CARCNET/RÉCCAR 2006

11th Annual Meeting of the

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

27 – 29 October 2006
Victoria · British Columbia · Canada
Harbour Towers Hotel and Suites

ISSN 1916-3797

CARCNET/RÉCCAR 2006

Our logo incorporates elements of coastal British Columbia's ecology and herpetofanua. The Arbutus (*Arbutus menziesii*) is found in rare ecosystems of coastal British Columbia and both the Common Garter Snake (*Thamnophis sirtalis*) and the Pacific Treefrog (*Hyla regilla*) can be found in similar habitats.

This year's logo was created by Dan Gregory, brother of esteemed herpetologist and beer drinker extraordinaire, Patrick T. Gregory. The logo includes both Pat's favourite and bizarro-favourite animals. 

CARCNET/RÉCCAR 2006

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CARCNET/RÉCCAR 2006

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Awards sub-committee
Dave Cunnington, Laura Friis, Sara Ashpole, Christine Bishop, and Don McAlpine

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CARCNET/RÉCCAR 2006

A Message from the Board

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

Other organizations such as the World Wildlife Fund and Environment Canada seek advice from CARCNET/RÉCCAR members 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 a CARCNET/RÉCCAR business meeting. Also at the AGM the great Canadian Herp Quiz takes place, the Blue Racer and Silver Salamander achievement awards are presented, and cash awards for the best student talk and best student poster are given out.
- A program of publishing. This includes contributions to *Amphibians in Decline. Reports from the Canadian Declining Amphibian Populations Task Force* and helping coordinate the upcoming *Ecology, conservation and status of reptiles in Canada* and other publications.
- Maintaining a network of herpetologists. Members of CARCNET/RÉCCAR receive the Boreal Dip Net newsletter by mail, and email messages concerning significant papers in herpetology and other announcements on an occasional basis
- Maintaining a website. In collaboration with the Ecological Monitoring and Assessment Network of Environment Canada, who host the website, and through the generous efforts of our webmaster Bev Horn (thanks Bev!) CARCNET/RÉCCAR has an informative website on the biology and conservation of Canadian herpetofauna and through which interested people are able to send queries to Canadian herpetologists
- Supporting and partnering with other organizations, universities, and government and other agencies in amphibian and reptile conservation projects. For example, a project with Mountain Equipment Co-Op and TURTLE S.H.E.L.L. TORTUE to post turtle crossing road signs in eastern Ontario, with herpetologists conducting surveys in Québec, and with wetland construction on Pelee Island. CARCNET/RÉCCAR also awards annual student scholarships. We also provide letters of support for funding applications that will increase knowledge and/or conservation of Canadian herpetofauna.

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

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

CARCNET/RÉCCAR 2006

ACKNOWLEDGMENTS

Local Organizing Committee

- Patrick Gregory
- Lita Gomez
- Virgil Hawkes
- Leigh-Anne Isaac
- Krysia Tuttle

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- British Columbia Ministry of Environment
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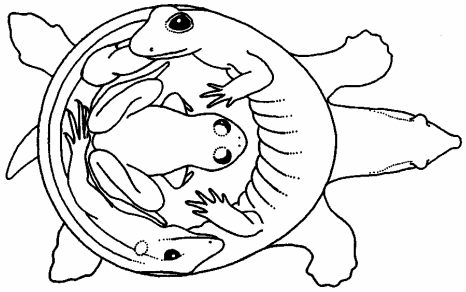


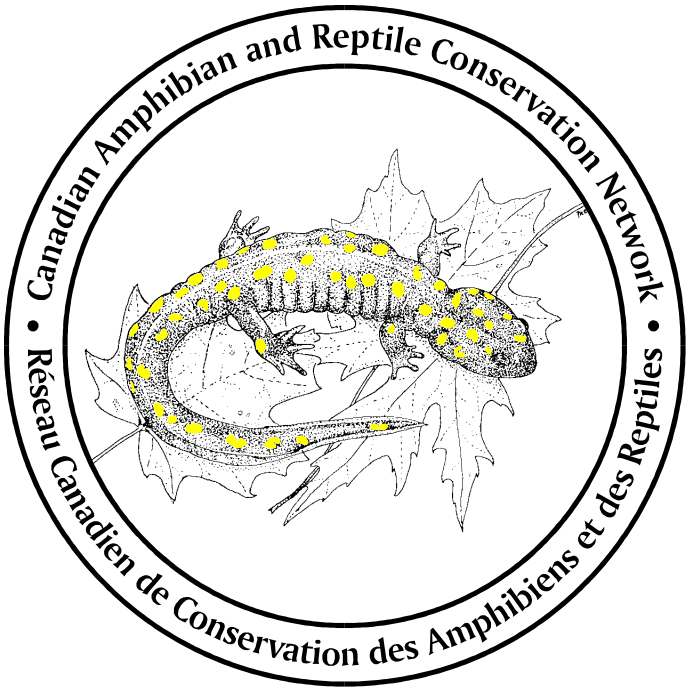
University of Victoria

- President's Office
- Department of Biology
- Faculty of Science
- Faculty of Graduate Studies
- Research Services

Conference Schedule

Friday, 27 October 2006

1700-2100	Registration (also open 0800-1700 on 28 & 29 Oct.)
1900-2200	Opening Reception
1900-2100	**Poster Session**



Conference Schedule

Saturday, 28 October 2006[1]

All Day	Posters		
0815-0830	Welcome & Announcements		P. Gregory
0830-0930	Keynote Address	Introduction:	P. Gregory
	Captive breeding of amphibians: conservation or cosmetic surgery? ***Richard A. Griffiths***		
0930-1000	**COFFEE BREAK / POSTER VIEWING**		
1000-1145	**Session 1: Amphibians**		**Chair: J. Litzgus**
1000-1015	Hibernation sites of the western toad (*Bufo boreas*) in north-central Alberta $***Constance L. Browne***		
1015-1030	Habitat relationships of amphibians relative to riparian management zones in western Washington State $***Virgil C. Hawkes***		
1030-1045	Using stable isotopes to determine ontogenetic shifts in Green Frogs (*Rana clamitans*) $***Dale Jefferson*** *and Ron Russell*		
1045-1100	Evidence for cryptic lineages and range expansion from northern refugia in the Wood Frog, *Rana sylvatica* $***J.A. Lee-Yaw****, J.T. Irwin, and D.M. Green*		
1100-1115	Influence of water conditions on the embryonic survivorship of the Oregon Spotted Frog (*Rana pretiosa*) in British Columbia, Canada. $***René McKibbin****, Christine Bishop, and William T Dushenko*		
1115-1130	The role of *ranavirus* in relation to developmental instability in the Green Frog (*Rana clamitans*) $***Valerie St-Amour*** *and David Lesbarrères*		
1130-1145	Using stable isotopes to explore competition and the diet of co-occurring tadpoles in the Aspen Parkland of Alberta $***Arthur Whiting*** *and C Paszkowski*		
1145-1200	**GROUP PHOTO**		
1200-1345	**LUNCH**		

[1] 🕒 **Set clocks back one hour tonight!**

$ Student Presentation

Conference Schedule

1345-1530 Session 2: Reptiles Chair: K. Larsen

1345-1400 Habitat selection and home range Size of Blanding's Turtle (*Emydoidea blandingii*) near the species northern range limit
***Christopher B. Edge**, Ronald J. Brooks, and Jacqueline D. Litzgus*

1400-1415 Sensitivity analysis for an eastern Georgian Bay population of Spotted Turtles (*Clemmys guttata*) and implications for conservation
***Jean Enneson** and Jacqueline D. Litzgus*

1415-1430 Habitat use by the western rattlesnake (*Crotalus oreganus*) in the interior of British Columbia, Canada
***Lita M. Gomez**, Patrick T. Gregory, and Karl. W. Larsen*

1430-1445 Prairie rattlesnake foraging strategies: the influence of changing landscapes and changing risks
***Dennis Jorgensen** and C.C. Gates*

1445-1500 Natural history and habitat use of the plains garter snake (*Thamnophis radix*) in Alberta
Krysia Tuttle

1500-1515 Describing an aspect of critical habitat: Great Basin Gophersnake (*Pituophis catenifer deserticola*) oviposition sites in BC
***Kathleen White**, Karen Hodges, and Christine Bishop*

1515-1530 Short seasons and limited resources: large Wood Turtle (*Glyptemys insculpta*) home range sizes in northern environments
***William F. Greaves** and Jacqueline D. Litzgus*

1530-1600 COFFEE BREAK / POSTER VIEWING

1600-1730 Session 3: Amphibians again! Chair: L. A. Isaac

1600-1615 Three years of invasive American Bullfrog (*Rana catesbeiana*) removal activities: can we successfully remove these populations?
***Sara L. Ashpole**, Dave C. Cunnington, and Laura Friis*

1615-1630 Early life stage survival and conservation of the Oregon Spotted Frog (*Rana pretiosa*) in Canada
***C.A. Bishop**, R. McKibbin, K. McNeil, J. Harris, A. Gielins, C. Sloan, D. Smith, B. Woods, D. Knopp*

1630-1645 Small streams: what buffer strip width is necessary to protect amphibian habitat?
***Brian Eaton** and Jim Witiw*

Conference Schedule

1645-1700 Are introduced bullfrogs (*Rana catesbeiana*) the vector of chytrid fungus (*Batrachochytrium dendrobatidis*) spread on Vancouver Island, BC
Purnima P. Govindarajulu*, Trenton W. J. Garner, Bradley R. Anholt, and Alex Kempson*

1700-1715 Age structure instability and its effects on population size in Fowler's toad, *Bufo fowleri*
David M. Green *and Nicole Sanderson*

1715 – 1730 Small and unprotected: frogs and forest harvesting
Elke Wind

1900-1930 Pre-banquet mixer

1930-2000 Banquet (with awards & quiz) Quizmaster: C. Bishop

Conference Schedule

Sunday, 29 October 2006

All Day	Posters	
0830-0930	Keynote Address	Introduction: P. Gregory
	The way of a gecko on a rock: why the animal's real environment matters ***Anthony P. Russell***	
0930-1000	**COFFEE BREAK / POSTER VIEWING**	
1000-1200	**Session 4: Mostly Reptiles (OK, some amphibians…)**	**Chair: K. Tuttle**
1000-1015	FrogWatch: citizens monitoring frogs and toads ***Heather Andrachuk***	
1015-1030	Herpetological research opportunities on the Creston Valley Wildlife Management Area ***Marc-André Beaucher***	
1030-1045	Development of a herpetofaunal monitoring program for the Lake Superior Basin: a preliminary report ***Stephen J Hecnar****, Gary S. Casper, Kel Cullis, Darlene R. Hecnar, and Megan J. Sellick*	
1045-1100	SARA and the American ESA: effective transboundary species protection? ***Brent Matsuda***	
1100-1115	Western Skinks in southeastern British Columbia ***Jakob Dulisse***	
1115-1130	I SAW A SNAKE! Are phone-in reports, sightings, and other information from the public a reliable inventory tool for snakes? ***Karl W. Larsen***	
1130-1145	Micro-habitat preference in the Northern Prairie Skink (*Eumeces septentrionalis*) *Jory Mullen and* ***Pamela L. Rutherford***	
1145-1200	Wood turtles on the St. Mary's River, Nova Scotia - a cast of thousands? *Mark Pulsifer,* ***Tom Herman****, and Stephanie Bradish*	
1200-1400	**LUNCH**	
1400-1530	**Session 5: Yes... wait for it... More Amphibians!**	**Chair: L. Gomez**
1400-1415	Amphibian land-use and species diversity in the South Okanagan, British Columbia (2003-2006) ***Sara L. Ashpole****, Christine A. Bishop, A. Michelle Edwards, and John Elliott*	

Conference Schedule

1415-1430 Pesticide exposure and reproductive effects in native amphibian species using agricultural habitat, South Okanagan, British Columbia (2003-2006)
*Sara L. Ashpole, **Christine A. Bishop**, Michelle Edwards, and John Elliott*

1430-1445 Patterns of evolution of freeze tolerance in anurans
Jason T. Irwin

1445-1500 Chytridiomycosis in Pacific Northwest amphibians: death and pestilence in your backyard
*Jim Johnson, Susan Belmont, and **R Steven Wagner***

1500-1515 Highway fragmentation and genetic depletion over two decades in Anurans
David Lesbarrères

1515-1530 Population trends of the Western Red-backed Salamander in Goldstream Provincial Park, Vancouver Island, BC
***Kristiina Ovaska**, Ted Davis, and Purnima P. Govindarajulu*

1530-1600 COFFEE BREAK / POSTER SESSION

1600-1715 Session 6: And yet more amphibians! Chair: V. Hawkes
Will it never end?

