faster, as compared with female metamorphs. We also found a tendency for male metamorphs to carry higher burdens (if infected with worms from conspecific host sources), demonstrating the potential for a relationship between host sex and susceptibility to infection that is driven by differential investment in developmental rate. Parasite specificity may amplify sex differences in susceptibility to infection.

POSTER

DIRECT AND INDIRECT IMPACTS OF NUTRIENT ENRICHMENT ON AMPHIBIANS AND REPTILES

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Anthropogenic nutrient enrichment of terrestrial ecosystems is a hallmark of modern agriculture, and is responsible for the large increases in productivity in food production since the agricultural revolution. It is also responsible for eutrophication of both aquatic and terrestrial habitats, primarily due to excessive nitrogen and phosphorus loadings. Nutrient loading can affect herptile populations directly through changes in survivorship, or indirectly through alterations in habitat quality. We present data from both manipulative and mensurative field exposures, as well as laboratory exposures. Amphibian eggs raised in cages within agricultural sites in the lower Fraser River valley (BC) had lower survivorship than those in cages within nearby reference sites. There were clear differences in water chemistry, such as higher ammonia, phosphate and BOD at the agricultural sites. Reptiles may also be exposed to fertilizers in terrestrial ecosystems. Turtle embryos that were exposed via soil in the laboratory to nitrogenous fertilizers experienced reduced hatching success and growth, albeit only at high concentrations, although eggs exposed in agricultural fields (Ontario) to similar fertilizers appeared to be unaffected. For both these amphibian and reptile studies, there were clear differences in the potency of fertilizers between the laboratory and field exposures, even given identical substrates. Our knowledge of indirect effects of nutrient loading on reptiles and amphibians is weaker than our knowledge of overt toxicity of these compounds. There is a possibility, yet unexplored, that nutrient loading may limit the distribution of hypoxia intolerant turtles by restricting available habitat during hibernation in the northern climates. Also, we present extensive field measurements of ammonia, nitrates, phosphates and other compounds by the (Ontario) Provincial Water Quality Monitoring Network, and Environment Canada. These data can be used to estimate the relative potential of impacts of nutrient loadings on a geographic scale.

PLATFORM

EVIDENCE FOR ANOXIA-TOLERANCE DURING OVERWINTERING IN BLANDING'S TURTLES (*EMYDOIDEA BLANDINGII*)

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Two overwintering strategies have been described for turtles: anoxia-tolerance and anoxia-intolerance. Those species that survive in oxygen-limited environments can overwinter in standing rather than flowing water, or bury themselves in the substrate. Anoxia-intolerant species are restricted to habitats that provide high levels of dissolved oxygen, such as flowing water. At the northern periphery of their range, turtles spend up to six months in hibernation. During this period it is not possible to acquire oxygen from the atmosphere due to ice and snow cover, and only limited oxygen can be obtained from the aquatic environment via extra-pulmonary routes. The result is an increase in lactic acid concentrations in blood and muscle tissue, which can make turtles lethargic and susceptible to predation. Blanding's Turtles (*Emydoidea blandingii*) are thought to be anoxia-tolerant, as the species has been reported to use a variety of habitats to overwinter; however, the overwintering strategy of the species has not been directly tested. We hypothesized that Blanding's Turtles would be anoxia-tolerant and predicted that they would use habitats that are low in dissolved oxygen for overwintering. From December to April we monitored dissolved oxygen concentrations once monthly and temperature using iButton data loggers every three hours at seven Blanding's Turtle locations

and 24 random locations in three wetland types in Algonquin Provincial Park. Water and substrate depth and habitat structure were also noted at all locations. Sites used by our turtles were lower in dissolved oxygen compared to random sites and were lower than values reported for hibernation sites used by other turtle species, indicating anoxia-tolerance in Blanding's Turtles.

PLATFORM

DIVERSITY HOTSPOTS, ALPHA, BETA AND GAMMA DIVERSITY PATTERNS OF HERPERTOFAUNA FROM THE PACIFIC LOWLANDS OF WESTERN MEXICO AND THE PREDICTED EFFECTS OF GLOBAL WARMING ON AMPHIBIAN ENDEMICS

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Here we determine diversity hotspots, alpha, beta and gamma diversity of the herpetofauna from the Pacific lowlands and adjacent valleys in western Mexico and the predicted effects of global warming on the diversity hotspots distribution of endemic amphibian species under three predicted scenarios (10, 50 and 80 years), all based on the results of modeling species spatial distributional patterns through GARP analysis at 1km² resolution. We also compare such predictions with the distribution of protected areas and intact seasonally tropical dry tropical forests. A total of 301 reptiles and amphibian species occur in the study area accounting for a third of the Mexican herpetofauna, and recording high levels of endemism and endangerment. Hotspots of herpetofauna species richness and endemism were mainly located in coastal Jalisco, Colima, Guerrero, and Oaxaca. Similar latitudinal trends of all scales of diversity were observed in all groups. Alpha and gamma responded inversely to latitude whereas beta showed a high latitudinal fluctuation due to the high number of endemic species. Alpha and gamma showed a strong correlation in all groups. Beta diversity is an important component of the herpetofauna distribution patterns as a continuous source of species diversity throughout the region. There is a dramatic reduction of geographic areas and hotspots of endemic amphibians mainly under the next 50 and 80 years global warming scenarios. There is a minimum correspondence of the distribution of the protected areas and tropical dry forest with hotspots identified from the actual and future scenarios.

PLATFORM

SELECTION FOR CHEMICAL, THERMAL AND PHYSICAL PROPERTIES OF OVERWINTERING SITES BY WOOD TURTLES (*GLYPTEMYS INSCULPTA*) AT THE SPECIES' NORTHERN RANGE LIMIT

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Northern vertebrate ectotherms are faced with the challenge of seeking refuge from harsh winter conditions for a large portion of their annual activity cycle. The objective of this study was to assess physical, chemical and thermal properties of overwintering sites used by a population of wood turtles (*Glyptemys insculpta*) located at the species' northern limit. We hypothesized that optimal overwintering sites may be limiting and that communal overwintering and site fidelity would therefore be observed. We also predicted that turtles would select overwintering sites that had high DO concentrations and consistent thermal regimes throughout the winter. Physical structure selection was assessed by mapping out all structural features (e.g. root balls, log jams), depth contours, and sediment types along a 1.5 km stretch of river that was considered to be available to turtles (N = 8) outfitted with radio-transmitters. Temperature selection was assessed using data loggers (iButtons) on turtles and temperature stations located at various depths and in structures within the river and in other riparian habitats (e.g. ephemeral pools, oxbows). Dissolved oxygen (DO) was measured at each temperature station and turtle location throughout the winter. Radiotelemetry was used to assess winter activity. We found that wood turtles were relatively active with a mean winter home range size of 3.2 m². Wood turtles overwintered in the river which had colder (~0°C) and more stable temperatures, and provided higher DO concentrations (86.3%) compared to adjacent riparian habitats. Turtles used structure based on availability but structure was used in only 40% of radio-locations. Communal overwintering and site fidelity were not observed; therefore, we suggest the river habitat is important for overwintering, but hibernacula within the river are not limiting. These results are important for recognizing hibernacula as critical habitats in the north where a large portion of the species' annual life cycle is spent overwintering.

PLATFORM

GOVERNORS OF POPULATION SIZE CHANGE IN FOWLER'S TOAD, *BUFO (ANAXYRUS) FOWLERI*.

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We previously presented an hypothesis based on differential growth rates and the timing of sexual maturity to explain why Fowler's toads tend to be smaller in size when abundance is high. Analysis of 20 years' data on body sizes of Fowler's toads at Long Point, Ontario, from 1988 – 2007 inclusive, shows that the predicted inverse correlation between body sizes of juveniles *versus* adults cannot be demonstrated. The hypothesis therefore has little support. Instead, we find that both the abundance and body size of juveniles and adults of the same year are well correlated. This indicates that environment factors affect the growth and survival of all post-metamorphic individuals in a similar direction. Over the two decades' of study, there was, however, an exception. In 1997, the relative number of juvenile toads was anomalously high, leading to a cohort effect extending over subsequent years. Reproduction in 1996 appears to have been unusually successful, for reasons that cannot be determined. The cohort effect is in conformity with Alford and Richards' 1999 boom-and-bust model of amphibian population growth but in this time-series it is clearly an exception and not the rule. The variable dynamics governing amphibian population size and demographics can only be detected through analysis of long time-series of information.

PLATFORM

TESTING TWO ASSUMPTIONS OF HOST PATHOGEN THEORY USING A VIRAL PATHOGEN OF AMPHIBIANS

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In theory, the manner in which pathogens are transmitted will have different effects on host populations. At one extreme, a host species will not go extinct if the pathogen is transmitted in a density dependent fashion, as is the case for influenza in humans. But, if transmission is independent of density, like many sexually transmitted diseases, or the pathogen has a reservoir, as for avian malaria in Hawaii, extinction may result. There are few empirical tests of these generalizations despite the importance of understanding emerging infectious diseases and how pathogens affect species richness and diversity. I used an *Ambystoma tigrinum* – *Ambystoma tigrinum* virus (ATV) model system to test basic assumptions of host-pathogen theory related to disease transmission dynamics. I found that the current diagnostic test for ATV infections underestimates the disease's true prevalence. Field habitats showed more fragmentation when vegetation was sparse and ATV transmission was higher in sparsely vegetated ponds because individual contact rates increased. ATV transmission in larvae also saturated at high densities, resulting in a non-linear transmission rate. In some years epidemics occurred in widely separated habitats. Environmental stochasticity in the form of winter precipitation and not dispersal synchronized these epidemics. Empirical tests of disease models at the population level can identify populations with transmission dynamics putting them at risk for pathogen-induced extinction. For example, disease is one likely cause of late twentieth century global amphibian declines. Theory predicts that populations with density dependent disease transmission are not at risk of pathogen induced extinction. In contrast, the most likely explanation for the enigmatic decline of some amphibian populations infected with the chytrid fungus, *Batrachochytrium dendrobatidis*, may be disease transmission that is not density dependent. These results highlight the importance of including host-pathogen interactions as an element of basic theoretical and empirical research in ecology and conservation.

