

7th Annual Meeting, Winnipeg, Manitoba September 27-30, 2002

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Abstracts of the presentations are available in print form through CARCNET.

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Presentation Abstracts:

AMPHIBIAN DISTRIBUTION IN NORTHWESTERN ONTARIO: ASSESSING THE ROLE OF LOCAL HABITAT AND LANDSCAPE CHARACTERISTICS

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Habitat loss is considered a serious threat to many amphibian populations, and has been implicated as a major cause of global amphibian decline. As a result of their dual-lives, and dependence on water, both aquatic breeding habitats and their adjacent terrestrial habitats are crucial for the persistence of amphibian populations and communities. From either ecological or conservation perspectives it is important to understand which habitat components may influence the occurrence of amphibians at a breeding site. We assessed the status of amphibians using presence/absence surveys, and investigated amphibian distribution and species richness with respect to local habitat and landscape characteristics at ponds. We repeatedly surveyed 69 ponds in Northwestern Ontario from 2001 to 2002. Local habitat characteristics evaluated include pond area, perimeter, volume, depth, bank slope, pH, conductivity, turbidity, and the structure of vegetation within and along the edge of each pond. Landscape variables were assessed using GIS software, and included forest cover, number of wetlands, lakes and rivers, length of paved and unpaved roads, landscape heterogeneity, and elevation within a 2 km radius of each pond. We observed ten species of amphibians throughout this study. Species incidence at all our ponds were as follows: *Pseudacris crucifer* (100%), *Rana sylvatica* (98.6%), *Bufo americanus* (91.3%), *P. triseriata* (66.7%), *R. septentrionalis* (63.8%), *Hyla versicolor* (47.8%), *R. clamitans* (26.1%), *R. pipiens* (13%), *Ambystoma laterale* (13%), and *A. maculatum* (11.6%). Species richness over the two-year period was approximately 4.6 ± 0.14 , and preliminary multiple regression analyses suggest that species richness is associated with depth, volume, pH, conductivity, and emergent and edge vegetation. Furthermore, preliminary logistic regression analyses suggests that each species is associated with a different set of habitat characteristics, except *P. crucifer* and *R. sylvatica* which were present in all ponds. These results will enable us to predict species presence at a breeding site, as well as crucial aquatic and terrestrial habitat components for amphibians.

COMPARATIVE PHYLOGEOGRAPHY OF TWO NORTH AMERICAN FROGS: CRYPTIC LINEAGES, CONTACT ZONES AND CONSERVATION PRIORITIES

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Phylogeographic perspectives increasingly influence priorities in conservation, providing insight into such areas as the geographic distribution of evolutionary independent population segments (ESUs), the location of contact zones, or the presence of cryptic species. Further, comparisons across co-distributed species can both clarify the roles of history and ecology in shaping present-day patterns of genetic diversity and help determine conservation strategies for regional

biotas. For example, regions containing distinct ESUs across a range of species may be candidates for high conservation priority because each houses a significant proportion of the evolutionary legacy of considered taxa.

To this end, we compared phylogeographic patterns in two evolutionarily and ecologically distinct anurans, spring peepers (*Pseudacris crucifer*) and bullfrogs (*Rana catesbeiana*) using mitochondrial DNA sequences. For both species we found pronounced and roughly concordant phylogeographic structure with evidence for historical fragmentation, expansion and isolation by distance. Our analyses further suggest that: 1. south-central Ontario is a suture zone, where long-separated lineages have come into secondary contact following the last Pleistocene glaciation, approximately 10-15,000 ybp., and 2. in a Canadian context, extreme southern Ontario may be a conservation priority not only because it contains herpetofauna found nowhere else in the country, but also because it captures a significant portion of the phylogenetic history of traditionally regarded "species."

EUROPEAN WALL LIZARDS (*PODARCIS MURALIS*) IN VICTORIA, BC.

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The European Wall Lizard was introduced in Victoria in the late 1970's. These lizards are well established at the original introduction site and at a minimum of two other sites. Dispersal appears to be through diffusion and jump-dispersal, similar to what has occurred in an introduced population of wall lizards in Cincinnati, Ohio. The areas inhabited by wall lizards in Victoria are disturbed, for example a power line and roadsides. The effects of wall lizards, if any, on the native Alligator lizard (*Elgaria coerulea*) are unknown. Differences between the two include their general behavior and modes of reproduction; their diets appear to be similar. Alligator lizards and wall lizards are known to occur together in Victoria. Analyses of habitat use and behavior experiments aim to identify any potential effects of wall lizards on alligator lizards.

ACTIONS OF THE HERPETOFAUNA CONSERVATION ACTION GROUP IN THE SOUTH OKANAGAN.

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In 2002, this group formed to draw up recovery plans for a suite of reptile and amphibian species in the south Okanagan. Currently, we are preparing recovery strategies for great basin gopher snake, tiger salamander, great basin spadefoot toad, night snake, and plan to write up a COSEWIC report for the new species *Crotalus oregonus* recently identified for BC. Our strategy is to prepare these strategies separately because that is how the species at risk system currently handles recovery plans, but to apply for funds for many of the species as a related

group of animals sharing similar habitats. We are presenting our strategy in hopes that others in the country might try the same approach especially with the impending passing of the federal Species At Risk legislation.