1600-1615 Forestry management, education, and ecology of British Columbia's Ominica amphibians
***Mark Thompson**, Roy Rea, and Dexter Hodder*

1615-1630 The Alaska wood frog monitoring project: utilizing science to map the distribution of wood frogs in Alaska
David F. Tessler** and **Tracey A. Gotthardt

1630-1645 Amphibian distribution in Nova Scotia roadside ponds
***Ron Russell**, Sara Collins, and Dale Jefferson*

1645-1700 Boreal toads in the temperate north: the last stand?
Sanjay Pyare

1700-1715 Recovery efforts for the northern leopard frog (*Rana pipiens*) in British Columbia, 2001-2005
***Doug Adama** and Marc-André Beaucher*

1715-1745 CARCNET Business Meeting & Student Awards

1745-1800 Silent Auction Wrap-Up

Conference Schedule

LIST OF POSTERS

Three Different Approaches to Protect Nesting Western Painted Turtles in British Columbia
Ross Clarke

Movement patterns of adult western toads, *Bufo boreas*, in fragmented landscapes
Isabelle Deguise

Recent Range Extensions for the Racer (*Coluber constrictor*) in Southeastern British Columbia
Jakob Dulisse

Thermal, Chemical and Physical Structure Selection for Overwintering by Wood Turtles (*Glyptemys insculpta*) at the Species' Northern Range Limit
William F. Greaves *and Jacqueline D. Litzgus*

Thermal ecology of the western rattlesnake in BC
Jared Hobbs

Alberta's northern leopard frog recovery program
K. Kendell *and D. Prescott*

Definition of Coeur d'Alene Salamander Habitat in British Columbia
Lisa I Larson *and John S Richardson*

Exposure of Northern Leopard frogs (*Rana pipiens*) tadpoles to agricultural run-off in agricultural areas with high rates of intersexuality in wild frogs
T.V. McDaniel, P.A. Martin, J. Struger, C. Marvin, C. Kaloudas, ***G.C. Barrett***

Determining effects of introduced trout and aeration on native amphibian communities in small boreal foothills lakes
C. Schank*, C. Paszkowski, and B. Tonn*

Assessing the role of microhabitat associations in producing among-taxon congruence
Shannon L. Turvey*, John S. Richardson, and Melissa A. Hogg*

Effects of Municipal Wastewater Effluents and 17α-Ethinylestradiol on Male Hatchling Snapping Turtles (*Chelydra serpentina*)
K. Oakes, E. Georgiades, K. Fernie, S. DeSolla, T. Mitchell, B. Knight, J. Ings, J. Heinrichs, J. Kormos, E. Leung, ***G.C. Barrett,*** *D.G. Dixon, D. Holdway, M.R. Servos*

Consequences of Sediment Influxes into Ponds on Survival and Development in the Western Toad, *Bufo boreas*
Sylvia Wood *and John Richardson*

Abstracts for Keynote Speakers

Saturday Morning

GRIFFITHS

CAPTIVE BREEDING OF AMPHIBIANS: CONSERVATION OR COSMETIC SURGERY?

Dr. Richard A. Griffiths

The Durrell Institute of Conservation and Ecology, University of Kent, Canterbury, Kent, CT2 7NR, UK R.A.Griffiths@kent.ac.uk

Captive breeding can contribute to the conservation of amphibians through reintroductions, research that can inform conservation practice and conservation education. We set out to determine how effective captive breeding has been in each of these three areas by an interrogation of the Global Amphibian Assessment database and a review of published and unpublished information. Out of 5743 amphibian species, 101 have been used in conservation breeding and/or release projects. Of these, 50 species have been used in captive breeding only, 23 have been used for breeding and release, and 28 have been used in release programmes that did not involve captive breeding (i.e. through head-starting or translocation). More than half of the 101 species used in breeding/release programmes were threatened in the wild. Of those species that have been bred in captivity and reintroduced to the wild, there is evidence that four species have established self sustaining populations and a further four are breeding in the wild. At least three species have been unsuccessfully reintroduced into the wild, but the fate of a number of other reintroductions is unknown. Although most captive breeding programmes cited conservation research as their main function, rather little published information has emerged from such studies to inform conservation practice. Equally, there is a paucity of data to support the notion that conservation education initiatives involving amphibians are effective in changing attitudes and knowledge. The long-term conservation prospects for amphibians are gloomy, and captive breeding is one of the few short-term options available. However, new population management protocols will need to be adopted if captive breeding is to play a significant role in ameliorating amphibian declines.

Oral

Abstracts for Keynote Speakers

Sunday Morning

RUSSELL A

THE WAY OF A GECKO ON A ROCK: WHY THE ANIMAL'S REAL ENVIRONMENT MATTERS.

Anthony P. Russell*

Department of Biological Sciences, University of Calgary, 2500 University Drive NW, Calgary, Alberta T2N 1N4. arussell@ucalgary.ca

Over the past 30 years, I have studied various aspects of the functional morphology of the adhesive system of gekkonid lizards. This work has been mainly anatomical in focus, and I have tried to integrate my findings with those of other workers interested in the phenomenon of adhesion from the whole animal to the nano levels. Collectively we have provided insights into how adhesion is affected and how the adhesive bond is created and broken in a controllable way, employing a reusable adhesive (modified integumentary outgrowths). Laboratory studies of the adhesive phenomenon have largely focused on the maximal adhesive capacity that can be generated, and have marveled at the strength of the bond that can theoretically be created. The recognition that the adhesive capacity may be several thousand-fold that required to support the lizard prompted me to place this into an evolutionary context, where such enormous safety margins run counter to the way we believe selection to work. Placing the question back into an evolutionary framework prompted me to undertake field work with the specific objective of investigating this apparent paradox. Seeking out the right species in the right environmental circumstances is a prerequisite to being able to attack the question. Such fundamental questions can only be approached by examining real organisms in real environments. If those environments are not conserved, then the species occupying them will not be available to ask questions of, when the realization comes to us that that is where the answer might lie.

Oral

Author Index

The Author Index provides the names of all authors listed for each paper / poster followed by the presenter. Abstracts in this program are arranged in alphabetical order by **presenter.**

Author Index

RECOVERY EFFORTS FOR THE NORTHERN LEOPARD FROG (*Rana pipiens*) IN BRITISH COLUMBIA, 2001-2005

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

[1]Adama Wildlife and Columbia Basin Fish and Wildlife Compensation Program, Golden, BC. adamawildlife@uniserve.com
[2]Creston Valley Wildlife Management Area, Creston, BC. biology@crestonwildlife.ca

Confined to a single 400-hectare wetland in southeastern British Columbia, the southern mountain population of the northern leopard frog (*Rana pipiens*) is listed as "Endangered" by the Committee of the Status of Endangered Wildlife in Canada and protected under the Federal *Species At Risk Act*. Recovery efforts underway since 2001 included head-starting, reintroduction, habitat enhancement and population monitoring. During this five-year period, 10,147 *Rana pipiens* tadpoles (Gosner stage 30) and 14,487 *Rana pipiens* metamorphs reared in captivity and released back into the wild. Habitat enhancement entailed dredging and vegetation control. In the final year of the project, successful breeding was documented at 2 new sites including one site that had been "enhanced" through vegetation management. These results suggest that reintroduction may be a viable recovery method for pond-breeding amphibians, particularly when coupled with habitat enhancement. While these results are positive, the population remains extremely vulnerable and recovery efforts are confounded by the presence of the chytrid fungus, *Batrachochytrium dendrobatidis*.

Oral

FROGWATCH: CITIZENS MONITORING FROGS AND TOADS

Heather Andrachuk

Ecological Monitoring and Assessment Network Coordinating Office
Canada Centre for Inland Waters 867 Lakeshore Road Burlington, ON L7R 4A6.
heather.andrachuk@ec.gc.ca

FrogWatch is a citizen science monitoring and education program that engages volunteer observers from across Canada in tracking when they hear and see frogs and toads. This data is entered and stored in an online database and is free to access and analyze. On the national Web site, www.frogwatch.ca, observations from across Canada can be viewed through an interactive mapping application. For educators, pan-Canadian- as well as Provincial-linked curriculum units have been developed and are accessible online.

Designed and created with the expertise of CARCNET members, FrogWatch was launched in 2001. On a national scale, FrogWatch is supported and promoted by Environment Canada's Ecological Monitoring and Assessment Network Coordinating Office in partnership with Nature Canada. On a regional scale, it is enhanced by the local knowledge and experience of Provincial and Territorial Coordinators. These Coordinators manage the program in their respective regions and as local experts, are a point of contact for recruiting, training, and providing feedback to observers.

Oral

ASHPOLE 1

THREE YEARS OF INVASIVE AMERICAN BULLFROG (*Rana catesbeiana*) REMOVAL ACTIVITIES: CAN WE SUCCESSFULLY REMOVE THESE POPULATIONS?

Sara L. Ashpole*[1], Dave C. Cunnington*[1], Laura Friis*[2]

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sashpole@fes.uwaterloo.ca; David.Cunnington@ec.gc,ca
[2]British Columbia Ministry of Environment. Victoria, British Columbia, V8W 9M1
Laura.Friis@gov.bc.ca

Populations of Invasive American Bullfrogs (*Rana catesbeiana*) pose a great hazard to all native amphibians in the South Okanagan, including the COSEWIC listed Spadefoot, Tiger salamander, and Western toad. In 2003 to 2005 bullfrogs were detected at four ponds in the South Okanagan, with breeding activity limited to two of these sites. The proximity of these ponds to each other is less than a few hundred meters, with the closest pond only 300m from Lake Osoyoos and the Okanagan River system. Since 2004, physical methods of removal have included: dip-netting, hand capture, seine netting, electro-shocking, and modified land and water traps. The total number of individuals removed to date, and their life stage include: 131 adults; 68 juveniles; 11,278 tadpoles; and 26 egg masses. In 2005 we constructed a semi-permanent exclusion fence around the two infected permanent ponds. The fences contained the existing populations and reduced the probability of bullfrog migration. Prior to 2006, bullfrog observations had been limited to the ponds. However, two adult frogs were observed in separate locations at the north end of Lake Osoyoos this past summer. Additionally, all adult frogs appeared to have been successfully removed from the four sites until a heavy rainfall when a new group of five to eight individuals migrated into one of the main ponds for breeding, presumably from the Lake. This raises great concern that this species may have a much wider local distribution than previously believed. Each year greater knowledge and insight has been acquired on how best to modify our techniques towards complete eradication.