PLATFORM

PLAYING FOR OVERTIME: IMMOBILITY DEFENCES IN SNAKES

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Most studies of anti-predator behaviour in animals focus on avoidance of capture, but, given the common occurrence of injuries in many species, escapes from predators' clutches apparently do occur. Once caught, an individual's options obviously are limited, but the possibilities nonetheless range from active counter-aggression to inactive deception. Studies of anti-predator behaviour of snakes generally are hampered by lack of natural observations of attacks on snakes by real predators, so responses to capture by humans are usually used as surrogates. Surprisingly, however, many species of snakes typically do not bite when caught, but adopt more passive behaviour. One example of such behaviour is death-feigning, which is spottily distributed across various taxa of snakes. At a study site in southern England, about 2/3

of captured grass snakes (*Natrix natrix*) exhibit some degree of death-feigning, which often involves voluntary supination and is stimulated by handling. Although death-feigning is unusual behaviour, it is best viewed as an elaboration of simple tonic immobility, which is widespread in nature. For example, garter snakes (*Thamnophis*) often remain immobile for some time following routine handling. In a study of this behaviour in *Thamnophis elegans* in British Columbia, 24% of captured snakes remained immobile for minimum times of 10-600 s following handling. Of these, half remained supine when placed in that position. Immobility and supination were most frequent in gravid females; presumably, the reduced locomotory capabilities of gravid females sometimes force them into alternative anti-predator tactics rather than immediate attempts to flee. At first glance, immobility in the face of extreme danger seems maladaptive, but a review of the literature suggests that it can buy time to escape from predators that do not kill and eat their prey immediately.

PLATFORM

LIVING ON A THIN LINE: LONG-TERM TRENDS IN POINT PELEE'S FIVE-LINED SKINK POPULATION

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Understanding the factors that determine the abundance and distribution of organisms is a fundamental goal in ecology and conservation biology. Contemporary ecologists recognize that these factors can operate on different spatial and temporal scales. Unfortunately, the dearth of long-term studies hampers our ability to fully understand population dynamics. We studied the patterns of relative abundance and spatial dynamics of the 'endangered' five-lined skink, *Eumeces (Plestiodon) fasciatus*, over the past 18 years at Point Pelee National Park, ON. This isolated population occupies a thin linear stabilized dune habitat. Skinks spend most of their time under woody debris which provides a suitable microclimate for refuge and nest sites. We conducted visual surveys during the peak of skink activity in each year to document population trends and to determine factors affecting the population. Abundance fluctuated drastically over time and was largely influenced by the quantity and quality of woody debris. Skinks show aggregated dispersion patterns throughout the park but these patterns shift annually as individuals track available debris. Park-wide distribution also reflects historical habitat loss resulting from catastrophic storms. Skinks are capable of co-existing with humans but cannot tolerate movement, collection and breakage of woody debris microhabitat. Rapid colonization of woody debris placed for habitat restoration has increased skink numbers. Abundance is also significantly and negatively correlated with lake water level. Other factors potentially affecting the population include raccoon predation, illegal collection, road mortality, and chemical contamination. Because of the nature of fluctuations in abundance, short-term analyses reveal conflicting trends depending upon which years are viewed. Long-term time series analysis does not indicate any trend but population viability analysis using field-derived parameters indicates that the population still carries considerable risk of extinction. Our study highlights the importance of long-term continuous studies to understand populations in dynamic habitats and to manage species at risk.

PLATFORM

THE ELLUSIVE EASTERN RIBBON SNAKE: METHODOLOGY, MOVEMENTS, AND HABITAT USE

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The Eastern Ribbon Snake (*Thamnophis sauritus*) is fairly common throughout most of its range. However, at the northern limit of the range, the highly disjunct Nova Scotia population has been listed as Threatened federally (SARA) and provincially (NS Endangered Species Act). Despite its common status, few studies have focused on the habitat requirements and movement patterns of this species, probably due in part to its cryptic nature. The large knowledge gap surrounding habitat use and movement patterns has made identifying the appropriate actions for protection and recovery of the species a challenge. In 2006, a high density site of Eastern Ribbon Snakes was identified on Molega Lake, which also supports a high density of lakeshore cottages. We have tested the effectiveness of using external radio-transmitters, fluorescent powder tracking, and visual surveys to obtain information on habitat use and movement of Ribbon Snakes at this site. Several difficulties were encountered during radio-transmitter attachment, including the loss of transmitters within 24 hrs of attachment and impaired movement in some individuals. Powder tracking and visual surveys provided fewer logistical difficulties, but have inherent biases. Despite difficulties with methodology, we have managed to collect information on movement and habitat use of Ribbon Snakes during various stages of their life history at a site experiencing considerable human disturbance. Additionally, work at the site has generated public interest in the species and provided significant stewardship opportunities.

PLATFORM

TOWARDS THE REPATRIATION OF MASSASAUGAS (*SISTRURUS CATENATUS*) TO THE OJIBWAY PRAIRIE IN WINDSOR, ONTARIO.

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The Ojibway population of massasaugas (*Sistrurus catenatus*) is subdivided amongst a remnant patchwork of isolated tallgrass prairie-oak savannah habitat within the urban environment of Windsor and LaSalle, Ontario. In autumn 2002, the Massasauga Recovery Team became aware that a prairie remnant containing active-season habitat and hibernacula was scheduled for development. Legal and policy protection were insufficient at the time to conserve the habitat from impending destruction. To protect the snakes and the potential genetic diversity they represented within the small (<100) population, the Recovery Team searched the site and removed four massasaugas. Aware that relocation of adults is detrimental, the rescued snakes were taken to the Toronto Zoo for temporary housing. Two female massasaugas were gravid at the time of rescue and the young were born in captivity in summer 2003. Presented with this new opportunity, an options analysis was conducted. An experimental repatriation of the young snakes to suitable habitat within the Ojibway Prairie Complex offered the greatest conservation benefit to the population. At 92 ha, Ojibway Prairie Provincial Nature Reserve (OPPNR) was

deemed the most appropriate site as it had supported massasaugas until the 1970s. Suitable massasauga habitat is actively managed at OPPNR and the historic threat of persecution has been alleviated through community-based outreach and education. This repatriation effort would provide a unique opportunity to determine whether repatriation from captive-born stocks is a viable mitigation measure for declining snake populations. The process of repatriating venomous snakes to a Provincial Park in an urban environment required three years of hard work and perseverance by various project partners just to prepare for the release in June 2006. Addressing partners' differing interests and priorities was a significant challenge and lessons learned throughout this process on communication, negotiation and compromise should prove invaluable to others undertaking conservation projects of this nature.

PLATFORM

ALBERTA'S NORTHERN LEOPARD FROG RECOVERY PROGRAM

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The northern leopard frog (NLF) (*Rana pipiens*) has suffered dramatic population declines in many parts of its range in Alberta. Although little studied, the decline in Alberta does not appear to be part of a natural cycle. Habitat loss is arguably the most pervasive threat to NLF populations in Alberta. Degraded water quality, disease, drought and climate change may be other limiting factors affecting NLFs in Alberta. The species' reduced area of occupancy and fragmented populations have led to its listing as Threatened under Alberta's *Wildlife Act* in 1996, and reaffirmation in 2003. Subsequently, in 2004, the Minister of Alberta Sustainable Resource Development (ASRD) established the Alberta Northern Leopard Frog Recovery Team (ANLFRT) and a recovery plan was drafted and approved by the Minister in 2005. The plan describes strategies and actions necessary for achieving the provincial goal of a "well-distributed, self-sustaining population of NLFs throughout their historical range in Alberta". Alberta Fish and Wildlife is the lead agency overseeing the recovery of the NLF in Alberta. The Alberta Conservation Association (ACA) is a member of the recovery team and is involved in the delivery of several strategies and actions outlined in the plan. The ACA is playing a key role in the implementation of stewardship projects involving landowners, land-managers and producers, which benefit the NLF. The ACA is also involved in genetic research project that will help guide future NLF recovery efforts (i.e., reintroductions), and is currently working on a collaborative project with the University of Alberta involving the genetic variation in NLF populations in Alberta. The identification of NLF reintroduction sites, population inventories and monitoring are other recovery activities in which the ACA is involved with, in partnership with Alberta Fish and Wildlife.

POSTER

PERSISTENCE AND PREVALENCE OF THE CHYTRID FUNGUS (*BATRACHOCHYTRIUM DENDROBATIDIS*) AT VARYING ELEVATIONS AND STAGES OF EPIDEMIC DECLINE IN PANAMA

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Recently global amphibian declines have received much scientific attention. Habitat destruction was once cited as the major limiting factor for amphibians, but recent evidence shows that amphibians living in pristine, montane regions of the tropics are subject to the majority of declines and extinctions. It is thought that a disease outbreak, caused by the vertebrate chytrid fungus *Batrachochytrium dendrobatidis*, can be implicated. Many scientists believe that the only hope for amphibian conservation is through *ex situ* breeding programs and subsequent reintroduction. Research sites were established at varying stages of infection and elevation throughout Panama, and the examination of pre and post-infection abundance data has been done for all communities. Through sensitive DNA-based Real-Time Quantitative PCR amplification, chytrid prevalence will be determined. Chytrid is anecdotally known to exist in frog populations at lower elevations, but the extent to which it exists in other organisms and the effect it has on frog populations there is poorly understood. Preliminary results show that chytrid is found in lizards in addition to amphibians, and that lowland populations harbour infection and appear to succumb to it much like their high elevation counterparts. Furthermore, sites hit by the epidemic 10 years ago still show infection. These results suggest that the primary assumption of chytrid ecology, which is that it acts fatally only in areas of low temperatures and high moisture (highlands), may be incorrect. If the infection can remain in frog communities and other organisms for long periods of time, it appears that reintroduction of captive-bred amphibians is not a plausible management plan for amphibian conservation.