TESTING ACCURACY AND PRECISION OF SKELETOCHRONOLOGY IN KNOWN-AGE BULLFROGS (*RANA CATESBEIANA*) FROM A NORTHERN POPULATION

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Skeletochronology is a widely used histological technique to estimate age in amphibians and reptiles which exhibit cyclic patterns of growth. Currently, it is the most widely used method to estimate age in amphibians and ages derived from skeletochronology form the basis of demographic analyses in which survivorship, age at maturity, and age-specific growth and fecundity are calculated. Although the method has been widely used for more than 20 years, we are unaware of any study that has validated skeletochronological estimates using known-age specimens. We tested two hypotheses based on the assumption that skeletochronology does indicate age accurately and precisely (i.e. has high repeatability). We predicted that (a) estimated ages would be accurate, (b) that observers would detect the correct sequence in samples taken from frogs in consecutive years, and (c) that estimates of age or sequence would not be strongly biased by observer expectancy. Lastly, we tested for differences in accuracy between experienced and novice observers. Cross-sections of the second phalanx of the forelimb toes were histologically mounted, photographed and archived on CD's so that visual projections could be enlarged on a screen to conduct counts of growth lines. Both experienced and inexperienced observers provided estimates significantly different from true age, had low success in determining the correct sequence of successive years of samples for individual frogs, and were significantly influenced by observer expectancy bias. Experience had no significant effect on observer performance. We conclude that skeletochronology is unreliable, inaccurate and essentially useless to estimate age in this population of bullfrogs.

AN ANALYSIS OF POPULATION VIABILITY OF THE WOOD TURTLE (*CLEMMYS INSCULPTA*) IN SOUTHERN ONTARIO

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Population data on the southern Ontario population of wood turtles (*Glyptemys insculpta*) from 1988-2002 were combined with relevant life history parameters to test the hypothesis that this population is viable and to recommend management initiatives to ensure the population remains viable. In 1993, the Maitland population probably consisted of about 300 adults and juveniles, largely confined to two small streams. By 2002, the populations had declined to fewer than 100 individuals. Only 2 or 3 new turtles have appeared since 1993, hence the population in 2002 is only 30% of that in 1993 and all the turtles are 10 years older, most are older than 30 years. The decline was likely due to a poaching event that occurred in 1994 or 1995. A population viability

analysis indicates that given typical age-specific rates of survival, age at maturity, fecundity, and sex ratio, this population will decline to zero in 50 years. Maximizing any single life-history parameter (e.g. raising survival of eggs to hatching to 100%) will not prevent extinction of the population within a few decades. If survival is maximized for all major life-history stages (egg, hatchling, juvenile, adult), the population could recover to 1991-93 levels in about 60 years. Without timely intervention by protecting nests, headstarting hatchlings to release as juveniles and protection of all turtles from collecting, the population will die out. Headstarting has not been tested in this species, but if it is not undertaken soon, prospects of success will be very dim.

TURTLE SPECIES LOSS AND SHIFTING POPULATION STRUCTURE AT POINT PELEE NATIONAL PARK: THE EFFECT OF PREDATORS?

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Point Pelee National Park (PPNP) was historically the location of greatest turtle diversity in all of Canada. Seven native species have been reported from PPNP: painted, snapping, Blanding's, map, stinkpot, spotted, and spiny softshell. However, like many other turtle populations worldwide, populations of many species at PPNP appear to be declining and some may already be extirpated. Our objectives were to determine the status of turtle species at PPNP and possible causes of declines. We conducted visual surveys and trapped turtles at 16 sites in 2001. We focused on 'hot spots' in 2002 to obtain more accurate population estimates. We also conducted extensive foot searches for species at risk in 2002 focussing on species not found in 2001. We trapped turtles using baited hoop, basking, and live traps, and by hand captures. Standard measurements, weight, habitat, and UTM coordinates of captured turtles were recorded and turtles were marked by notching the marginal scutes of their shell and painting numbers on their shells. We searched for nests in 2001 and 2002 and monitored half of all nests found in 2002 for predation. We marked 1596 individual turtles in 2001/2002 representing 5 of the 7 native species. Spotted turtles and spiny softshell were not found despite extensive search efforts. Populations of painted and snapping turtles still appear to be large but are significantly male-biased. Painted, snapping, map and Blanding's populations have significantly top-heavy age structures. The distribution of carapace lengths (age) when compared to data from 1972 suggests that there has been a significant shift toward older age classes for both snapping and Blanding's turtles. If this trend continues these populations can not be sustained. Nest predation (mostly by raccoons, skunk, and opossum) rates were 100% in some areas of the park. This high rate of predation appears to be at least partially responsible for the lack of recruitment into turtle populations at PPNP. recorded and turtles were marked by notching the marginal scutes of their shell and painting numbers on their shells. We searched for nests in 2001 and 2002 and monitored half of all nests found in 2002 for predation. We marked 1596 individual turtles in 2001/2002 representing 5 of the 7 native species. Spotted turtles and spiny softshell were not found despite extensive search efforts. Populations of painted and snapping turtles still appear to be large but are significantly male-biased. Painted, snapping, map and Blanding's populations have significantly top-heavy age structures. The distribution of carapace lengths (age) when compared to data from 1972 suggests that there has been a significant shift toward older age classes for both snapping and Blanding's turtles. If this trend continues these populations can not be sustained. Nest predation (mostly by raccoons, skunk, and opossum)

rates were 100% in some areas of the park. This high rate of predation appears to be at least partially responsible for the lack of recruitment into turtle populations at PPNP.