Oral

ASHPOLE 2

AMPHIBIAN LAND-USE AND SPECIES DIVERSITY IN THE SOUTH OKANAGAN, BRITISH COLUMBIA (2003-2006)

Sara L. Ashpole*[1], Christine A. Bishop*[1], A. Michelle Edwards*[2], John Elliott*[1]

[1]Canadian Wildlife Service. 5421 Robertson Rd. Delta, British Columbia, V4K 3N2, Canada. sashpole@fes.uwaterloo.ca; CAB.Bishop@ec.gc.ca, john.elliott@ec.gc.ca
[2]University of Guelph, Guelph, ON, N1G 2W1. edwardsm@uoguelph.ca,

The Okanagan Valley is the most ecologically diverse region in Canada, and unfortunately one of the most endangered, where 80% of the natural wetlands and riparian areas have been developed. This pocket dessert supports a diverse amphibian population, including the nationally endangered Tiger Salamander (*Ambystoma tigrinum*), threatened Great Basin Spadefoot (*Spea intermontana*), and the Western Toad (*Bufo boreas*) a species of special concern. This research is to determine the amphibian diversity, reproductive success, and relative abundance. Ponds (N=108) were surveyed using time-constrained active searches, call counts, night trapping (2003 to 2006). Sites were inventoried three to five times throughout the season and were visited at least two years successively. Ponds were categorized according to the main land-use, including: lowland or high elevation; organic or conventional agriculture; restricted or full access livestock; industrial; residential; and miscellaneous ponds such as golf courses, waste water or sewage treatment plants etc. Habitat and landscape parameters, including a standard water chemistry sample during mid-tadpole development, were assessed. In 2006 we expanded our search area to include auditory surveys along the river channel, thus allowing us to monitor hard to access drainage ditches and open fields without discrete ponds. Tiger salamanders were detected, and in all cases breeding successfully at 15% of the sites. Spadefoots were detected at 47% of the sites; however breeding occurred at only half of those sites. Western toads were the most rarely observed (3% of sites), whereas Treefrogs were the most commonly observed species (54% of sites), however breeding was only detected in half of these sites. This research will provide critical information on amphibian breeding areas and corridor-use, and will be utilized for habitat restoration efforts being conducted over the next few years.

Oral

BARRETT 1

EXPOSURE OF NORTHERN LEOPARD FROGS (*Rana pipiens*) TADPOLES TO AGRICULTURAL RUN-OFF IN AGRICULTURAL AREAS WITH HIGH RATES OF INTERSEXUALITY IN WILD FROGS.

T.V. McDaniel[1], P.A. Martin[1], J. Struger, C. Marvin, [2], C. Kaloudas[3], and G.C. Barrett[1]*

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In 2003 - 2005, surveys of male Northern leopard frogs (*Rana 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 ovo-testes (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 intersex 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. The water at the enclosure locations was sampled either weekly or tri-weekly, and contaminants and chemical components were measured at the National Laboratory for Environmental Testing. 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. Poster presentation

Poster

BARRETT 2

EFFECTS OF MUNICIPAL WASTEWATER EFFLUENTS AND 17A-ETHINYLESTRADIOL ON MALE HATCHLING SNAPPING TURTLES (*Chelydra serpentina*).

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Pharmaceuticals and personal care products (PPCPs) are widespread environmental contaminants frequently detected in municipal wastewater effluents (MWWE). Some PPCPs are incompletely removed or degraded to bioactive metabolites during processing at municipal wastewater facilities. The persistence and environmental effects of some PPCPs has led to heightened research interest evaluating the endocrine disrupting properties of MWWEs on phyla inhabiting receiving environments. Snapping turtles (*Chelydra serpentina*), being quite tolerant of organic enrichment, are commonly found below MWWE discharges. Male hatchling snapping turtles, collected as eggs from a relatively pristine location (Algonquin Park, northern Ontario) were reared in a laboratory setting and exposed to MWWE concentrations up to 90% for 82 d. Turtles exposed to MWWE displayed reduced liversomatic indices and somatic growth commensurate with an observed decrease in appetite. However, no changes were observed in brain citrate synthase or lactate dehydrogenase activity indicating metabolic rate was not significantly altered in this organ following MWWE exposure. Similarly, no changes in acetyl cholinesterase or peroxisomal enzyme activities were observed, coincident with decreases in hepatic oxidative stress. These results suggest that pesticide and PPARα receptor ligands (such as hypolipidemic drugs) were not present at high levels in the MWWE examined during the course of the study. In a separate experiment, a second group of male snapping turtles received a single *i.p.* administration (up to 0.1 ug/g) of a well-characterized estrogenic MWWE constituent, 17α-ethinylestradiol. Turtles administered 17α-ethinylestradiol *i.p.* had significant increases in hepatic oxidative stress as quantified by 2-thiobarbituric acid reactive substances, suggesting an estrogen-dependent increase in peroxidizable lipid substrate.

Oral

BEAUCHER

HERPETOLOGICAL RESEARCH OPPORTUNITIES ON THE CRESTON VALLEY WILDLIFE MANAGEMENT AREA

Marc-André Beaucher

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Located in the central Kootenay region of British Columbia, immediately south of Kootenay Lake, the 17,000-acre Creston Valley Wildlife Management Area (CVWMA) offers students exceptional opportunities to conduct graduate field studies. Recognized as an Important Amphibian and Reptile Area in Canada by the Canadian Amphibian and Reptile Conservation Network (CARCN), in 2005, this extensive Ramsar wetland supports six species of reptiles and six species of amphibians. Of the 12 species present, four are listed as species of "Special Concern" and one as "Endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). While some research has been conducted on the Northern Alligator Lizard, Common and Western Terrestrial Garter Snakes, Rubber Boa, and the Northern Leopard Frog, very little is known about the Western Painted Turtle, Western Skink, or the Columbia Spotted Frog in the valley.

Oral

BISHOP 1

EARLY LIFE STAGE SURVIVAL AND CONSERVATION OF THE OREGON SPOTTED FROG (*Rana pretiosa*) IN CANADA

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The Oregon Spotted Frog is endangered in Canada. Three sub populations exist in the Fraser Valley, BC at disjunct locations where immigration and emigration among populations does not occur. In 2006, in the largest population, we found 99 egg masses. At this site, in situ embryonic survivorship measured in sub samples of egg masses was high (mean = 78.8 %) as was survival to metamorphosis in captivity (mean = 61.8 %) in 2006. Whereas, in the smallest population the population size is just 5 egg masses detected in 2006. Similarly, in situ embryonic survivorship in egg masses was lower (mean = 69.5 %) and survival to metamorphosis in captivity was 73.1% in 2006. Conservation of these populations is dependent on community involvement and interest in the species. In 2006, the Seabird Island band initiated several community liaison projects about wetlands and the Oregon Spotted Frog that involved the local school children and training of conservation technicians.

Oral

BISHOP 2

PESTICIDE EXPOSURE AND REPRODUCTIVE EFFECTS IN NATIVE AMPHIBIAN SPECIES USING AGRICULTURAL HABITAT, SOUTH OKANAGAN, BRITISH COLUMBIA (2003-2006)

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The Okanagan valley in BC is an intensive agricultural area where 80% of the natural wetlands and riparian zones have been developed. In total 108 ponds, including 28 agricultural ponds, were surveyed to determine adult breeding, larval productivity, and relative population densities (2003 – 2006). To assess the risk of native amphibian populations to multiple stressor effects of pesticides we conducted *insitu* experiments (2004 to 2006) examining early amphibian stages of development, hatching success, tadpole survival, and abnormalities. Enclosures with eggs were placed in either conventional orchards and exposed to realistic pesticide applications, organic orchards, or non-agricultural control ponds. Water samples for pesticides were collected at standard times (2004), after rain events (2005,2006) and after known spray events (2004-2006). Select water pesticide concentrations (2004 to 2006) range include: azinphos-methyl 5 - 103 ng/L, diazinon 141 - 634 ng/L, endosulfan 10 - 57 ng/L, and Atrazine 13 – 19 ng/L. In 2004, substantial mortality of Spadefoot (*Spea intermontana)* and Western Toad (*Bufo boreas)* eggs were observed in one of our two conventional sites (92% and 100%), whereas mortality was very low at one of our three organic sites (3% and 4%). Mortality among the remaining sites in 2004 ranged between 15% and 38%. In 2005, Spadefoot and Pacific Treefrog (*Hyla regilla*) eggs were placed in conventional orchards (N=3) and control ponds (N=3). Our conventional sites experienced 35 - 100% mortality, whereas our reference sites experienced less than 12% mortality. In 2006, Spadefoot, Pacific treefrog, and Columbia Spotted Frog (*Rana luteiventris*) mortality was greater than 60% in eggs from conventional (N=3) ponds, whereas organic (N=1) and control pond (N=3) mortality was less than 26%. Additionally pesticide water samples were taken at three high elevation sites to determine geographic variation of pesticides in the valley.

Oral

HIBERNATION SITES OF THE WESTERN TOAD (*Bufo boreas*) IN NORTH-CENTRAL ALBERTA.

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The western toad (*Bufo boreas*) is one of many species that has experienced population declines; however, it is the only amphibian species in Canada that has been red-listed by the World Conservation Union. Our objectives were to investigate the habitat use, movements, and basic biology of western toads in Alberta throughout the breeding, foraging, and hibernation periods. Here we present the first ever Canadian results on the hibernation sites selected by western toads. We radio-tracked toads at Elk Island National Park, Alberta in 2004, a nearby pasture site in the Aspen Parkland in 2004 and 2006, and at a site influenced by the energy and forestry industries in the Boreal region in 2005. Toads were captured in the spring and summer and tracked until entering their hibernation sites in October. For hibernacula, western toads selected pre-existing tunnels such as natural crevasses, muskrat tunnels, beaver lodges, red-squirrel middens, cavities in peat hummocks, and decayed root tunnels. Hibernation sites were up to 1674 m from the breeding ponds (mean = 976 m, n = 20). Twenty-three of the 33 toads tracked to hibernation (in 2004 and 2005) were in communal hibernacula. The distances moved to reach hibernation sites and the communal use of sites suggests that suitable hibernation sites may be limited for this species in the northern part of its range.

Student: Oral

THREE DIFFERENT APPROACHES TO PROTECT NESTING WESTERN PAINTED TURTLES IN BRITISH COLUMBIA

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The western painted turtle (*Chrysemys picta*) is provincially blue listed due to its localized occurrence and threats to its habitat in British Columbia. Because populations of painted turtles depend on low adult mortality, protection of this life stage is critical. One of the major threats is road mortality of females accessing suitable nesting habitat. This problem has been identified at several sites within the Columbia Basin. We attempted to mitigate the impacts of the road mortality at three sites using three different approaches. At Elizabeth Lake near Cranbrook, female painted turtles were being killed as they crossed Highway 3 in search of suitable nesting areas. In 1991 concerned local residents erected turtle crossing signs in an attempt to reduce mortality. The mortality continued and it was recognized that more extensive measures were required. In response to this, the Fish and Wildlife Compensation Program - Columbia Basin in conjunction with the Rocky Mountain Naturalists successfully developed alternative nesting habitat on the Elizabeth Lake side of Highway 3 to keep turtles from crossing it and an interpretative sign for educational purposes. In Revelstoke nesting females were being killed crossing Airport Road in search of suitable nesting habitat however the biggest concern was female turtles and their nests being impacted by people and their pets along a popular walkway which is also the primary turtle nesting area adjacent to the road. Alternate nesting areas were created away from the path but with little use by the turtles. Efforts then turned to public education including the establishment of an interpretative sign as well as successfully convincing the municipal government to relocate the path to the opposite side of the road. At the north end of Kootenay Lake female turtles were being killed crossing a secondary road in search of suitable nesting habitat. An alternative nesting area was created on the marsh side of the road resulting in limited success. The majority of turtles were using an existing ungulate trail to access the road so in 2002 a drift fence was installed from the trail to direct the nesting turtles to the alternative nesting area, which proved successful. Nest predation at all three sites continues to be a problem.