PLATFORM

COMPARATIVE PHYLOGEOGRAPHY OF ANDEAN FROGS

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South America encompasses a disproportionately large fraction of global biodiversity, yet relatively few modern molecular analyses exist of taxon diversification in this region, particularly of amphibians. I have chosen two co-distributed species of frogs (*Pleurodema borellii* and *Hypsiboas andinus*) differing in life history and ecological characteristics to examine the effect of these characteristics on patterns of connectivity and lineage distribution among populations within each species. Northwestern Argentina, the focal area for this study, possesses great diversity and complexity of habitats along the front ranges of the Andes Mountains reflecting great spatial variation in precipitation and temperature. Both historical and contemporary factors affect the distribution of genetic diversity within each species, but the levels of differentiation, and hence the timing of divergence, differ. Discordance in patterns among co-distributed taxa highlight differences in ecology and demography among species, although the patterns of connectivity we found are reversed from expectations for each species.

PLATFORM

USING GPS LOGGERS TO TRACK THE ENDANGERED BLANDING'S TURTLE (*EMYDOIDEA BLANDINGII*) IN NOVA SCOTIA.

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Freshwater turtles are particularly vulnerable to disturbances, such as road mortality, increased predation, and collection when undertaking seasonal movements. In Nova Scotia, Blanding's turtles are long lived, mature at a late age and are restricted in distribution to the southwestern interior of the province. They show strong site affinities and make regular seasonal movements to and from overwintering sites, nesting sites, and feeding areas. As their precise movements are unpredictable, and since turtles can move long distances remarkably quickly, accurate identification of travel routes has proven challenging. Conventional radio tracking is labour intensive, may disrupt turtle movement, and does not provide fine scale movement data; as a result most travel routes remain unknown. Most current GPS tracking devices rely on transmission to and from satellites; they are costly and exceed acceptable weight limits for small freshwater turtles. In this project, we have developed a small, custom-built GPS logger that stores data directly in the unit. Data is retrieved from the units following subsequent re-capture facilitated by the inclusion of a small radio transmitter in the unit. If successful, this technology will provide a cost-effective means of documenting previously unknown travel routes, nesting areas, overwintering and feeding habitats, as well as identifying several components of critical habitat.

POSTER

TRIALS AND TRIBULATIONS OF CAPTURING, SUSTAINING AND CREATING STEWARDSHIP OPPORTUNITIES FOR REMNANT SAR POPULATIONS WITHIN AN URBAN LANDSCAPE.

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The Rouge Park is one of North America's largest natural parks located within an urban area. Consequently, the park holds a diverse array of habitats and species, including several threatened species. In 2005, the Toronto Zoo launched a research program named the Urban Turtle Initiative (UTI). Historical data suggested the presence of several species at risk, including the Blanding's turtle (*Emydoidea blandingii*) and the Northern Map turtle (*Graptemys geographica*). Results of the UTI from 2005 until 2007 yielded the capture and radio-telemetry of

six Blanding's turtles and three Northern Map turtles, as well as the identification of several Northern Map turtles. Traditional catch methods such as basking and hoop net traps were utilized in this study, and deemed fairly unsuccessful. Trapping during 2005 and 2006 totaled 1205 and 563 trap nights for hoop-net and basking traps, respectively, resulting in the capture of only one new animal. Additionally, researchers disguised themselves as floating vegetation allowing them to get close enough to catch the animals by hand; this proved to be the most successful catch method. Home range analysis for both species was determined using minimum convex polygon for 2005 and 2006. Specific habitat usage was also examined over 2005 and 2006, throughout which exhibiting many potential threats to both populations. Potential threats faced by turtles in the Rouge Park are similar to other populations described elsewhere: habitat reduction, collection, road kills, other anthropogenic perturbations, increased predation and population isolation. These threat factors should be controlled in order to protect the remaining population, and further programs to be implemented that will help increase the population size of these threatened species. Whether it be through stewardship opportunities or direct action, urbanized areas create more obstacles than that of a rural setting when working to conserve a species.

PLATFORM

GROWTH DYNAMICS OF NOVA SCOTIA'S ENDANGERED BLANDING'S TURTLE, (*EMYDOIDEA BLANDINGII*), AND ITS' CONSERVATION IMPLICATIONS.

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In 2005, the Committee on the Status of Endangered Wildlife In Canada (COSEWIC) changed the designation of Nova Scotia's three sub-populations of Blanding's turtles from threatened to endangered. This change in status resulted in part from a population viability analysis (PVA), developed by Herman et al in 2004. It predicted that over a 100 year period, without further intervention the population will continue to decline, and may eventually disappear. The model identified early life history stages as being susceptible to effective manipulation and proposed that combining two or more management regimes at this stage greatly reduces the risk of decline. Laboratory incubation of eggs and the head-starting of hatchling turtles were the two most effective regimes examined in the model. The objective of hatchling head-start programs is to raise neonatal turtles to a size that will reduce their vulnerability to predation. Previous studies suggest that accelerated growth increases the initial survivorship of hatchling turtles. The long term dietary, internal development and morphological effects of this accelerated growth are not yet known. Enhancing survivorship without head-starting could avoid health risks and reduce effort and costs associated with recovery. Current literature shows that incubation environment for several species of turtles is more critical for hatchling growth than the head-starting environment. If this remains true the survivorship of hatchling turtles could be enhanced by incubating eggs alone. This research combines laboratory incubation and a controlled two year head-start program to study the growth dynamics of hatchling Blanding's turtles from two of Nova Scotia's sub-populations. Comparing incubated and wild hatchlings in a controlled head-start environment will allow us to determine the ideal combination of methods which yield the most conservation benefit, possibly helping to reverse the probability of decline in the Nova Scotia population.

POSTER

LONG-TERM MONITORING OF THE THREATENED ALLEGHENY MOUNTAIN DUSKY SALAMANDER (*DESMOGNATHUS OCHROPHAEUS*)

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The Allegheny Mountain dusky salamander (*Desmognathus ochrophaeus*) is a stream salamander abundant in the northeastern mountains of United States. However, it reaches its northern limit in Québec and the north side of Covey Hill is the only known region where this salamander is found in the province. It lives in forested cascades and brooks and takes cover under rocks, logs and leaf litter. The Allegheny Mountain dusky salamander is particularly vulnerable to drought, as it needs constant humidity to make its skin gas exchanges possible. It is thus extremely affected by climatic factors such as temperature, precipitations and air humidity. To monitor the status of the Covey Hill population, we are establishing a long-term research program. During each month of every summer for a period of ten years, a survey will be done in 10 stations and bio-physical data will be recorded. This information will allow us to better understand the environmental factors associated with the presence of the Allegheny Mountain dusky salamander in order to protect this threatened species.

PLATFORM

BLANDING'S TURTLE (*EMYDOIDEA BLANDINGII*) POPULATION STATUS IN BARREN MEADOW/KEDDY BROOK: A SUB-POPULATION VITAL TO THE SURVIVAL OF A SPECIES-AT-RISK.

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An inventory was made of Barren Meadow/Keddy Brook, part of the watershed containing the Pleasant River population of Blanding's turtle (*Emydoidea blandingii*) in Nova Scotia. The inventory, which was conducted from May 13 - August 25, 2006, incorporated visual surveys, trapping and radio-tracking. Twenty-five trap sessions ($\Sigma = 934$ trap nights; $\bar{L} = 37.4$ trap nights per session) yielded 39 individuals (12 females, 10 males, 17 juveniles). C-M-R analysis using the Chapman variation of Petersen formulas for bi-census yielded estimates for the population of 65 ± 7 turtles. The sex-ratio did not deviate significantly from 1:1. Analysis of radio-tracking data from 11 turtles (6 females, 3 males and 2 juveniles), using the Minimum Convex Polygon (MCP) method, yielded preliminary estimates of home range size and location for each group. Females had larger home ranges, probably due to the limited availability of nesting sites in Barren Meadow. Home ranges of males did not overlap. An expanded sample of males and juveniles is needed to better assess home ranges, movements and behaviour. If home ranges of additional males do not overlap, then conservation of the species in this population might require habitat protection on a larger scale than previously thought.

PLATFORM

REPRODUCTIVE OUTPUT DEPENDS ON BODY CONDITION IN SPOTTED TURTLES (*CLEMMYS GUTTATA*)

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The body condition of an animal reflects its energetic state such that an animal in good condition has greater energy reserves than one that is in poor condition. Body condition in turn should be positively correlated with fitness because energetic reserves limit the amount of energy that can be allocated to reproduction. Using Spotted Turtles (*Clemmys guttata*) as a model system, and three years of field data from a South Carolina, USA population, we tested the prediction that reproductive output increases with maternal body condition. The effect of body condition on the reproductive output of female turtles was examined at three temporal scales (among clutches, among nesting seasons, and among females) using several variables including clutch frequency, clutch size and multiple measures of egg size. We predicted that females in good condition will have a higher clutch frequency than those in poor condition; that females in good condition will have larger clutch sizes than those in poor condition; and that females in good condition will have larger eggs than those in poor condition. Among clutches and nesting seasons, we found no relationship between female body condition and reproductive output. Among females over the entirety of the 3-year study, we found a positive relationship between body condition and clutch mass and egg size. In addition, females in poor condition and females in good condition both produced larger clutch sizes than females in intermediate condition. Our findings suggest that within a given reproductive bout and within a given reproductive season, energy reserves do not affect immediate reproductive investment. However, over the longer-term, females in good condition have greater reproductive output, which supports the idea of a bet-hedging life history strategy in turtles.

PLATFORM

AN ANALYSIS OF MORPHOLOGY, GROWTH RATES AND SURVIVAL IN POPULATIONS OF EASTERN FOX SNAKES (*ELAPHE GLOYDI*) WITH DIFFERING GENETIC DIVERSITY

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Neutral genetic markers are often used to quantify the amount of divergence between populations, as well as to estimate the fitness and evolutionary potential of populations. These results can have strong conservation implications, yet relatively few studies have attempted to determine the correlation between genetic diversity and ecologically relevant traits. Eastern foxsnakes are a globally threatened species with a limited range, approximately 70% of which is contained within 3 regional populations (eastern shore of Georgian Bay, Essex County and Norfolk County) in Ontario. We used 15 microsatellite loci to estimate the genetic diversity within

the Georgian Bay and Essex County populations. We also estimated the ecological divergence and fitness of the populations by first counting the total number of ventral scales and number of ventral scale anomalies. The total number of ventral scales and the number of ventral scale anomalies are reflective of the number of vertebrae and the number of fused vertebrae in snakes, respectively and have been shown to correlate (total number - positive correlation; scale anomalies - negative correlation) with body size, growth rate and survival. Furthermore, we quantified fitness more directly by measuring the parasite infection levels (*Hepatozoon sp.*) and estimating growth rates for individuals. We correlated the genetic divergence and genetic diversity of populations with our fitness correlates to determine the utility of neutral genetic markers in conservation biology. Application of these results may assist in increasing the understanding of the current status of this other species of conservation concern.

POSTER

EXPOSURE OF NORTHERN LEOPARD FROGS (*RANA PIPIENS*) TADPOLES TO AGRICULTURAL RUN-OFF IN AREAS WITH HIGH RATES OF TESTICULAR OOCYTES IN WILD FROGS

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In 2003-2005, surveys of male Northern leopard frogs (*Rana [Lithobates] pipiens*) in southern Ontario, in areas of intensive row crop agriculture were found to have a high proportion of ova within their testes (an average of 45% in extreme Southwestern Ontario) compared to non-agricultural sites which had a much lower incidence of testicular oocytes (7%). To determine if this gonadal abnormality is linked to exposure to water borne chemicals from agricultural activity, we took eggs from a non-agricultural site where no inter-sex individuals had been detected, and raised them in four agricultural sites to determine if the gonadal abnormalities persisted and for comparison in two non-agricultural sites. Eggs and tadpoles were raised in outdoor enclosures until metamorphic climax, when they were removed to the laboratory and euthanized for histological examination and assessment of growth and survivorship. Hatching success was significantly depressed in three out of four agricultural sites as compared to at least one non-agricultural site, which seemed to correlate with elevated nutrient burdens at agricultural sites. While effects were seen at earlier life stages there was no consistent difference between agricultural and non-agricultural sites in terms of survivorship to metamorphic transformation, body size, sex ratio or deformity rates. Gonads were examined to compare rates of abnormalities between agricultural and non-agricultural sites. The proportion of males with testicular oocytes was significantly higher at some of the agricultural sites than the two reference sites.

PLATFORM

STATUS OF MUDPUPPY (*NECTURUS MACULOSUS*) POPULATIONS IN THE SYDENHAM RIVER SYSTEM.

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The Sydenham River is a large tributary flowing into Lake St. Clair, draining primarily agricultural land in southwestern Ontario which provides habitat for a variety of COSEWIC listed species of mussels, reptiles and fish. Of these, the mudpuppy mussel is found nowhere else in Canada and is reliant upon its host species, the mudpuppy for the completion of its lifecycle. We surveyed mudpuppies in the Sydenham River to evaluate population status and its ability to sustain the endangered mudpuppy mussel. Mudpuppies were trapped for short intervals at seven sites along the Sydenham River to generate relative densities and trapped at two sites intensively in an attempt to generate mark recapture population estimates. Contaminant levels were measured from blood samples and age estimates generated from skeletal chronology of toe clips. Population parameters were compared to other Great Lakes mudpuppy populations. Mudpuppies were found to be successfully reproducing at two sites on the Sydenham River. Deformity rates were elevated at some sites but contaminant levels were relatively low. The relative density of mudpuppies in the Sydenham River was considerably lower than other Great Lakes sites previously surveyed. In addition, in comparison to other populations surveyed in the Great Lakes system, age distribution of mudpuppies in the Sydenham River appears to be skewed towards younger individuals.

POSTER

THE INFLUENCE OF DATA PARTITIONING ON BAYESIAN PHYLOGENETIC INFERENCE OF THE *LITHOBATES CATESBEIANA* SPECIES GROUP

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Although many phylogenetic studies routinely employ Bayesian inference, few have examined the effects of different partitioning strategies on tree topology and posterior probability support. Partitioned Bayesian analyses of 1175 bps of mitochondrial DNA sequence were used to investigate the evolutionary affinities of the *Lithobates catesbeiana* species group of frogs. Fragments of mitochondrial 16S, tRNA^{Leu} and ND1 from 14 individuals encompassing all seven species were used in analysis with four different partitioning strategies (1. all data combined; 2. RNA and protein coding genes; 3. each gene separately; 4. stems and loops in RNA coding genes, ND1 3rd codon, ND1 1st and 2nd positions). Comparison of Bayes factors showed that no partitioning strategy was significantly better than any other although different strategies did yield trees with slightly different topologies and varied support values. This result is potentially due to the incorporation of random error associated with the small partition sizes of more complex partitioning strategies. Six of the seven species form an unresolved basal polytomy in the tree determined by the best partitioning strategy. To increase resolution of the phylogeny additional data need to be included. While there remain many areas of exploration in Bayesian analysis, including evaluation of the effects of partitioning and model choice, this study points to

how more sophisticated analyses can more fully capture how evolution proceeds for phylogenetically-informative markers.

POSTER

POPULATION GENETICS OF TWO WOODLAND AMPHIBIANS IN SOUTHERN QUEBEC IN RELATION TO LAND-USE HISTORY

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Habitat fragmentation can influence the genetics of a population both through the direct loss of genetic diversity and via the genetic processes small and/or isolated of populations that are. To address these phenomena, we used microsatellite markers to examine the population genetics of two woodland amphibian species in three localities in southern Quebec with different land-use histories. One locality had been persistently fragmented by agricultural and forestry activity, one locality had a temporary period of deforestation but is now continuous forest, and one locality had been historically continuous forest. The wood frog (*Rana sylvatica*) and the red-backed salamander (*Plethodon cinereus*) use the same general habitat but differ with respect to key life-history characteristics relating to dispersal. In comparing the relative influence of land-use history on population genetic structure, we expected that *P. cinereus*, which exhibits very low dispersal, would show greater genetic differentiation among sites within localities, than would the most readily dispersing *R. sylvatica*, particularly with respect to habitat fragmentation. F_{ST} values confirmed these expectations. In the persistently fragmented locality, *R. sylvatica* populations had the most genetic substructure ($F_{SL}=0.093$) but *P. cinereus* had disappeared. Comparing the temporarily fragmented locality and the continuous locality, *R. sylvatica* exhibited no significant difference in genetic structure ($F_{SL}=0.011$ vs. 0.021) but *P. cinereus* showed significantly greater population genetic structure at the temporarily fragmented locality ($F_{SL}=0.074$) than the continuous locality ($F_{SL}=0.019$). Thus habitat fragmentation had differing affects on the population genetics of the two species, emphasizing that a species with lesser dispersal ability will exhibit a higher degree of population genetic structure than a species with greater dispersal ability at the same spatial scale.

POSTER

EXTREME COLOUR VARIATION WITHIN POPULATIONS OF THE COMMON GARTER SNAKE, *THAMNOPHIS SIRTALIS*, IN MANITOBA, CANADA

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We report on the remarkable variation and frequency of colour morphs within and among six populations of the common garter snake (*Thamnophis sirtalis*) in central Manitoba, Canada. Five distinct colour morphs are identified and scored (scores 1 and 2 operating on a continuum):

0 - no red; 1 - slight red flecking on interscale skin; 2 - prominent red interscales, sometimes with some red on the lateral stripes; 3 - erythristic with red interscales, lateral stripes, ventral and labial scales; 4 - melanistic with no red or yellow and with muted striping. Sampling at seven denning sites around the province has revealed substantial variation in interscale red pigmentation within discrete populations. In the most northern population (Jenpeg at 54° 27' 49.1" N 98° 06' 54.8" W) and an island population (George Island, Lake Winnipeg, at 52° 49' 6.6"N 97° 37' 11.1"W), all five colour morphs were expressed. The northernmost population also exhibited sexual colour dimorphism, with female snakes expressing significantly more red than males. In contrast, the two central and western populations showed very little variation, with only two of the most similar colour morphs expressed (1 and 2) and with score 2 found in 97% of the population. We provide the first report of erythristic snakes in Manitoba. This bright red colour morph was found in three separate locations around Lake Winnipeg. Melanistic snakes are also reported from three new locations in the province, all widely disjunct from previously identified sites exhibiting melanism found around Lake Winnipegosis. The evolutionary underpinnings of these phenomena are yet to be fully understood, but the extreme intrapopulation variation has implications for the validity of subspecies of common garter snakes based on colour.

PLATFORM

PHYLOGEOGRAPHY OF THE WESTERN CHORUS FROG (*PSEUDACRIS TRISERIATA*) IN SOUTHERN QUÉBEC

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The western chorus frog (*Pseudacris triseriata*) is a small species largely found in the United States but restricted to extreme southern Ontario and Québec in Canada. It lives in marshes, open fields, meadows, and damp woods and breeds early in the spring in temporary or shallow ponds. In Québec, populations are scarce and have dramatically declined since 1950. This situation is imputable to habitat loss caused by human activities. The extensive development of suburbs and intensive agriculture have both contributed to the destruction of valuable habitats for the western chorus frog and the species is now listed as vulnerable in the province. Recent works have shown that there are two mitochondrial lineages within *P. triseriata* in North America. To ascertain which lineage is present in Québec, a portion of the mitochondrial 16s rRNA gene was sequenced. Results show that western chorus frogs from Quebec are a distinct genetic unit from those in the USA, which presented new avenues and challenges for the conservation of this species.