Poster

MOVEMENT PATTERNS OF ADULT WESTERN TOADS, *Bufo boreas*, IN FRAGMENTED LANDSCAPES

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In fragmented landscapes, dispersal ability and movement behaviour are critical factors determining the persistence of a threatened species. I used radio-telemetry to follow the movement patterns of adult western toads in a fragmented landscape. Toads were experimentally translocated into either forest patches or clear-cut patches, and their movements followed on a daily basis. Preliminary results and conclusions will be shown.

Poster

DULISSE 1

RECENT RANGE EXTENSIONS FOR THE RACER (*Coluber constrictor*) IN SOUTHEASTERN BRITISH COLUMBIA

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The blue-listed racer (Coluber constrictor) is a large, fast snake typically associated with open grassland habitat and sparse tree cover in the dry areas of the southern interior of British Columbia. The species has only recently been known from the lower Columbia Valley of the West Kootenay region. Inventory work conducted during the 2005 and 2006 field seasons has extended the known range of the species north along the Columbia River from the U.S. border to Trail and east along the Pend d'Oreille River to Limpid Creek. The racer often co-occurs with two other species at risk, the western skink (*Eumeces skiltonianus*) and rubber boa (*Charina bottae*), which presents an opportunity to manage for multiple reptiles of concern. Several racer occupation sites are on private land so conservation outreach projects will be pursued at these locations.

As part of this project, we attempted to implant racers with radio transmitters to determine movements and habitat use. Although the weight of the transmitters were well under five percent of the body weight of a typical adult racer, it was determined that the volume of the transmitters were too large, even in comparison with large adult racers. For example, when we attempted to implant a large individual, the transmitter was 48% and 21%, respectively, of the width and cross-sectional area of the snake's body cavity. In our opinion, this would have represented an unacceptable impact to the individual, so the snake was not implanted. Transmitter size presents a major challenge when working with narrow-bodies snakes such as the racer.

Poster

DULISSE 2

WESTERN SKINKS IN SOUTHEASTERN BRITISH COLUMBIA

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An inventory and habitat assessment for the blue-listed western skink (*Eumeces skiltonianus*) was conducted in the West and East Kootenay regions of British Columbia during 2004 and 2005. Western skinks were located at 41 out of 91 sites surveyed. Data collected from other sources confirmed skinks at another 86 locations to make a total of approximately 127 known occupied sites within the West Kootenay. The easternmost records were for the Creston Valley and skinks were confirmed at several locations northward along Kootenay Lake as far north as Pilot Bay and Ainsworth. Vallican remains the northernmost confirmed western skink location in the Slocan Valley but the species may occur at New Denver and Rosebery. Western skinks are relatively common from Syringa Provincal Park, south along the Columbia River Valley to the U.S. border and throughout the Pend d'Oreille River Valley. At occupied sites, western skinks were the most commonly encountered reptile and they often co-occurred with northern alligator lizards (*Elgaria coerulea*) and rubber boas (*Charina bottae*). Skinks were located primarily in low elevation dry forest and mixed grassland habitat. Important habitat components included sites with low crown closure, warm aspects, loose soil substrates, and an abundance of cover objects, such as rocks with nearby grass, shrubs or woody debris. The conservation of skink habitat is especially important considering the patchiness of suitable sites in many areas and the species' apparent lack of ability to move between habitats. Loss of habitat through development activities and forest ingrowth are probably the primary threats to the western skink in the study area.

Oral

SMALL STREAMS: WHAT BUFFER STRIP WIDTH IS NECESSARY TO PROTECT AMPHIBIAN HABITAT?

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Small streams (ephemeral, intermittent, small permanent) are not currently consistently protected during timber harvesting in Alberta. To support production of relevant timber harvesting guidelines, we initiated a project to examine the relative abundance and spatial distribution of amphibians in riparian habitat around small streams in the boreal mixedwood forest of Alberta. During 2006 (the first year of the project) we established pitfall trap / drift fence arrays at eight sites to sample amphibians. We also sampled vegetation to determine if amphibians are associated with particular habitat parameters. A total of 264 amphibians were captured during 5690 trap nights. We are presently in the process of analyzing the capture and vegetation data to determine the size of buffer strips that would be necessary to protect amphibian habitat around these small streams.

Oral

HABITAT SELECTION AND HOME RANGE SIZE OF BLANDING'S TURTLE (*Emydoidea blandingii*) NEAR THE SPECIES NORTHERN RANGE LIMIT

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Understanding habitat selection by Species at Risk is critical for effective conservation and management plans. In Canada, the majority of Blanding's Turtles (*Emydoidea blandingii*) live north of the Great Lakes, and populations in this region have been designated Threatened by COSEWIC, yet there have been no studies on the species in this region. Studies in Illinois, Nebraska, Nova Scotia, Michigan, Minnesota and Québec have produced a basic understanding of habitat use by Blanding's Turtles, although most studies have focused on life-history traits, home range sizes and movement patterns. Our study used radio telemetry to obtain preliminary data on movements and habitat use of adult Blanding's Turtles near the northern limit of the species range. Habitat was characterized into 5 types; pond, stream/oxbow pool, sphagnum marsh, stream delta and sedge meadow. Since a large portion of an individuals' home range is available to it at any point in time, we compare the percentage of radio locations within each habitat category to the percentage of land cover each habitat constituted in the study area. Home range size is calculated using the Minimum Convex Polygon Method and compared to sizes reported for other locations. This information will provide a basis for future investigations into microhabitat selection. In the future study we will develop predictive models based on habitat structure (water depth, vegetation stratification and species present, water temperature, substrate depth, etc.). The overall goal of our study is to characterize the critical habitat requirements of Blanding's Turtles so that effective recovery plans can be implemented for this Species at Risk.

Student: Oral

SENSITIVITY ANALYSIS FOR AN EASTERN GEORGIAN BAY POPULATION OF SPOTTED TURTLES (*Clemmys guttata*) AND IMPLICATIONS FOR CONSERVATION

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The spotted turtle is listed as an endangered species in Canada. A population in eastern Georgian Bay, Ontario has been the focus of an ongoing long-term demographic study. The objective of the current project is to use these data to conduct Population Viability Analyses and to make recommendations concerning the conservation and management of the species. Demographic data from the Georgian Bay population were used to create a stage classified matrix. Mark recapture was used to estimate adult survivorship and population growth rate. Palpation and X-rays were used to obtain information on clutch size and fecundity. Egg survival was estimated using data from nests monitored in the Georgian Bay population, and data on egg survival were borrowed from other spotted turtle populations. Survival of turtles between the egg stage and adult stage was estimated based on the proportion of hatchlings required to survive to maturity to maintain the observed population growth rate. Sensitivity and elasticity analyses were used to identify the life stage for which changes in survival would have the greatest effect on the population growth rate and viability. Results of sensitivity analyses can indicate which life stage would be most receptive to conservation efforts. Future work will include development of Population Viability Analyses models which incorporate demographic and environmental stochasticity and the spatial structure of the population.

Student: Oral

HABITAT USE BY THE WESTERN RATTLESNAKE (*Crotalus oreganus*) IN THE INTERIOR OF BRITISH COLUMBIA, CANADA

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The western rattlesnake (*Crotalus oreganus*) depends on the low-lying grassland habitats that characterize the Southern Interior of British Columbia for overwintering, foraging and mating. These habitats are being increasingly altered and fragmented by urbanization and agricultural land use practices. Although habitat loss poses a major threat to the persistence of this species, there has been no rigorous evaluation of which habitats are essential to western rattlesnakes. In response to this need, we undertook a two year study on habitat use and movements exhibited by the western rattlesnake in the Interior of BC. We radio-tracked 12 adult male rattlesnakes and recorded characteristics of the areas surrounding relocations that could potentially affect snake behaviour such as thermoregulation and predator avoidance. Analysis is currently underway to determine which specific features best describe rattlesnake habitat during the summer season. At a larger scale, our research has shown that some rattlesnakes use areas not previously considered to be typical rattlesnake habitat. Some individuals moved out of low-lying grasslands and into higher elevation Douglas-fir forests (>1000m in elevation). We highlight the need for more research to determine whether the pattern of habitat use detected in our study occurs throughout the range of the western rattlesnake.

Student: Oral

ARE INTRODUCED BULLFROGS (*Rana catesbeiana*) THE VECTOR OF CHYTRID FUNGUS (*Batrachochytrium dendrobatidis*) SPREAD ON VANCOUVER ISLAND, BC?

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The amphibian chytrid fungus (*Batrachochytrium dendrobatidis*) has been implicated in catastrophic declines of amphibians in many parts of the world. Important vectors of introduction and dispersal are thought to be to be commercially traded amphibians such as the African clawed frog (*Xenopus laevius*) and the American bullfrog (*Rana catesbeiana*). Bullfrogs have been widely introduced in British Columbia and are expanding their range. In the summer of 2005, we sampled native amphibians and bullfrogs in four bullfrog and four bullfrog-free sites on southeastern Vancouver Island. We used Quantitative Real-Time PCR to detect fungal presence and quantify infection load. Bullfrogs at all sites showed high prevalence rates and infection loads. Some native amphibians, in particular Pacific treefrogs (*Hyla regilla*) and roughskin newts (*Taricha granulosa*) also tested positive for the presence of the fungus in both bullfrog and non-bullfrog sites. Prevalence rates and infections loads were often lower in native amphibians compared to bullfrogs. Preliminary results suggest that *B. dendrobatidis* is widespread on southeast Vancouver Island and that bullfrogs can act as vectors of spread. However, whether bullfrogs are the only vectors of introduction and spread of *B. dendrobatidis* remains unclear. Ongoing surveys are targeting areas outside the range of the bullfrogs to resolve this question.

Oral

GREAVES 1

SHORT SEASONS AND LIMITED RESOURCES: LARGE WOOD TURTLE (*Glyptemys insculpta*) HOME RANGE SIZES IN NORTHERN ENVIRONMENTS

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In northern extremes of their range, turtles are confronted with harsh conditions which include lower productivity, shorter active seasons, and extremely cold climates. We hypothesized that in order to achieve the same amount of nourishment as a southern conspecific, turtles in our northern population will have to be more active and increase their home range sizes to cope with limited resources and time. The purpose of this study was to describe seasonal home range size, habitat use, and movements of wood turtles (*Glyptemys insculpta*) in Ontario at the northern extreme limit of their range to test for an increase in home range size with an increase in latitude. The study was conduced from 2 May until 20 October in 2005 and 2006. Wood turtles were radiotracked 2-3 times per week in both study years. Data collected in 2005 showed that home range (MCP) sizes did not differ between the sexes (females = 58.5 ha, males = 59.2 ha). Females displayed large movements (> 1 km) to nesting grounds with one turtle moving 5.7 km to nest. However, males were more active than females during the study and when the nesting period was removed from the analysis, home range sizes differed between the sexes (females = 6.6 ha, males = 59.2 ha). The large discrepancy in home range size between the sexes may be due to increased searching for mates by males in order to increase their fitness in the much shorter growing and activity period in the north; however, data for the second year of the study are still being collected and we are awaiting the final results to see if this relationship is held across years. Data collected for this study will provide a better understanding of variable wood turtle requirements among populations and will have implications for management and conservation of this species at risk.

Student: Oral

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

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In extreme northern locales, ice-cover of wetlands may last upwards of six months; thus, reptiles in northern environments are faced with the challenge of seeking refuge for protection from freezing temperatures for a large portion of their annual life cycle. These long periods of overwintering for northern turtles increase the need for anaerobic respiration during winter which can lead to metabolic acidosis and ultimately death of the individual. Low temperatures also decrease turtle mobility leaving them vulnerable to predation; therefore, selection of good hibernacula are critical for successful overwintering. The purpose of this study is to quantify thermal, physical and chemical selection of overwintering sites by wood turtles (*Glyptemys insculpta*) at the northern extreme of the species range. We tested dissolved oxygen weekly in 8 hibernacula and biweekly in 23 random stations. We hypothesized that winter activity of wood turtles may be related to the search for higher concentrations of dissolved oxygen (DO) and predicted that wood turtles would select the main river for overwintering as opposed to other aquatic habitats (e.g. oxbow, ephemeral pool, tributary) because other aquatic habitats should have lower dissolved oxygen levels. We tested temperature selection with dataloggers on 8 radiotracked turtles and 41 random aquatic temperature stations. We tested for physical structure selection by mapping out depth, sediment, and physical structures available along a 1.5 km stretch of river used for overwintering. Data collected for this study will provide insight into whether overwintering is a limiting factor in northern extremes of the wood turtles range. Data can also be applied to development and implementation of conservation strategies for wood turtles through understanding the critical habitats and parameters required for overwintering.

Student: Poster

AGE STRUCTURE INSTABILITY AND ITS EFFECTS ON POPULATION SIZE IN FOWLER'S TOAD, *Bufo fowleri*

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Fluctuations in population size among amphibians and other organisms are the result of many, oftentimes synergistic, influences upon recruitment and survivorship rates but, in a small ectotherm, growth rate may also be an important factor affecting recruitment into the adult population. Intensive long-term population studies are invaluable for providing data on how individual populations may behave under changing conditions and for estimating demographic parameters. A population of Fowler's toads (*Bufo fowleri*) on the north shore of Lake Erie has fluctuated considerably over 19 years with little obvious pattern. Age determinations of using skeletochronology and mark/recapture methods have been made for this population for more than a decade. Although the majority of adult males breed at two years of age, both age structure and age-specific survival are highly variable from year to year. In particular, the proportion of one-year old adults varies considerably from year to year, evidently coupled with the opportunity for rapid growth by juveniles the previous year. Coupled with low survivorship amongst all age classes, this may explain the observation that adult males tend to be smaller on average when the census adult population size is high. Along with birth and death rates, growth rate leading to variable age of recruitment into the adult population is a third important factor affecting amphibian population size.

Oral

HABITAT RELATIONSHIPS OF AMPHIBIANS RELATIVE TO RIPARIAN MANAGEMENT ZONES IN WESTERN WASHINGTON STATE.

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Riparian habitats in the Pacific Northwest are home to a diverse group of flora and fauna and are often more diverse than adjacent upland habitats. Similarly, the abundance of certain species can also be higher in riparian zones. Because of the unique and important habitats that riparian ecosystems provide, retention of riparian zones in managed forests has become increasingly important; however, the efficacy of riparian management zones in providing habitat for amphibians over the long-term has not been adequately studied. Riparian buffer width criteria used in the Pacific Northwest are based largely on the requirements of fish, not terrestrial animals and empirical data to support those criteria are lacking. Conservation of amphibians in forested habitats of the Pacific Northwest has been linked to the retention of riparian management zones around 3rd and 4th order streams; however, data in support of this link is non-existent. To address this, I studied the habitat associations of amphibians in riparian habitats and compared them to adjacent upland logged habitats over three time intervals: pre-logging, two years post-logging, and ten-years post-logging. I describe the habitat associations over the three sampling intervals for two common species *Plethodon vehiculum* and *Ensatina eschscholtzii* and an old-growth related species *Ascaphus truei* relative to logging and two different riparian buffer zone treatments. My data suggest that, while there are obvious changes in habitat structure and complexity at my study sites over time, the change in relative abundance is not necessarily linked to habitat change nor does the width of the buffer matter equally for all species. Observed changes in relative abundance are likely regional rather than local and habitat alteration is only one of myriad possible explanations for the observed change. These results are discussed in the context of riparian buffer width retention and forestry management.

Student: Oral

DEVELOPMENT OF A HERPETOFAUNAL MONITORING PROGRAM FOR THE LAKE SUPERIOR BASIN: A PRELIMINARY REPORT.

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Concerns regarding widespread declines of amphibians and reptiles have led to the development of numerous monitoring programs. An important issue facing all monitoring programs is species detectability. Because species activity patterns and abundance can differ spatially and temporally, detectability can also be quite variable. Standard monitoring methods may also differ in how well they detect a target species. Even when an appropriate survey method is selected, detectability can vary for any species based on its diel and seasonal activity patterns. Typically, monitoring programs sample a site on only a few occasions during an activity season. Because species activity can vary on a daily basis, using a limited number of surveys tends towards more false negative conclusions on presence. The distribution and status of herpetofauna in the Lake Superior Basin is poorly documented and a need for a basin-wide monitoring program exists. Two important questions that should be considered before monitoring programs are initiated are which survey methods work best and how detectible are the target species? In 2006, we compared six standard methods to detect amphibians and reptiles (call surveys, funnel trapping, turtle trapping, cover objects, visual encounter surveys, and casual observations) at two locations (Thunder Bay District, ON; Pictured Rocks National Lakeshore, MI) in the Lake Superior Basin. At each location we chose a minimum of 14 sites (3 lakes, 3 ponds, 3 temporary pools, 5 uplands). Using each method, we surveyed sites a minimum of five times within a given time window to determine how detectable species were at sites where we knew they were present. We sampled during four time periods over the spring and summer to account for species phenology and species life history. Preliminary results indicated that call surveys and funnel trapping worked well for detecting most anurans and newts. Turtle trapping worked well but visual surveys may outperform trapping for detecting presence of painted turtles. Few salamanders were detected using visual encounter surveys and cover objects. However, cover objects were highly effective for detecting snakes in Michigan but not in the Ontario location. Detection probabilities varied widely among species, methods, sites, and among time periods. There was also considerable overlap in detection of individual species by several methods. We discuss the applicability of these methods for monitoring herpetofauna in the Lake Superior Basin and stress the need for evaluating methods prior to adoption in large-scale monitoring programs.

Oral

WOOD TURTLES ON THE ST. MARY'S RIVER, NOVA SCOTIA - A CAST OF THOUSANDS?

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The St. Mary's River watershed (~1500 km^2 and 1800 km of watercourse) in eastern Nova Scotia comprises landscapes highly fragmented and disturbed by 200 years of forestry and farming. Anecdotal evidence from land owners along the river suggests that the wood turtle population has been in decline for the past 30 years. However, wood turtle surveys between 2003 and 2005 along limited portions of the three main branches of the St. Mary's River yielded over 500 individual wood turtles, indicating that the population may be one of the largest in the species range.

The present study addresses two questions: 1) how large is the population within the entire watershed, and 2) are there any demographic indications of a decline? We used a stratified random survey design, defining six strata from an existing Ecological Landscape Classification system based on topography, drainage and soil characteristics. Eighty-five 10 m wide, 1 km riparian transects (representing 141 km of river or stream bank) were visually sampled by pairs of observers between 11 April and 1 June, 2006. All turtles found were sexed, aged, and measured. Injuries and parasites were noted.

The transects generated a conservative watershed-wide population estimate of 1083 breeding age adults (assuming 100% detectability). Among transect captures, 26% of individuals were juveniles between ages 1 and 8 y, and sex ratio of adults was slightly male-biased (1.17:1). Preliminary analysis of previous survey work suggests that these data underestimate the true population size at least two- to threefold. Although the population is presently large, the long-term population trend is still uncertain.

Oral

THERMAL ECOLOGY OF THE WESTERN RATTLESNAKE IN BC

Jared Hobbs*

The Northern Pacific Rattlesnake (*Crotalus oreganus oreganus*) (Holbrook 1840) is the only representative member of the Western Rattlesnake (*Crotalus oreganus*) that occurs in Canada (Ashton and de Queiroz 2001). The Northern Pacific Rattlesnake occurs within the dry southern interior grasslands of British Columbia (BC) and is designated as 'blue listed' by the Conservation Data Centre and as 'threatened' by the Committee on the Status of Endangered Wildlife In Canada (COSEWIC 2004). Restricted geographic range within BC, threats (habitat loss and persecution) and reported declines in the BC population (due to localized extinctions and reductions in population size) make this species a cause for conservation concern. To better manage the conservation of rattlesnakes managers need to be aware of the uniqueness of over-winter denning sites or hibernacula. Understanding the thermal characteristics of this life history component will inform conservation efforts and also aid in the more efficient detection of these hibernacula across the species' range in BC. I will present an examination of the thermal characteristics of this important aspect of rattlesnake ecology within its range in BC. My data will serve to: 1. Develop an improved understanding of the thermal characteristics of over-winter den features on the landscape; 2. Describe the thermal properties of snake body temperatures during the hibernation period; 3. Examine environmental temperatures concomitant with snake movements to and from dens during spring emergence and fall retreat. I will use a combination of field techniques, including the use of automated temperature data logging sensors, to advance our understanding of the thermal ecology of the western rattlesnake at the northern extent of its range. This research will improve our ability to manage for rattlesnakes, as well as other rare snake species, in the dry interior grasslands of BC.

Student: Poster

PATTERNS OF EVOLUTION OF FREEZE TOLERANCE IN ANURANS

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The ability of some anurans to survive extensive tissue freezing was first described by W.D. Schmid in 1982. Since that report, various aspects of physiological and biochemical responses to freezing have been explored. However, few of these studies have considered the evolution of freeze tolerance. Recent studies allow intraspecific and interspecific comparisons that yield some cues to the evolution of freeze tolerance. A lack of geographic variation in the freeze tolerance of gray treefrogs (*Hyla versicolor* and *H. chrysoscelis*) and similar physiological responses to freezing by Nearctic and Palearctic ranids suggest that freeze tolerance may be a very old adaptation in anurans. However, the possibility of convergent evolution of the physiological responses to freezing needs to be considered. Potential avenues of future research to resolve these issues will be discussed.

Oral

USING STABLE ISOTOPES TO DETERMINE ONTOGENETIC SHIFTS IN GREEN FROGS (*Rana clamitans*)

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Metamorphosing frogs undergo dramatic morphological and physiological alterations, which are pursued by shifts in diet. Green frogs provide an ideal model for illustrating ontogenetic shifts in diet because of their biphasic life history, and general abundance throughout most of Nova Scotia. Analyzing stable isotopes of carbon and nitrogen from green frogs, at various stages of development, can be used to illustrate and quantify these ontogenetic shifts. Stable isotopes of carbon can be used to indicate the long-term general diet of an animal, while the stable isotopes of nitrogen indicate the relative trophic position of an animal. The combined analysis of carbon and nitrogen isotopes indicates both the shift in diet and the resulting shift in trophic level as the frogs mature and shift from passive aquatic grazers, and scavengers to terrestrial predators. Adult, newly emerged and larval green frogs, as well as sediment samples were obtained from six wetland locations across Nova Scotia, for stable isotope analysis. Green frog and sediment samples were analyzed for $\delta^{15}N$ and $\delta^{13}C$ composition at the Stable Isotopes in Nature laboratory, U.N.B., Fredericton. Water samples, collected from each site, were tested for nitrate concentrations. Results indicated that larval green frogs typically occupy a lower trophic position than adults, and that the diet of adult frogs differs from that of the larvae. Tadpoles from wetlands with high nitrate concentrations were observed occupying equivalent or higher trophic levels than adults, although differences in general diet remained similar to those observed between tadpoles and adult from pristine wetlands. Therefore, the trophic position of green frog tadpoles, observed through stable isotope analysis, is artificially influenced by elevated concentrations of nitrogen in wetland waters. This indicates that nitrogenous pollution entering these wetlands has a profound effect on amphibian larvae. Similarly, tadpoles and sediments collected from wetlands with deep, anaerobic sediment had extremely depleted carbon values. Depleted carbon values likely resulted from methane, produced in the anaerobic sediments, entering the food web through methanotrophic bacteria and larval insects.