PLATFORM

THERMAL ECOLOGY OF THE STINKPOT TURTLE (*STERNOTHERUS ODORATUS*) AT THE NORTHERN OF ITS DISTRIBUTION

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The stinkpot turtle (*Sternotherus odoratus*) has been designated as a Threatened species by COSEWIC, yet there have been very few studies completed on their ecology. As ectotherms, stinkpot turtles rely on environmental temperatures to regulate their body temperatures. To date, no quantitative thermoregulatory studies have been done for this species. Since body temperature regulation is achieved by habitat selection and activity patterns, thermoregulation is an important factor affecting habitat use. This study was conducted from early May to late August 2007 on a population of stinkpot turtles at the northern extreme of their range in St. Lawrence Islands National Park. Automated radio-telemetry data loggers were used to record daily body temperature profiles of 22 stinkpots fitted with temperature-sensitive radio-transmitters. In addition, active tracking allowed habitat use, behaviour, and additional body temperatures derived from the pulse rate of the transmitters, to be recorded. Stinkpot turtles rarely leave the water to bask. Instead stinkpots often use aquatic basking to thermoregulate by floating at the surface. Available temperatures throughout the habitat were measured using temperature data loggers placed at various depths and locations. By comparing available to realized body temperatures, we expect to determine the species' thermoregulatory strategy in relation to habitat use. This study will identify the types of habitats used to regulate body temperatures, thus helping formulate appropriate habitat management and recovery plans.

POSTER

DO DIFFERENT METHODS OF DETERMINING THERMAL PREFERENCE CHANGE INTERPRETATIONS OF THERMOREGULATORY STRATEGIES?

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In ectotherms, maintenance of body temperature (T_b) within an optimal range is important for maximizing performance and, therefore, fitness. Two methods exist to measure thermal preference; the majority of studies have used thermal gradients in which an animal can select any T_b and the preferred T_b range (T_{set}) is determined from a subset of the T_b distribution (e.g. the central 50% or 80%). The subset of T_b s used to determine T_{set} is arbitrary and it is unclear how it relates back to the biology of an organism. The second method, the shuttle box, accounts for the dual point system where animals avoid T_b s below and above the voluntary maximum and minimum temperatures. The goal of this study was to evaluate the two methods of determining T_{set} for *Pogona vitticeps*, emphasizing the usefulness of a method with less behavioural substantiation. T_{set} determined in the thermal gradient by the central 50% and 80% of the distribution of T_b was 32.33-38.35°C and 29.85-39.24°C (mean $T_b=35.24\pm0.04$; $n=12$), respectively. T_{set} determined by the shuttle box method was 25.63-40.63°C (mean $T_b=32.33\pm2.62$; $n=12$) and approximated the central 96% distribution. Disparities between T_{set} measured by these two methods can have consequences for the interpretation of thermoregulatory strategies. As such, this study provides a cautionary note on the methods used to determine T_{set} .

POSTER

NORTH AMERICAN WATERFOWL MANAGEMENT PLAN PERMANENT BASIN AS AN EFFECTIVE TOOL FOR NORTHERN LEOPARD FROG (*RANA PIPIENS*) CONSERVATION

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We characterized the environment, development and growth of the northern leopard frog's (*Rana pipiens*) tadpoles in two sites: a natural bay of the St. Lawrence River and a permanent basin managed for waterfowl in the context of the North American Waterfowl Management Plan (NAWMP). We were interested in investigating the hypothesis that permanent managed wetland could be considered as "source habitat" for this species. Environmental conditions presented similarities but it seems that tadpoles from the permanent basin developed in more productive environment and in lower density. Patterns of water level fluctuations seem to be the proximal cause of those environmental differences. Tadpoles from the permanent basin grew more and metamorphs were about two times heavier than those from the natural bay. Size differences were still significant when comparing metamorphs from other similar sites. NAWMP permanent basin can be considered as a "source habitat" for the northern leopard frog and appears to be a useful tool for the conservation of this species.

PLATFORM

LANDSCAPE ECOLOGY OF AN AMPHIBIAN COMMUNITY: A STUDY OF RECRUITMENT SUCCESS, SOUTHERN QUEBEC

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Amphibian decline in pond-breeding amphibian species is challenging to study, because these populations fluctuate tremendously between years, and pond-breeding species are differentially affected by the decline. Recruitment success, the proportion of eggs surviving metamorphosis in order to become new adults, is now known to predict breeding success and population viability more accurately than hatching success. There is a need to develop tools for predicting successful recruitment, because it does not always seem to be correlated with breeding effort, and is not known to occur consistently at the same breeding sites every year. Twenty-four breeding sites distributed across a 400-hectare forest remnant have been characterized in terms of environmental and biological factors. The presence of breeding calls, eggs, tadpoles and metamorphs have also been determined for five species at those breeding sites. Canonical correspondence and discriminant analyses were used to find the main factors affecting recruitment, and to elucidate whether particular species have successful recruitment at sites showing particular environmental conditions, and whether a correlation exists between sites in which calls, eggs and tadpoles are present and those where recruitment is found to be successful. Based on data measured in the field, a model predicting population dynamics for different weather conditions (e.g. wet or dry year) was designed, accounting for habitat preferences of each species. This will help to better understand the dynamics of amphibian communities, enabling the most effective management strategies and questioning current amphibian sampling methods used to assess breeding success such as call and egg mass surveys.

PLATFORM

REPATRIATION OF MASSASAUGAS (*SISTRURUS CATENATUS*) TO THE OJIBWAY PRAIRIE IN WINDSOR, ONTARIO

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After three years of preparation 27 captive-born three year-old massasaugas (*Sistrurus catenatus*), borne to females that were locally rescued, were repatriated to the Ojibway Prairie Provincial Nature Reserve in June 2006. The snakes' behaviours and movements were monitored using radio telemetry through to spring 2007. No snakes survived after one year. After a soft release most snakes remained in the immediate vicinity of the release site. Typical snake behaviours were observed including courtship, mating and hibernation selection. Mortality of juvenile snakes is known to be very high. Twenty-one snakes (77%) survived the summer. Fifteen (55%) successfully hibernated. Unfortunately exceptionally heavy winter rains drowned 9 snakes and likely caused the remaining six to emerge early into cold weather where they were quickly predated. Documented predators included Coyote and Mink. The massasauga is a flagship species of Ojibway's tallgrass prairie. This innovative conservation project allowed the recovery team, municipal, provincial and federal governments, local residents, stewardship and environmental interest groups to work together towards conserving a species at risk within an urban environment. Education and public awareness were a strong component of this project and incredible community support was evidenced with all of the snakes being adopted through an Adopt-A-Snake program. A one-time repatriation of Massasaugas is not guaranteed to result in immediate success. Mortality from predation, persecution, disease and environmental events can easily offset the limited reproduction potential of a small number of snakes. Introducing animals into a new site is difficult, belying a common misconception that it is okay to relocate them. Habitat protection is clearly the preferred choice for long-term success. It will be a challenge to maintain a population of rattlesnakes at Ojibway.

PLATFORM

REPRODUCTIVE ECOLOGY OF A CENTRAL ONTARIO POPULATION OF SPOTTED TURTLES (*CLEMMYS GUTTATA*)

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Nesting by aquatic turtles often requires upland habitats that differ greatly from those used during the rest of the annual cycle. Thus, understanding the reproductive ecology of turtles at risk is an important aspect of identifying critical habitat. Reproduction in an Ontario population of spotted turtles (*Clemmys guttata*) was studied using radio telemetry and x-ray photography. The study population was large (75 turtles captured), had an even sex ratio, and was located in an area relatively free from recent or past major disturbances, and thus well-suited for monitoring. Habitats used by the population included fens, sedge and rush-dominated marshes, as well sheltered lacustrine shore waters. Females were confirmed gravid from 29 May to 25 June

2007; however, nesting activities did not begin until 12 June. All 10 females outfitted with radios were gravid and all 10 nests were located, as well as the nest of an additional un-radioed female. Nest construction was nocturnal and primarily on open sites with low sparse herbaceous vegetation and moss cover over loamy or sandy soil. Average minimum nesting time was 9h 48 min from first observation of digging to completion of covering. Clutch size (3.8 ± 0.22 eggs) was not related to female body size (CL or body volume), nor was individual egg mass related to clutch size. Nest failure was categorized into three types: poor nest construction ($n = 1$), poor site selection ($n = 2$), and predation ($n = 2$). The remaining 6 nests are currently being monitored. Due to the wide variability in spotted turtle ecology throughout the species' range, site-specific studies are necessary to understand critical habitat and to make recommendations for conservation.

POSTER

DEMOGRAPHY OF AN ISLAND POPULATION OF SPOTTED TURTLES (*CLEMMYS GUTTATA*) AT THE SPECIES' NORTHERN RANGE LIMIT

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Demographic information from geographically isolated populations is important for understanding how a species is locally adapted, and can thus inform conservation. The Spotted Turtle (*Clemmys guttata*) is declining throughout its range in eastern North America due to habitat loss and fragmentation, and collection for the pet trade. The objectives of our study were to describe the demography of a recently-discovered island population of Spotted Turtles and to make comparisons to conspecific mainland populations. We conducted two seasons of mark-recapture study on a small (23.2 ha) island in eastern Georgian Bay, Ontario. Over 6 visits, a total of 37 turtles were captured: 22 females, 5 males, 9 juveniles and 1 hatchling. Interestingly, many turtles were captured in small, isolated pools of water on exposed rock outcrops. Males had significantly greater straight-line carapace lengths and contour carapace lengths than females, whereas females had greater carapace heights than males. Island turtles were significantly smaller than mainland turtles, possibly due to resource limitations or founder effects. The island population was estimated to include 31 adults. Density was estimated to be 1.3 turtles/ha for the entire island, and 21.4 turtles/ha in one wetland where turtles aggregated in spring; these density estimates are higher than those in mainland sites. The adult sex ratio was skewed in favour of females (1 male : 4.4 females), perhaps resulting from warm nest sites on the island as Spotted Turtle sex is environmentally determined with warm incubation temperatures producing females. Future work will include surveys for Spotted Turtles on other nearby islands. Our study provides information on the population ecology of Spotted Turtles in isolation, which is important for the creation of management plans for populations being fragmented by human activities.

POSTER

GENETIC DIVERSITY AND GENE FLOW WITHIN AND BETWEEN EASTERN FOXSNAKE (*ELAPHE GLOYDI*) POPULATIONS ACROSS ONTARIO

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Human activities, most notably habitat destruction, have led to the decline in size, number, and extent of populations for many species. As a consequence, many populations suffer from reduced genetic diversity, which can lower reproduction and survival rates and also may reduce the ability of populations to adapt to changes in the environment. Eastern foxsnakes are a globally threatened species with a very limited range, approximately 70% of which is contained within 3 regional populations (eastern shore of Georgian Bay, Essex County and Norfolk County) in Ontario. From 2003 to 2007 we acquired and collected > 600 blood samples from each of the 3 regional populations and ~10 local sub-populations. Using these blood samples and 15 hyper-variable microsatellite loci we determined that a significant portion of the genetic diversity was conserved within the regional populations (~25%) and within the local sub-populations (~15%). Contrary to our prediction populations in the heavily fragmented Essex County had much higher levels of genetic diversity than populations in Georgian Bay and Norfolk County. All three regional populations were significantly differentiated ($p < 0.001$) and local subpopulations within Georgian Bay and Essex County were significantly differentiated at relatively fine scales (~ 50 km). Further research and analysis will identify landscape features that promote and or impede gene flow within and between populations and determine the scale at which populations are organized.

PLATFORM

CYTOPLASMIC VS NUCLEAR GENETIC DIVERGENCE ACROSS A HYBRID ZONE IN TOADS

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Hybrid zones (narrow regions where genetically distinct populations may interbreed to produce hybrids) are good “natural laboratories” to study processes involved in evolution, the creation of new species and the maintenance of genetic barriers. The present study aims to investigate a hybrid zone in southeastern Manitoba using mitochondrial DNA markers, nuclear DNA markers and morphometric analysis. Two species of toads, *Bufo americanus* and *B. hemiophrys*, interbreed in this region and produce fertile hybrids. Previous studies of this hybrid zone described its general location and form using morphological characters and data from isozyme electrophoresis, but mitochondrial genes have not been investigated before so the level of concordance between characters encoded by nuclear genes and mtDNA haplotypes is unknown. Mitochondria are known to spread through populations across hybrid zones between species. Because mitochondrial genes are routinely used to study species-level evolution and taxonomy, using DNA barcoding for example, it is important to understand how well mitochondrial and nuclear genomes actually match each other. This project will allow us to better understand the dynamics of this hybrid zone, and, therefore, eventually help us understand more general processes such as speciation through hybridization and species boundaries. This study will also give us better insight into the interaction between mtDNA and

nuclear DNA and therefore will allow a test the Barcode of Life assumption of COI sequences being species specific.

PLATFORM

PREDICTING SUITABLE HABITAT FOR THE NORTHERN PRAIRIE SKINK (*PLESTIODON SEPTENTRIONALIS*) IN MANITOBA

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The northern prairie skink (*Plestiodon septentrionalis*) is Manitoba's only lizard and is currently listed as endangered, in part, due to its limited Canadian distribution. The prairie skink's range appears to be limited to the sandy habitats in the southwestern portion of the province in several disjunct populations roughly 150 kilometres from the nearest southern population. In this study, we used coarse-scale environmental features (soil characteristics, temperature and land-use patterns) to predict habitat suitability for *Plestiodon septentrionalis*. We identified suitable habitat using the locations from historical captures provided by the Manitoba CDC, locations of our own field captures from 2006, and literature reports on the habitat requirements of this species. Using a Geographic Information System (GIS) and data available from the Manitoba Land Initiative (MLI), three qualitative habitat suitability indices (low, moderate, high) were derived from specific combinations of soils, climate and land use criteria. Our model identified suitable habitat centred around the Carberry and Lauder Sandhills; both areas are within the known distribution for this species. In addition, the model predicted suitable habitat in the Portage Sandhills and in the southeastern portion of Manitoba, neither of which have known prairie skink populations. We used field captures from summer 2007 to test the accuracy of the habitat suitability model. In future, we will test the model by searching for prairie skink populations in areas of low, moderate and high suitability.

PLATFORM

AMPHIBIANS AS INDICATORS OF CLIMATE CHANGE EFFECTS IN TERRESTRIAL WETLAND ECOSYSTEMS

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Terrestrial wetlands are among the most imperiled habitats in the world. They provide essential ecosystem services to humans, are required habitat for a diverse array of wildlife, are linked directly to terrestrial processes, and are susceptible to changes in climate because their persistence often is a function of precipitation and evaporation. Integrated studies are needed to test specific hypotheses regarding effects of climate change in terrestrial wetland ecosystems. Many amphibian species live in the terrestrial and wetland components of these systems globally. For the purpose of conducting multilevel studies in these systems, amphibians stand out as potentially effective indicators of climate change effects because they can be sensitive to changes in temperature, moisture, and precipitation due to unique physiological and reproductive requirements. Wood frogs (*Rana sylvatica*), for example, are well-suited for such studies in North America because they live most of the year in moist terrestrial habitats and are distributed from the southeastern U.S. across much of Canada to Alaska, an area which spans climate gradients and where concern about climate change is high. They breed mostly in ephemeral wetlands and are reliant upon suitable temperature ranges, hydroperiod, and primary production in these wetlands to reproduce successfully. In addition, they are amenable to sampling and experimentation throughout most life stages. Further, they are known to be susceptible to infection by potentially lethal diseases, such as *Ranavirus* and the chytrid fungus, *Batrachochytrium dendrobatidis*, the distribution and prevalence of which could change with climate. The U.S. Geological Survey, U.S. Fish and Wildlife Service, Environment Canada, and Natural Resources Canada/Canadian Forest Service are working to develop protocols and a network of research sites to study climate change in terrestrial wetlands across the range of wood frogs, using several measures of wood frog fitness, integrated with other environmental measures, as indicators of effects.

POSTER

DO INTRODUCED TROUT AFFECT ABUNDANCE AND PATTERNS OF METAMORPHOSIS OF NATIVE AMPHIBIANS?

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Alberta Conservation Association (ACA) and Alberta Sustainable Resources Development (AB SRD) are managing and stocking lakes with salmonids to encourage recreational fishing in the eastern slopes region of Alberta. However, introduced salmonids can cause changes to the structure and processes of receiving ecosystems, including effects on native biota. We studied 12 lakes in the boreal foothills to document the effects of trout stocking on amphibian communities. Lakes were grouped into four treatments: stocked (n=3), stocked and aerated (n=2), unstocked (n=6), and fishless (n=1). All study lakes contain populations of forage fish. We assessed the abundance of adult and young-of-the-year (YOY) amphibians, and emergence timing, and size of YOY using transect surveys. Three species of amphibians inhabit the lakes: the wood frog (*Rana sylvatica*), boreal chorus frog (*Pseudacris maculata*) and western toad (*Bufo boreas*). During the summer of 2006, adult and YOY wood frogs (n=2103) were the most abundant species on all lakes, whereas, adult and YOY boreal chorus frogs (n=293) and western toads (n=525) were only found on a subset of stocked and unstocked lakes. Adult wood

frog abundance tended to be higher in stocked lakes, whereas YOY abundance tended to be higher in unstocked lakes. Date at emergence and median snout-vent lengths of YOY wood frogs did not differ among treatments. A single lake in each of the stocked (without aeration) and unstocked treatments produced exceptionally large number of YOY wood frogs and western toads. Our results suggest that, contrary to results from alpine lakes, trout-stocking does not always have catastrophic, negative effects on amphibian communities.

PLATFORM

EVIDENCE THAT AMPHIBIAN RANAVIRUSES ARE MULTI-HOST PATHOGENS, AND WHY IT MATTERS

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Infectious diseases are among the suspected causes of global amphibian declines. Like many pathogens, ranaviruses (family Iridoviridae) appear to infect multiple species. We examined several North American amphibian ranavirus isolates to improve our understanding of the effects these viruses have on host communities. Our study had two objectives. The first was to characterize isolates from epizootics affecting wild amphibian populations and compare them to previously described isolates. The second was to test whether amphibian ranaviruses infect ecologically relevant heterologous species, and if so, document the outcome of exposure. The combined results of restriction endonuclease (RE) digestion analyses, sequence analyses, and experimental challenge trials suggest that two amphibian ranaviruses, *Ambystoma tigrinum* virus (ATV) and Frog Virus 3 (FV3) viruses, are distinct viral species with different ecologies. Characterizations revealed that several isolates with identical major capsid protein (MCP) gene sequences have distinctive RE profiles. This suggests that high degrees of similarity in MCP sequences may belie important differences among isolates and we argue it is important to characterize ranavirus isolates beyond sequencing the MCP gene. Results from experimental exposure trials indicate that multiple host species may be involved in the ecology of ranaviruses, especially FV3-like viruses, and that ranaviruses are capable of infecting multiple amphibian species that share breeding habitats. Additionally, field collections revealed FV3-like ranaviruses circulating in Wood Frogs (*Rana sylvatica*) and ATV-like ranaviruses circulating in Tiger Salamanders (*Ambystoma tigrinum diabolii*) in the same week at a single breeding pond, highlighting the ecological potential for transmission among different host species. Ultimately, experiments elucidating the dynamics of intra- and inter-specific transmission will be particularly important for understanding the roles that ranaviruses play in their host communities.