Student: Oral

JORGENSEN

PRAIRIE RATTLESNAKE FORAGING STRATEGIES: THE INFLUENCE OF CHANGING LANDSCAPES AND CHANGING RISKS.

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Optimality models often assume that organisms know the location of the resources for which they are searching. However it is more reasonable to assume that the searcher is “naïve” considering that the distribution and abundance of resources tends to vary both spatially and temporally. This being the case, search strategies should maximize the likelihood of encountering resource targets the locations of which are unknown. Past research on the foraging migrations of prairie rattlesnakes determined that long-distance (up to 25 km) fixed-bearing migrations from over-wintering dens are common. Simulation models provide evidence that fixed-bearing movements maximize the likelihood that prairie rattlesnakes will encounter prey and mates that are spatially clustered at points within a large area surrounding the den. Agriculture and roads in south eastern Alberta have significantly altered the landscape in which the prairie rattlesnakes forage and mate. It is expected that cultivation has also altered the distribution and abundance of resources, and more specifically prey sought by migrating rattlesnakes. 27 non-gravid female prairie rattlesnakes were radio-tracked in either native or agricultural landscapes near Medicine Hat Alberta to determine whether search strategies differ among rattlesnakes in the two landscapes. Our results suggest that individual prairie rattlesnakes do not alter their search strategy in response to agricultural landscapes but rather that mortality associated with traffic is contributing to selection for a search strategy that involves less risk.

Student: Oral

ALBERTA'S NORTHERN LEOPARD FROG RECOVERY PROGRAM

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In February 2004 the Minister of Alberta Sustainable Resource Development (ASRD) reaffirmed the listing of the northern leopard frog (*Rana pipiens*) as Threatened in Alberta, and formally initiated recovery efforts in the province. The formation of the Alberta Northern Leopard Frog Recovery Team followed shortly thereafter, and the Alberta Northern Leopard Frog Recovery Plan 2005-2010 was approved for implementation in late 2005.

The plan aims to restore viable populations of leopard frogs throughout their historical range in Alberta through habitat management, information and education, research and reintroduction of populations into vacant areas of the species' historical range.

In 2005, a detailed population survey was undertaken to document the distribution and size of the current northern leopard frog population in Alberta. Additional information on habitat threats and conditions were also collected at occupied and unoccupied sites to set the stage for a number of management (stewardship, reintroductions, etc.) and research (completion of a habitat suitability model) activities listed in the recovery plan. In 2006 occupied sites were further investigated to better understand the location of breeding habitat in order to facilitate future egg mass collections to support reintroduction activities. In addition, stewardship opportunities were identified and implemented at priority sites.

Population survey results in 2005 and 2006 indicated that northern leopard frog populations in Alberta remain small and fragmented, and in some areas vulnerable to further decline.

A research project involving the investigation of the genetic diversity of northern leopard frogs in Alberta was initiated in 2004 by the Alberta Conservation Association (ACA) and Alberta Fish and Wildlife Division (AFWD), in partnership with the University of Alberta. It is hoped that the outcome of this study will help determine the genetic variation in leopard frog populations in Alberta and help guide future recovery efforts.

Poster

I SAW A SNAKE! Are phone-in reports, sightings, and other information from the public a reliable inventory tool for snakes?

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Turning to public sightings and reports as a means of obtaining inventory information often is seen as a viable alternative to conducting costly and labour-intensive field surveys. The cryptic nature of snakes makes them especially difficult to inventory, particularly if the animals are not aggregated at overwintering sites or rookeries. For example, attempts to model and predict the best times for conducting inventory work in the field have proven somewhat fruitless. For the past 7 years, I have been collecting data on the accuracy of public reports and sightings on two threatened species of snakes in my area, namely the Great Basin Gopher Snake and the Western Rattlesnake. Situations where species reports were provided by a member of the public, and then subsequently verified through an on-site visit or the procurement of a specimen, have suggested that rattlesnakes often are accurately identified, but gopher snakes pose a great problem. Confusion with the common Western Terrestrial Garter Snake leads to a substantial number of the erroneous reports. I caution people who are conducting inventory projects of these and other animals to take public sightings and reports with the proverbial 'grain of salt'. In cases where multiple species of snakes co-exist, reports and sightings collected by the public should be used with extreme caution when determining the abundance and distribution of snakes.

Oral

DEFINITION OF COEUR D'ALENE SALAMANDER HABITAT IN BRITISH COLUMBIA.

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The Coeur d'Alene salamander (*Plethodon idahoensis*) occurs in northern Idaho, northwestern Montana, and southeastern BC (Special Concern in Canada and the US). Given the limited global range and number of occurrences in BC (n = 53), there is a requirement to better define the habitat of the species at the landscape, stream, and microhabitat scales to protect *P. idahoensis*. The goal of this study is to determine associations between relative abundance of Coeur d'Alene salamanders and habitat factors at four sites on each of three streams along an altitudinal gradient in Mount Revelstoke National Park. Night surveys were conducted from June through September during which salamanders were captured, measured, marked and released at their capture locations. Habitat variables reflecting geomorphology, hydrology, vegetation and climate were collected in 1 m^2 quadrats at salamander capture sites and in random locations throughout each transect. Salamanders are present on one of six plots above 950 m and on all six transects below 950 m. Abundance varied between streams and between transects on the same stream. Salamanders are patchily distributed throughout transects when present. The majority of salamanders are found within 2 m of the stream centre. The recapture rate was low (3%) and all recaptures occurred within the transect of original capture. Although this species is classified as fully terrestrial, we observed *P. idahoensis* retreating to water and swimming in the streams. Coeur d'Alene salamanders appear to be more abundant in the local area than previously thought.

Student: Poster

EVIDENCE FOR CRYPTIC LINEAGES AND RANGE EXPANSION FROM NORTHERN REFUGIA IN THE WOOD FROG, *Rana sylvatica*

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Although the post-Pleistocene range dynamics of recolonizing amphibians in North America are increasingly better understood, recolonization of the most northern regions and the impact of southern refugia on patterns of genetic diversity in these regions are not well reconstructed. Here we present a phylogeographic history of the widespread and primarily northern, wood frog (*Rana sylvatica*). We surveyed 551 individuals from 116 localities across the species' range for a 650 b.p. region of the NADH dehydrogenase subunit 2 and $tRNA^{TRP}$ mitochondrial genes and an additional 45 individuals for a 700 b.p. fragment of cytochrome b. Our phylogenetic analyses revealed three distinct clades corresponding to eastern, Maritime and western populations. Phylogeographic patterns within each of these clades were both similar and distinct from patterns found in other species. Specifically, we find evidence to corroborate eastern refugia located in the southern Appalachians near present-day North and South Carolina and in the interior plains in the lower Ohio River Valley. Current Maritime populations appear to have been colonized from the coastal refugium. However, a more northern refugium located in the Appalachian highlands appears to have been source for most other northeastern wood frog populations. *Rana sylvatica* populations in the Great Lakes region all appear to have been derived from a western refugium that was likely located in present-day Wisconsin. This refugium also appears to have been source for populations in the species' expansive northwestern range since we find no evidence to support additional, more western refugia.

Student: Oral

LESBARRÈRES

HIGHWAY FRAGMENTATION AND GENETIC DEPLETION OVER TWO DECADES IN ANURANS.

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Habitat destruction and fragmentation caused by highways can negatively affect animal populations, but a better understanding of the effects of highways on population genetic structure is still needed to improve conservation plans in urbanized landscapes. We investigated the degree of genetic variability and differentiation within and among seven *Rana dalmatina* populations located far from highly trafficked roads (non-fragmented populations), and four populations sampled on both sides of a major highway (fragmented populations). The degree of population subdivision was significantly higher among fragmented (F_{ST} = 0.238) as compared to non-fragmented populations (F_{ST} = 0.022) and also among bisected (F_{ST} = 0.263) as compared to non-bisected populations (F_{ST} = 0.173) from the fragmented group. Furthermore, in the four fragmented populations, significantly lower allelic richness as compared to non-fragmented populations was observed. Together with potential high levels of road mortality leading to smaller population size, these results suggest that separation by highways has not only reduced the genetic diversity and polymorphism in local populations over two decades, but also resulted in a higher degree of population differentiation, most likely due to genetic drift.

La destruction des habitats et la fragmentation causées par les autoroutes peuvent s'avérer néfastes pour les populations animales; cependant une meilleure compréhension des effets des autoroutes sur la génétique des populations est encore nécessaire pour améliorer les plans de conservation dans les paysages urbains. Nous avons examiné le degré de variabilité génétique et de différentiation génétique entre sept populations de *Rana dalmatina* éloignées de toute route présentant un fort trafic (populations non- fragmentées) et quatre populations situées a proximité d'une autoroute (populations fragmentées). Le degré de divergence des populations est significativement plus grand entre les populations fragmentées (F_{ST} = 0.238) comparées aux populations non- fragmentées (F_{ST} = 0.022). Parmi le groupe des populations fragmentées, on retrouve également une différence significative entre les populations qui sont séparées par l'autoroute (F_{ST} = 0.263) et celles qui sont parallèles à celle-ci (F_{ST} = 0.173). Par ailleurs, au sein des quatre populations fragmentées, on observe une richesse allélique significativement inférieure à celle des populations non- fragmentées. En considérant également le fort taux de mortalité routière réduisant probablement la taille des populations, ces résultats suggèrent que la séparation due à l'autoroute a non seulement réduit la diversité génétique et le polymorphisme des populations locales en une vingtaine d'années, mais a également conduit à un plus grand degré de différentiation génétique vraisemblablement due à la dérive génétique.

Oral

SARA AND THE AMERICAN ESA: EFFECTIVE TRANSBOUNDARY SPECIES PROTECTION?

Brent Matsuda

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After a 10 year gestation fraught with complications, Canada's Species at Risk Act (SARA) came into being in March 2003. With its last stages of development completed on June 1, 2004, this newborn legislation must grow alongside a much older Endangered Species Act (ESA), which has stirred controversy in the United States (US) since its birth in 1973. Developing a modest equivalent to ESA in Canada has been an uphill battle; Due to a lengthy and costly process in the US for approving projects potentially impacting threatened or endangered species and habitats, Canadian industry and other parties have been recalcitrant towards SARA's development. Although modeled after ESA, both Acts can learn from each other's experiences. Fundamental differences between them however, will determine their long-term effectiveness in protecting threatened and endangered species in North America. The pros and cons of SARA and ESA will be highlighted by discussing protection measures for amphibians that do not recognize political boundaries.

Oral

INFLUENCE OF WATER CONDITIONS ON THE EMBRYONIC SURVIVORSHIP OF THE OREGON SPOTTED FROG (*Rana pretiosa*) IN BRITISH COLUMBIA, CANADA.