PLATFORM

AMPHIBIANS OF THE DEHCHO AND SAHTU REGIONS OF THE NORTHWEST TERRITORIES, CANADA

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It is widely recognized that amphibian populations are declining globally. Baseline information on distribution and abundance is key to identifying and then addressing declines on regional and local scales. The amphibian species that occur in the NWT, and those that potentially occur in the NWT, tend to be widespread species that reach the northern edges of their ranges within the NWT. While some information exists on these species elsewhere in their respective ranges, information for NWT populations is incomplete, which impedes management decisions. This is of immediate concern for two species in the NWT, Northern Leopard Frogs, *Rana pipiens*, and Western Toads, *Bufo boreas*, because they are federally listed as Special Concern and require multi-jurisdictional management plans under the federal Species At Risk Act. More generally however, information is required for all amphibian species in the NWT so that management decisions can be made with an eye towards long-term sustainability. In 2007, amphibian surveys were conducted in the Dehcho and Sahtu regions, with the objectives of collecting information on the distribution and abundance of amphibians, and collecting tissue samples (non-lethally) to screen for pathogens that are implicated in amphibian declines elsewhere. Breeding populations of Wood Frogs (*R. sylvatica*) were widespread, occurred in a variety of habitats, and population densities were often quite high. Boreal Chorus Frogs (*Pseudacris maculata*) were found only in the Ft. Liard, Blackstone, and Nahanni Butte areas, and only in small numbers. Breeding populations of *Bufo boreas* were found at two sites (20 km apart) near Ft. Liard. Also near Ft. Liard, calls were identified as *Rana pipiens* but attempts to visually verify the species were not successful; future survey work in the area is strongly recommended. Approximately 400 tissue samples were collected and work is underway to screen for ranaviruses and chytrid fungus.

POSTER

DECLINE IN THE PROPORTION OF ROAD-KILLED TURTLES OBSERVED IN EASTERN ONTARIO SINCE 2000: HAS CONSERVATION HAD SOME EFFECT?

Frederick W. Schueler and Aleta Karstad

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In the course of our activities, we record every Turtle we see on the roads. Through the 1990s there was increasing concern for road mortality of Turtles among eastern Ontario naturalists, with many minor educational projects. In 2000 *Turtle SHELL Tortue* collaborated with governments to erect the first signs warning motorists of stretches of road where turtles were known to cross. Through the 1990s, during the months of May and June, we recorded 11.2 on-road turtles/year in Leeds-Grenville, Ottawa-Carleton, and Lanark counties, Ontario, of which

46% were alive when seen. From 2000-2007 we again recorded 11.2 per year, of which 67% were alive. We can't think of any bias in our driving habits which would account for such a change ($G= 8.7$ $p=0.003$). This result, combined with the increased concern expressed about road-crossing Turtles by many People, leads us to suspect that drivers on provincial highways and county and township roads in Eastern Ontario may be actively avoiding collisions with Turtles.

PLATFORM

DOING THE STREETS: HERPS ON THE ROAD IN A RURAL ONTARIO VILLAGE, 2004-2006.

Frederick W. Schueler

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In 2004-2006 we set out to tally all roadkills on 246 m of streets that intersect in the rural village of Bishops Mills, Ontario. We made 572 surveys, of which 170 resulted in no observation, on 392 days, resulting in 990 records of 3342 individuals of 48 taxa: 3.9/m in 2004, 5.8/m in 2005, 3.9/m in 2006. *Rana pipiens* was the most abundant anuran: movements began in late March, fell off through May-July, and increased through August to mid-October, ending in late November. Records of *Bufo americanus*, April-October, were dominated by the juvenile cohort of 2004, which first appeared on the streets in July 2004, continued abundant through September, and reappeared as yearlings in early August of 2005. Aquatic frogs came at least 300m from the water: 101 *Rana clamitans* and *R. catesbeiana*, mostly juveniles, and two *Rana septentrionalis*. Among Hylids, *Pseudacris crucifer* were seen during April and from late September-late November, and scattered *Hyla versicolor* from early August to early November. Most other Vertebrates were Snakes: *Storeria occipitomaculata* from September-November and *Thamnophis sirtalis* from June-early October, with juvenile *Nerodia sipedon* in September. No Salamanders were seen, and the only Turtle was a hatchling *Chrysemys picta*.

POSTER

STATUS OF SOUTHERN ONTARIO CHORUS FROGS

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Recent genetic evidence that the morphologically delimited taxa of Chorus Frogs, *Pseudacris triseriata*, don't correspond to genetic lineages, combined with the impression that Chorus Frogs have declined, since the 1970's, from 'ubiquitous' to 'scattered' in many areas, require an overall analysis of the "species" status in southern Ontario. Seburn & Seburn documented a decline in Ontario Herpetofaunal summary records (OHS; controlled by records of the closely related Spring Peeper, *P. crucifer*) between Lake Erie and Lake Huron; there are signs of a widespread disappearance in eastern Ontario, the populations on the outer Bruce Peninsula disappeared through the 1990s, and in Marsh Monitoring records over 1995-2004, Chorus Frogs declined significantly in the Lake Huron and Lake Ontario basins. In 2006 several auditors revisited sites where Chorus Frogs had been recorded in the OHS. I assembled about 6K spring frog calling records from my data, about 12K from the OHS, and about 2K from Frog Watch

Ontario. In the first tabulation, the basic result is that before 1990 Chorus Frogs comprised about 20% of the calling records from southern Ontario, and since then there hasn't been a year when they have totaled 20%. In 14,570 records from the 1980s and the 2000s, Chorus Frogs declined from 19% of all records in the 1980s to 12% from 2000-2006. A geographic breakdown of these results will be presented, in relation to the distribution of the genetic lineages.

POSTER

IDENTIFYING CRITICAL HABITAT FOR BLANDING'S TURTLES (*EMYDOIDEA BLANDINGII*) AT A MILITARY BASE NEAR OTTAWA

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Working in partnership with the Department of National Defence and the National Capital Commission I have been attempting to identify key habitats used by a population of Blanding's Turtles (*Emydoidea blandingii*) at the Shirleys Bay Crown Game Preserve, along the Ottawa River, just west of Ottawa. The 1700 ha site is an active military base, with firing ranges, a grenade range, and training areas across the site. In the spring of 2007, 8 Blanding's Turtles (4 males, 3 females, 1 juvenile) were outfitted with radio transmitters and their movements have been followed throughout the spring and summer. Evening surveys during June identified the core nesting area. In total, 11 females, 4 males and 1 juvenile were captured, although no effort was exerted to catch as many turtles as possible. Movement patterns varied among the turtles. At one small maple swamp that was drying up in mid-June, two Blanding's Turtles with transmitters moved to another nearby marsh. Another adult male left the same swamp in late May before it dried up. It left the base and has remained off the base. In contrast, at another large wetland complex, two turtles made extensive movements within the connected wetlands (even crossing a road) but remained within the complex. No road kill was observed on the base, despite a road that runs along the perimeter of the base, adjacent to and through wetlands. However, one adult female first caught in the nesting area was found dead along the major public road that runs just outside the edge of the base. Telemetry work will continue into the fall to determine the location of hibernacula. The data for all Blanding's Turtle locations on the base will be used to create a preliminary map of critical habitat.

PLATFORM

LACK OF GEOGRAPHIC VARIATION IN SEXUAL SIZE DIMORPHISM IN PAINTED TURTLES (*CHRYSEMYS PICTA*)

Sheila E. Smith and Jacqueline D. Litzgus*

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Geographic variation in body size reflects adaptations to local environments and sexual size dimorphism (SSD) reflects adaptations of the sexes to different reproductive roles in those environments. The Painted Turtle (*Chrysemys picta*) is a wide-ranging North American freshwater turtle species with known female-biased SSD. We hypothesized that, due to fecundity advantage, there would be geographic variation in the degree of sexual size

dimorphism (female:male SSD index). We predicted that the SSD index would be high in unpredictable seasonal northern and mid-longitudinal populations relative to in more predictable moderate southern and coastal populations where the SSD index would be lower. We conducted a meta-analysis using adult male and female body size data (carapace and plastron lengths) from 66 study sites. Surprisingly, we found no statistically significant patterns in SSD when regressing carapace and plastron lengths on latitude and longitude. Contrary to our prediction, the trend indicated that the SSD index increased slightly with decreasing latitude. With respect to longitude, the trend supported our prediction in that the SSD index was slightly higher in interior populations. Future research should examine sex differences in carapace height and body volume which may more directly reflect selective pressures on fecundity than straight-line shell length.

POSTER

AMPHIBIANS, REPTILES, AND THE CHALLENGES OF MULTIPLE ENVIRONMENTAL STRESSORS: PALEOENVIRONMENTAL APPROACHES FOR TRACKING LONG-TERM CHANGES IN AQUATIC ECOSYSTEMS

John P. Smol

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We live in a constantly changing environment. There is growing evidence that human activities are greatly impacting many ecosystems, although the timing and magnitude of changes are difficult to determine as long-term monitoring data are rarely available. For example, although one of Canada's most cherished resources is its aquatic ecosystems, monitoring data on these systems are especially sparse. Important questions include: Is the water quality changing? Are aquatic habitats being altered? If so, why and by how much? What are the causes and ecological repercussions of these changes? Because long-term monitoring data are not available, indirect methods must be used to infer past environmental and ecological conditions. Fortunately, aquatic systems archive a tremendously important library of information of past changes in their sediments. For example, a large number of organisms leave morphological and biogeochemical fossils in lake, pond, river, and wetland deposits, which paleolimnologists can use to track past assemblages, from which environmental conditions can be inferred. Geochemical and other proxy indicators are also well represented in sediments. Many of the key stressors believed to be affecting amphibian and reptile populations (e.g. climatic change, loss of habitat, acidification, UV-B radiation, contaminants) can be tracked, at least indirectly, in the paleolimnological record. This lecture will summarize some of these approaches, and explore ways that these data may be useful to scientists working on amphibians and reptiles.