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The Oregon spotted frog (*Rana pretiosa*) is an endangered species with only three known populations in Canada located in isolated sites in the extreme south-west corner of British Columbia. One of the populations has shown a steady decline while another has shown an increase during 1997 to 2000. This research examined the question of whether water conditions correlate with the embryonic survivorship at these populations.

At MD Aldergrove, mean embryonic survivorship for 2002 and 2004 to 2005 varied between 9% and 36% at sub site A and 78% and 88% at sub site B while at Seabird Island during 2002 to 2004 mean embryonic survivorship varied between 77% to 84%. No extreme water quality conditions occur at either of the two study sites and water quality did not significantly correlate with poor embryonic survivorship. Sulphate, pH, chloride and conductivity were the only water chemistry variables that differed significantly (or marginally) among sites. A weak positive correlation was found between chloride and embryonic survivorship and conductivity and embryonic survivorship.

Student: Oral

POPULATION TRENDS OF THE WESTERN RED-BACKED SALAMANDER IN GOLDSTREAM PROVINCIAL PARK, VANCOUVER ISLAND, BC

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Populations of plethodontid salamanders are thought to be stable when compared to other vertebrates, but long-term data exist for only a few species. Since 1992, we have monitored a population of Plethodon vehiculum in an old-growth mixed-wood forest on Vancouver Island using cover boards. Numbers of salamanders have remained remarkably stable across years, apart from an initial increase after the set-up of the boards. The ratio of juveniles to adults has also remained relatively stable. Recapture of salamanders marked with fluorescent elastomeres indicates that individual salamanders can live over 10 years, move little, and are site-tenacious over long periods. Analysis of 10 years of mark-recapture data using Program MARK showed that in the best supported model survival probability varied among sex-age classes and was the lowest for juveniles, and recapture probability varied with both year and survey effort.

Oral

BOREAL TOADS IN THE TEMPERATE NORTH: THE LAST STAND?

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Boreal toad (*Bufo boreas*) populations have severely declined or have essentially disappeared throughout much of their former range south of the Canadian border. In contrast, populations in southeastern Alaska and western Canada, although there are reports of putative declines from historical levels, are still prevalent. Given the pace of environmental change expected in the future and the emergence of chytrid fungus in this otherwise ecologically-intact region, there is a possible opportunity to test 2 major hypotheses concerning declines (climate change and chytrid fungus) as well as study the possible resiliency of boreal toad populations. To establish a distribution-monitoring baseline for boreal toads in southeastern Alaska, we derived patch-occupancy estimates over large spatial scales and in 3 monitoring areas with differing wetland regimes: lacustrine dominated, glacially-influenced riverine, and palustrine-dominated systems. The overall occupancy estimate in high-probability patches was 0.15+0.07 (n=248); a figure higher than simple encounter rates reported currently in regions with declines. Occupancy estimates did not vary significantly among 2 years with markedly different climates -- one of which was considered a “good” year (early breeding and reports of persistent breeding activity) and the other a “bad” year (late breeding with fewer incidental reports). Occupancy did, however vary considerably among the 3 monitoring areas (0.6-0.22) but reasons for these differences are not yet clear. Given the fungus was identified in the region in 2005, regional variation in fungal infection rates could be a factor but test results are not yet available. Within monitoring areas, the linkage among macro- and micro-scale factors appeared to explain variation in breeding occurrence: toad breeding occurred at shallow margins of deeper wetlands and wetlands that exhibited higher levels of landscape connectivity to other probable breeding sites. Distribution baselines established in this study demonstrate that breeding populations of the boreal toad are still prevalent enough to study and monitor in the region. Continued research and monitoring in this region could be important both for hypothesis testing concerning possible declines in this species and for exploring possible ways to mitigate the impacts of further possible declines.

Oral

RUSSELL R

AMPHIBIAN DISTRIBUTION IN NOVA SCOTIA ROADSIDE PONDS

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The negative effects of roads are a major concern in amphibian conservation. Habitat loss, isolation, direct mortality, edge effects, chronic disturbance, and toxic runoff are known to affect amphibians inhabiting roadside wetlands. Proximity to roads is a potential structuring force in amphibian communities. Road density in Nova Scotia is greater than the Canadian average so effects of roads on amphibians in this province may be particularly severe. Acidification of runoff water due to exposure of acidifying minerals in bedrock during road construction combined with the low buffer capacity of most Nova Scotia soils and water is a problem for many roadside wetlands. Runoff water containing chlorides and nitrates is known to affect amphibians. This study describes a field survey of amphibian species richness and distribution in roadside wetlands, water chemistry, and laboratory experiments on salt toxicity in common Nova Scotia amphibian species. This research indicates a significant negative relationship between chloride concentration in ponds and amphibian species richness. The effect of chloride in runoff water on amphibian species richness extends at least 50m into the adjacent forest. Spotted salamander (*Ambystoma maculatum*) and wood frog (*Rana sylvatica*) distributions are significantly affected by elevated chloride concentrations in roadside ponds while spring peeper (*Pseudacris crucifer*) and green frog (*Rana clamitans*) distributions are not. Acute toxicity experiments indicate that spotted salamanders and wood frogs are the most sensitive to salinity and spring peepers and green frogs are the least sensitive.

Oral

MICRO-HABITAT PREFERENCE IN THE NORTHERN PRAIRIE SKINK (*Eumeces septentrionalis*)

Jory Mullen and Pamela L. Rutherford*

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The northern prairie skink (*Eumeces septentrionalis*) was listed as Endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2004. The primary conservation issue for this species is habitat loss, which is occurring at their primary location, the Carberry Sandhills, but there has been little research done to identify the micro-habitat requirements of this species. This study examines summer micro-habitat preference in the northern prairie skink. We collected data on the capture location of skinks (open vs cover), and at the time of capture we recorded the temperature at the capture location, temperature in the open on the ground, and air temperature. Skinks were captured by hand, measured, weighed and sexed. All skinks were given with unique toe-clips. In addition, we conducted a study to compare use and temperatures of three kinds of cover materials (wood, carpet and linoleum) of three different sizes (small, medium, large). Two sets of these cover objects were placed at three separate locations at CFB Shilo, Manitoba, where skinks had been previously captured. We measured the temperatures under these cover objects during weekly visits to the sites.

Oral

DETERMINING EFFECTS OF INTRODUCED TROUT AND AERATION ON NATIVE AMPHIBIAN COMMUNITIES IN SMALL BOREAL FOOTHILLS LAKES

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Alberta Conservation Association (ACA) and Alberta Sustainable Resources Development (AB SRD) stock salmonids into small lakes to encourage recreational fishing. Introduced salmonids have negative effects in some freshwater ecosystems, especially naturally fishless unproductive alpine lakes. However, effects of trout stocking in highly productive and/or fish-bearing lakes are poorly documented. In 2005 we initiated a study of 11 lakes in the boreal foothills to document the effects of trout stocking and aeration on breeding amphibians. Lakes were grouped into three treatments: stocked (n=3), stocked and aerated (n=2), and unstocked (n=6). During our 2005 and 2006 field seasons, we assessed adult and young-of-the-year (YOY) amphibian abundance, emergence timing, size, and recruitment rate. In 2005, sampling focused on perimeter and transects surveys. In 2006 we conducted intensive call surveys and egg mass searches, transect, and pitfall trap (on a subset of 4 lakes) surveys. Three species of amphibians inhabit the lakes: the wood frog (*Rana sylvatica*), boreal chorus frog (*Pseudacris maculata*) and western toad (*Bufo boreas*). In 2005, we successfully saw and/or captured 94 boreal chorus frogs, 985 wood frogs, and 60 toads. During more intensive visual surveys in 2006, 293 boreal chorus frogs, 2103 wood frogs, and 525 western toads were encountered. Captured amphibians were identified to species, sexed, aged, and the snout-vent length (SVL; mm) and mass (using a pesola in the field) were recorded. In both years, adult and YOY wood frogs were the most abundant amphibian on all 11 lakes, whereas adult and YOY boreal chorus frogs and western toads were only found on a subset of stocked and unstocked lakes. A single lake in each of the stocked (without aeration) and unstocked treatments produced a large number of YOY wood frogs and western toads. Our study promises to provide valuable information to ACA and AB SRD on the consequences of trout-stocking on amphibian communities in the boreal foothills.

Student: Poster

ST-AMOUR

THE ROLE OF RANAVIRUS IN RELATION TO DEVELOPMENTAL INSTABILITY IN THE GREEN FROG (*Rana clamitans*)

Valerie St-Amour*[1] and David Lesbarrères[2]

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Amphibian populations are facing rapid declines and recent discoveries have shown that Emergent Infectious Diseases (EIDs) such as *Ranavirus* and chytrid fungus are playing major roles. Although these diseases are involved in the decline of certain populations little is known about the effects of these EIDs in relation to development. Developmental instability can be measured using fluctuating asymmetry (FA) which is often used as a tool to measure stress and the overall fitness of organisms. The theory assumes that an organism presents mechanisms that control asymmetry during development. Such mechanisms may be costly to the individual and when faced with other stressors it is believed that these mechanisms will suffer resulting in fluctuating asymmetry. Using standard and new genetic tools several populations of green frogs (*Rana clamitans*) were analyzed for presence or absence of *Ranavirus.* Individuals were then measured to determine FA under the hypothesis that FA will be more likely to be observed in individuals infected by *Ranavirus*. Our results clearly indicate significantly higher FA in infected individuals as compared to non infected individuals and the same trend was also observed within populations. This shows that not only are EIDs causing massive die offs they are also having further reaching effects on the development of those individuals carrying the diseases.

Student: Oral

THE ALASKA WOOD FROG MONITORING PROJECT: UTILIZING CITIZEN SCIENCE TO MAP THE DISTRIBUTION OF WOOD FROGS IN ALASKA.

David F. Tessler[1] and Tracey A. Gotthardt[2]

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The Alaska Wood Frog Monitoring Project was established in 2002 to obtain volunteer support in gathering baseline distribution data on wood frogs (*Rana sylvatica*) and their habitats in Southcentral and Interior Alaska. Concurrent objectives are to promote public involvement in the conservation of amphibians and wetlands, and to develop a robust volunteer program that can be utilized to monitor amphibian occupancy over time. Calling survey protocols follow the national standards set forth by the U.S. Geological Survey North American Amphibian Monitoring Project (NAAMP). We conducted educational training programs at schools and various public venues throughout Southcentral and Interior Alaska. In addition, we developed and produced a CD-ROM of training, outreach, and promotional materials for distribution to partnering entities, so that partners conduct their own public programs and training sessions, delivering a uniform message and methodology. We published the website www.akfrogs.net to provide background information, survey instructions, and data sheets for potential volunteers, and produced two educational posters for distribution to schools and youth groups. We contacted school districts, youth organizations, and conservation groups directly, and used a variety of mass media elements including radio, newspapers, and flyers to promote the project. In 2006, we extended outreach efforts to state and federal resource agencies dispatching field crews throughout the state. Surveys types included “roadside surveys” including 10 sites per route, “backyard surveys” of a single local site, and reports of incidental observations. Between 2002 and 2006, educational programs reached nearly 2500 individuals, and we received thousands more phone calls, website hits, and written requests for information. Two hundred and thirty eight volunteers conducted 1122 surveys at 281 unique sites: 272 roadside surveys, 291 backyard surveys, and 118 incidental reports. Some sites were resurveyed multiple times throughout a given season, and not all sites were surveyed in all years. Frogs were detected at 68% of sites, but the proportion of unreported negative results is unclear. Wood frogs have been observed from sea-level to 1100 meters; from the Brooks Range in the north, to Sleetmute and Shagaluk in the west, Tok in the east, and Cordova to the south.