PLENARY

DEVELOPMENT OF A HERPETOFAUNAL MONITORING PROGRAM FOR THE LAKE SUPERIOR BASIN: PRELIMINARY DETECTION PROBABILITIES IN LAKE SUPERIOR PROVINCIAL PARK:

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Concern over widespread declines in amphibian and reptile populations has prompted interest from the US and Canada to develop a monitoring program for the Lake Superior Basin. Challenges to developing effective monitoring programs arise when attempting to determine true presence or absence of a species when using a limited number of surveys over large geographical areas, especially when considering the great variance in activity levels and life history traits of species. We evaluated sampling methods at four locations during the spring/summer of 2006 and 2007 (Thunder Bay, ON, Pictured Rock National Lakeshore MI, Lake Superior Provincial Park, ON and the Bayfield County Moquah Barrens, WI). In each location we tested six standard detection methods (turtle traps, funnel traps, cover boards, call surveys, timed visual encounter searches, and casual observations) at a minimum of 14 sites (3 lakes, 3 ponds, 3 vernal pools, and 5 upland sites). We divided seasons into 4 one to two week sampling periods to account for species phenology. We tested each sampling method at least five times per session to determine species-specific detection probabilities. Preliminary results for Lake Superior Provincial Park suggest that detection probabilities vary widely among species, methods, sites and periods. Funnel traps successfully detected both adult and larval anurans, and newts. Turtle traps were moderately effective at catching painted turtles and bullfrogs. Timed visual encounter searches proved highly successful for detecting Plethodontid salamanders, but only moderately so for Ambystomatids. Call surveys were generally effective for detecting anurans. Casual observations detected more snakes than cover board surveys. Overlap in detection of species occurred with different methods, especially between call surveys and funnel trapping. Effectiveness of the methods we tested varied greatly among species, sites, and periods, reinforcing the need to evaluate and refine monitoring protocols prior to the establishment of large-scale monitoring programs.

PLATFORM

ANTHROPOGENIC INFLUENCE ON THE PREVALENCE OF *RANAVIRUS* AND CHYTRID FUNGUS (*BATRACHOCHYTRIUM DENDROBATIDIS*) IN AMPHIBIANS

Valerie St-Amour* and David Lesbarrères

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As amphibian populations continue to decline new hypotheses emerge regarding the possible causes for this phenomenon. Emerging infectious diseases (EIDs) have recently become a focus of attention in these declines. Chytridiomycosis, caused by the chytrid fungus *Batrachochytrium dendrobatidis* and infection by *Ranavirus* have been reported as the causal agents of several amphibian mass mortality events. Recent studies have attempted to determine environmental factors that are involved with or predict EID presence, particularly in human-dominated landscapes. We measured several variables indicating human disturbance in order to investigate their possible role in the presence and prevalence of *Ranavirus* and chytrid fungus. Our results show that measures of human activity strongly correlate with *Ranavirus* prevalence. However, the same relationship was not observed for chytrid fungus prevalence. This study demonstrates that anthropogenic activities may influence the prevalence of

PLATFORM

DOES CLIMATE LIMIT ANURAN DISTRIBUTIONS IN NOVA SCOTIA?

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Climate change is thought to be one of the leading causes of global amphibian declines. Statistical bioclimatic models, which correlate species current distributions with climatic variables, can be used to predict future range shifts and are therefore a promising tool for amphibian conservation. However, some have questioned the validity of bioclimatic models, suggesting that factors other than climate can impose species range limits. When these factors are not accounted for, bioclimatic models are likely to over predict species potential distributions, a situation which may have dire consequences for conservation. We use data obtained from a regional species atlas to investigate whether topography, landcover and an autocovariate which compensates for a lack of independence among neighbouring locations can improve bioclimatic models for eight anuran species in Nova Scotia. The results of this research will have important implications for the study and conservation of amphibians in temperate ecosystems.

PLATFORM

THE EFFECTS OF DENSITY MANIPULATION ON SIZE AND SURVIVAL OF *RANA SYLVATICA* TADPOLES: A FIELD STUDY

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Female wood frogs (*Rana sylvatica*) lay their eggs in close proximity to other egg masses resulting in a relatively elevated density of hatchlings and tadpoles in one specific area. At the tadpole stage, larval density may play a major role in survival and size of the tadpoles, which can then affect the fitness of metamorphs and adult frogs. Our hypothesis claims that tadpoles in lower densities will have a greater size and survival than tadpoles at higher densities. The present study manipulated *Rana sylvatica* tadpole densities in four natural ponds, each containing one high and one low density enclosure stocked in a 4:1 ratio. The responses to different densities in terms of mass, length and survival were assessed. In all four ponds, the mass of tadpoles in low density enclosures was greater than those in high density enclosures. However, differences in length between high and low ponds occurred in only three of the four ponds. Moreover, development of hind legs was more rapid and survival was greater in tadpoles living in low densities. Thus, our original hypothesis can be validated. Towards the end of experimentation, mass and length of tadpoles in both high and low densities decreased or stagnated due to approaching metamorphosis. This experiment was performed until there was no more water in the enclosures. Because tadpoles at low densities seem to thrive better, it would seem counter-intuitive to lay eggs in large masses as seen in the wild. There must therefore be other mechanisms such as kin-recognition, decreased stress and herd behavior

which overcome the benefits of low density during the tadpole stage. The overall goal of our study is to determine which density (high or low) is more beneficial for tadpoles to live at and to relate our findings to the behavior of frogs in the wild.

PLATFORM

MOVEMENTS OF GREAT BASIN GOPHERSNAKES IN BC'S INTERIOR

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Human development and agriculture in the Okanagan Valley of southcentral BC are fragmenting habitats used by the federally threatened Great Basin Gophersnake (*Pituophis catenifer deserticola*). Two major objectives of the Recovery Team are to document problem areas for road kill and other human-caused mortality, and to obtain data on snake movements. I determined snake movement rates at four study areas in the Okanagan Valley during 2006 and 2007, using radio telemetry of 41 adult snakes to observe snake behaviour and movement in various habitats. Individual snakes did not consistently use the same retreats or occupy the same areas from one year to the next. Snakes at different study areas moved differently; snakes at the north Okanagan site were at higher density and moved shorter distances than snakes at south Okanagan sites. Snakes regularly moved off of protected areas, putting them at increased risk due to road mortality and habitat conversion. To date, 19% of the mortality of transmitter-implanted snakes has been road kill. Management of these areas and this species will require mitigation of these threats, through such things as culvert creation, snake fencing, or expansion of protected areas.

PLATFORM

IDENTIFICATION, CHARACTERIZATION AND SUBTERRANEAN DELINEATION OF CRITICAL MASSASAUGA (*SISTRURUS CATENATUS*) HIBERNATION HABITAT IN A PARTIALLY MINED PEATLAND FOR THE PURPOSES OF SPECIES RECOVERY

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Massasauga (*Sistrurus catenatus*) hibernation habitat identification and characterization followed the recent closure of an extensively strip-mined peatland. Woody material was removed and the remaining compacted subsurface peat was left to regenerate. Based upon this evidence we have assumed that hibernation habitat is limiting in the mined area and for the purpose of population recovery we initiated a microhabitat investigation to characterize existing hibernation habitat. Our hypothesis is, rattlesnakes hibernate successfully within a subterranean vertical space or "life zone". This zone is below the frost line and above the water table in an aerobic space. Nine snakes with radio transmitters were followed to their hibernation sites over multiple years providing us with 16 known sites. Based upon their site occupancy we recognize

two hibernation study areas, 'Not Mined' and 'Mined'. A grid of wells and frost tubes were installed across both sites and the following variables were measured weekly during the winter; distance to drains, peat, frost and snow depth, relative groundwater level, temperature and dissolved oxygen. In the 'Mined area' linear regression comparison between nearby wells, demonstrated a correlation between homogeneous groundwater patterns and the distribution of known hibernation burrows ($R^2 > 0.5$) with a disjunction across the middle of the area. We found no similar correlation between other variables. In this area groundwater dissolved oxygen became anaerobic with increased snow depth. In the 'Not Mined' area we found no relationship between snow depth and groundwater DO. Over winter mortality is suspected in the 'Mined' peat hibernation area during severe winters. From 2003 to 2006 vertical space was reduced to 20 cm in the 'Mined' area whereas the 'Not Mined' area maintained over 40 cm vertical frost and groundwater free space. Following a severe storm event in late 2007, the life zone was eliminated in the 'Mined' study area only. Habitat management is recommended.

PLATFORM

PARKS CANADA'S MONITORING PROTOCOL FOR ASSESSING LANDSCAPE CHANGE USING ECOLOGICALLY SCALED LANDSCAPE INDICES – AN ONTARIO EXAMPLE FOCUSING ON HERPETOFAUNA

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Parks Canada, in association with the Canadian Centre for Remote Sensing and the Canadian Space Agency, has recently developed a standardized monitoring protocol for assessing the effects of landscape pattern in and around national parks. The protocol is based on the concept of ecologically scaled landscape indices (ESLI). ESLI's attempt to translate landscape patterns from the perspective of different species and the ways in which they use and disperse throughout a landscape. So, depending on the species of interest, a single landscape with a certain pattern of habitat fragmentation may be functionally connected for some species but functionally disconnected for others. This protocol focuses on estimating these species-specific differences to fragmentation patterns within the context of the same landscape. A landscape may be defined as a national park, region, ecozone or any other criteria depending on the needs of the user. The characteristics that define the ESLI's include species-specific definitions of what constitutes an effective habitat patch (eg, land cover type, minimum patch size, patch shape, patch edge, etc.), a cost surface of the non-patch matrix (eg, road density patterns between the patches), and the spatial scale at which the species in question utilizes the landscape (eg, small versus large home range size).

PLATFORM

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