Oral

FORESTRY MANAGEMENT, EDUCATION, AND ECOLOGY OF BRITISH COLUMBIA'S OMINICA AMPHIBIANS.

Mark Thompson*, Roy Rea, and Dexter Hodder

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Amphibians are mis-measured agents in British Columbia's forestry management because they are primarily addressed through legislation that targets fish riparian habitat. Fish riparian habitat differs—qualitatively and quantitatively—from amphibian riparian habitat. Terrestrial adult amphibians are found under the cover of detritus, leaf litter, and coarse woody debris where they consume a substantial amount of soil invertebrates. This behaviour serves key ecological functions in the transfer of energy and nutrients, such as carbon, between wetland and terrestrial ecosystems. Hence, there is a direct and dynamic link between forest soils and amphibians. Since 2004, University of Northern British Columbia's (UNBC) forestry students enrolled in "Field applications in resource management" are encouraged to consider amphibians in relation to strategic forestry management. Students are taken into to the habitat of amphibians where they are given a brief lecture on amphibian ecology and research methods. The field course is held at one of UNBC's two research forests, the John Prince Research Forest and the Aleza Lake Research Forest. This presentation includes an outline of our strategic plan and monitoring of British Columbia's northern interior amphibians. Results and progress on this initiative is presented in context of the natural history of amphibians in the Ominica region.

Oral

TURVEY

ASSESSING THE ROLE OF MICROHABITAT ASSOCIATIONS IN PRODUCING AMONG-TAXON CONGRUENCE

Shannon L. Turvey[1]*, John S. Richardson[1], and Melissa A. Hogg[2]

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Observational studies have demonstrated significant weak correlations in diversity across multiple taxa, but have generally failed to find evidence of strong across-taxa congruence. However, examples of experimental studies testing for across-taxa congruence as a result of an underlying ecological mechanism are largely lacking. One mechanism that may produce congruence is use of a common habitat element by several taxa. Downed wood (DW) is abundant in the Pacific Northwest and is utilized by small mammals, amphibians, and invertebrates for a variety of ecological functions. We have used experimental additions of downed wood to riparian areas in a BACI (before, after, control, impact) design to test for congruence in diversity across sites between small mammals, amphibians, and ground beetles due to their common use of downed wood as a habitat resource. The results of this study will be relevant to riparian management and to an evaluation of the effectiveness of biodiversity monitoring programs that utilize species-level indicators or indicators of habitat quality.

Student: Poster

NATURAL HISTORY AND HABITAT USE OF THE PLAINS GARTER SNAKE (*Thamnophis radix*) IN ALBERTA.

Krysia Tuttle

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The relationship between wildlife populations and habitat is an important component in studies of ecology and natural history, as well as a central factor in the development of management and conservation strategies. Most of what is known about the habitat use of temperate zone garter snakes comes from studies of the common garter snake (*Thamnophis sirtalis*). At northern latitudes, these snakes often have a characteristic annual cycle that includes communal over-wintering and long-distance migration between hibernacula and summer habitats. The western plains garter snake (*Thamnophis radix*) provides an opportunity to test the generality of this '*sirtalis* model' of habitat use in garter snakes. The natural history and the habitat use of these snakes were studied at the northern limits of their distribution in central Alberta in 2005 and 2006. Snakes were captured opportunistically and tracked using telemetry, and data were collected on population structure, food habits and habitat use. Snakes were captured most of the time in fields, even though fields comprised only 15% of the total available habitat. Snakes were also strongly associated with edge habitat between field and marsh vegetation. Five snakes were radio-tracked to individual over-wintering sites, and no communal den sites were identified. A logistic regression analysis is currently being developed for the use-availability data collected from these snakes.

Student: Oral

CHYTRIDIOMYCOSIS IN PACIFIC NORTHWEST AMPHIBIANS: DEATH AND PESTILENCE IN YOUR BACKYARD

Jim Johnson, Susan Belmont, and R Steven Wagner*

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Chytrid fungus *Batrachochytrium dendrobatidis* has been implicated in mass mortalities and declines of amphibian species world-wide, but had not previously been reported from Washington State. During March 2005, routine amphibian monitoring revealed a mass mortality event in the Central Cascades. Evidence suggests *Batrachochytrium dendrobatidis* is the most probable cause of mass mortality involving four species (*Hyla regilla*, *Rana cascadae*, *Ambystoma gracile* and *Ambystoma marcrodactylum*) recovered at Swamp Lake (Kittitas Co., WA). This evidence includes the presence of zoosporangia in skin sections, appearance and symptoms, PCR products amplified using primers specific for *B. dendrobatidis,* and DNA sequences of PCR products. In addition, this pathogen already appears to be widespread in Washington State. We have found evidence of *B. dendrobatidis* associated with the morbidity and mortality of *Rana pipiens* from Crab Creek (Grant Co., WA) and associated with living amphibians at a number of sites throughout the state. In consideration of the conservation status of the northern clade of *R. pipiens*, international efforts need to be developed to address species recovery.

Oral

DESCRIBING AN ASPECT OF CRITICAL HABITAT: GREAT BASIN GOPHERSNAKE (*Pituophis catenifer deserticola*) OVIPOSITION SITES IN BC

Kathleen White*[1], Dr. Karen Hodges[2], and Dr. Christine Bishop[3]

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Human development and agriculture in the Okanagan Valley are fragmenting habitats used by the federally threatened Great Basin Gophersnake (*Pituophis catenifer deserticola*), before critical habitat has even been described. Utilizing radio telemetry to observe snake behaviour and movement in various habitats, I determined critical habitat such as oviposition sites at several locations in the Okanagan Valley. What features characterize suitable gophersnake oviposition sites? I quantified various characteristics of the oviposition sites such as slope and vegetative cover to accurately describe this critical habitat type. Gophersnakes used locations on south facing slopes with sandy soil and sparse vegetative cover. As gophersnakes often make lengthy journeys from summer foraging grounds to lay their eggs, protecting these often scarce locations and corridors between them is key in conserving the species.

Student: Oral

USING STABLE ISOTOPES TO EXPLORE COMPETITION AND THE DIET OF CO-OCCURRING TADPOLES IN THE ASPEN PARKLAND OF ALBERTA.

Arthur Whiting*[1] and C. Paszkowski[2]

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Tadpoles in temporary wetlands may compete for resources, which may limit individual growth and overall success of populations at a location. The diets of boreal chorus frog and wood frog tadpoles were examined using stable isotope analysis (SIA). Differences in diets may permit coexistence of anuran species within a wetland. We monitored growth rates, density, and diet of boreal chorus frog and wood frog tadpoles at seven locations in the Beaver Hills. Chorus frog tadpoles grew slower than sympatric wood frog tadpoles, but metamorphosed earlier. Early results from SIA suggest that the two species do not overlap significantly in resource use, but is dependent upon pond conditions.

Student: Oral

SMALL AND UNPROTECTED: FROGS AND FOREST HARVESTING

Elke Wind

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In coastal British Columbia, small ponds less than 0.5 ha in size are not afforded protection under the *Forest and Range Practices Act*. These largely ephemeral sites are commonly used for breeding by numerous amphibian species. I began a study with Weyerhaeuser's BC Coastal Group in 2002 to investigate the impacts of forest harvesting on small ponds and associated amphibian populations. We initiated a pre- and post-harvest study at three forested sites slated for harvest in 2004/05. The results to date suggest that immediately after harvest most small ponds on south-eastern Vancouver Island contain more water and have longer hydroperiods than before logging. In addition, amphibians continued to breed in these habitats, with some species moving into 'new' ponds not formerly utilized for breeding. Climatic conditions play a major role in hydroperiod and the survival rate of larvae in these small ponds and long-term data are needed to understand the effects that green-up will have on these sites.

Oral

CONSEQUENCES OF SEDIMENT INFLUXES INTO PONDS ON SURVIVAL AND DEVELOPMENT IN THE WESTERN TOAD, *Bufo boreas*

Sylvia Wood*, Dr. John Richardson

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Alterations in the natural fluxes of material and energy from terrestrial to aquatic environments have the potential to affect aquatic species and communities. The impact of fine sediment loading on amphibian larval development and survival was studied in the Western Toad (*Bufo boreas*). Sediment levels were experimentally manipulated in pond mesocosms generating turbidity levels similar to those created by large run off events. Analysis of diet content, growth rates, primary productivity and metamorphic parameters indicated a strong negative influence of sediment on tadpole growth rates and metamorphic size. Results to be presented.

Student: Poster

Notes

11th Annual Meeting of CARCNET / RÉCCAR

Victoria British Columbia Canada

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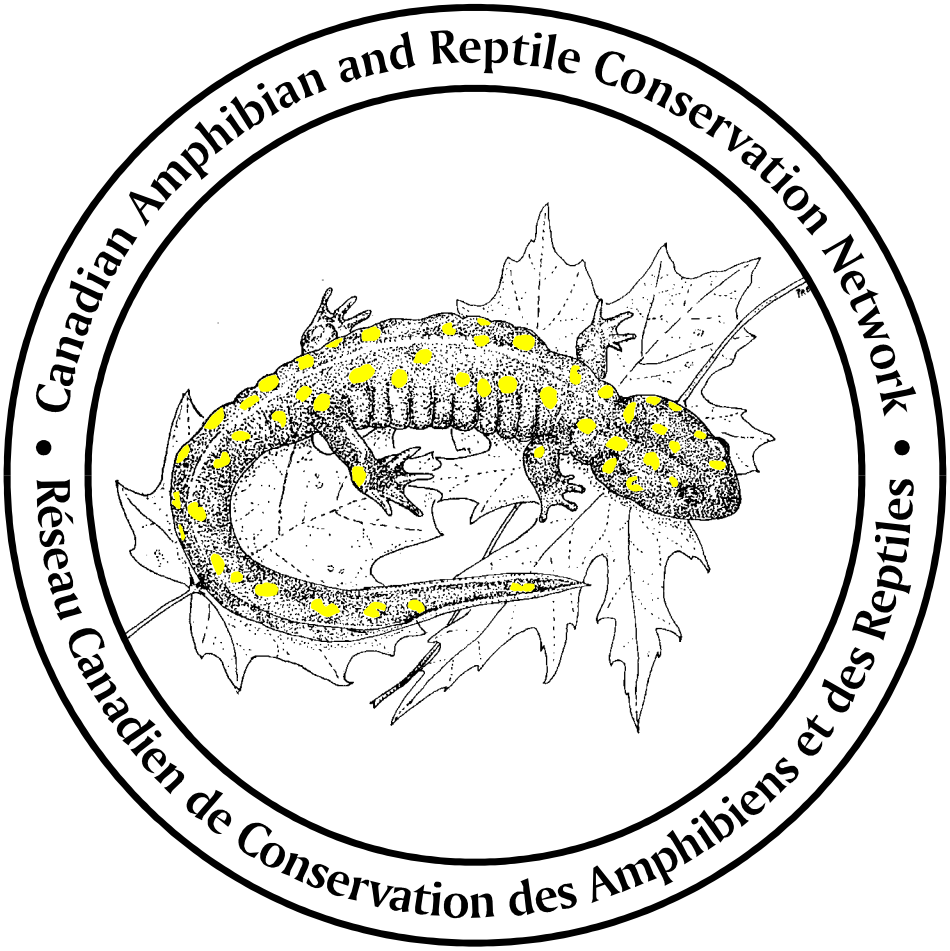

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