THE AMPHIBIAN SPERM INHIBITION TOXICOLOGICAL TEST (ASITT) METHOD

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The Amphibian Sperm Inhibition Toxicological Test (ASITT) method is fast, simple, cost-effective, and has the potential to contribute valuable information to a growing database of toxicological endpoints used to evaluate health risks. It will also decrease the number and suffering of amphibians as test organisms. ASITT measures the effects of environmental contaminants on various sperm kinematics (curvilinear velocity–VCL, straight line velocity–VSL, average path velocity–VAP, linearity–LIN, straightness–STR, wobble–WOB) and sperm motility phases (non-motile, idle, progressive, hyperactivated). The effects of pH, osmolality and zinc on *Xenopus laevis* sperm motility are discussed here. pH 7.0 displayed the highest percent motility of the entire range of pH's tested (5.5 to 7.8). Sperm solutions (SS) were diluted with distilled water (DW) in various SS:DW ratios (1:1, 1:2, 1:3, 1:4, 1:5) to observe the effects of osmolality on sperm motility. There was a significant quadratic dose response with percent total motile and percent progressives. The SS:DW 1:3 had the highest percent motility and highest velocities. The results from the pH and osmolality test series were used to develop a control solution for subsequent testing with zinc. Seven concentrations of zinc were used in this research (0 to 1417 µg/L). Zinc is prevalent in water downstream of acid mine drainage, and has been found at concentrations >10,000 µg/L. Increasing zinc caused a significant decrease in percent motility in a linear dose response, where motility reached 64% of controls at 1417 µg/L. Percent progressives also decreased in a significant linear dose response. Previous research has shown that a decrease in sperm motility negatively affects fertilization success in amphibians. As indicated by the present research, *Xenopus laevis* sperm motility is very sensitive to the aquatic environment and could act as a more sensitive water quality indicator than other indices. For instance, *Xenopus laevis* tadpoles show serious malformations to zinc at concentrations >2700 µg/L, compared to our results showing sperm inhibition at concentrations as low as 334 µg/L. This test is in very preliminary stages and more work in this area may lend weight to ASITT's effectiveness and usefulness as a standardized laboratory method for toxicity testing.

CONSERVATION ACTIONS TO REDUCE MORTALITY OF SNAKES ON ROADS AT CFB SUFFIELD AND SUFFIELD NATIONAL WILDLIFE AREA, ALBERTA

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Prairie rattlesnakes and bullsnakes make pronounced seasonal migrations from hibernacula along the South Saskatchewan River to summer foraging areas. These movements are strongly directional and many snakes traverse a road network adjacent to the river. Mortality of snakes arising from road traffic has been observed annually since research activities commenced in

1994, and recent acceleration of shallow gas development has resulted in increased road traffic. The biological factors, physical setting, and human activities which have made snake mortality on roads a management issue, and the conservation actions which have been initiated, are presented.

AMPHIBIAN AND REPTILE SPECIES AT RISK IN CANADA: THE ARRIVAL OF SARA

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There are now 48 amphibians and reptiles on the Species at Risk list produced by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), a four fold increase over the past 10 years. This increase largely reflects the pace at which COSEWIC has been able to assess these species. Once the Species at Risk Act (Bill C-5), known as SARA, receives royal assent and is proclaimed, species listed by COSEWIC will receive legal protection at the federal level. SARA is currently in committee hearings before the Senate, having passed the Commons in May, 2002. After several previous attempts at endangered species legislation in the past several years, how SARA came to be written in its current form and finally passed is a story of compromises, frustrations, political deals, and procedural tricks. Once proclaimed, however, the law will directly or indirectly influence virtually all aspects of species conservation in the country. The genesis of the Bill in its current form and the species, particularly amphibians, it will affect will be discussed.

FOWLER'S TOADS: AN UPDATE - DISPERSAL AND VIABILITY OF FOWLER'S TOADS (*BUFO FOWLERI*) POPULATIONS IN CANADA

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Fifteen consecutive years of monitoring of Fowler's toads at Long Point, Ontario, from 1988 through 2002, has yielded accurate estimations of the numbers of toads present, relative numbers of juveniles and adults, recruitment, age structure, longevity, sex ratio, clutch size, and survivorship. The toads at this locality have undergone several cycles of population rise and fall related to variations in recruitment, immigration, and over-winter survival. Extensive mark-recapture data demonstrate that although the majority of toads move very little, about 2% may move surprisingly far. Over a year, the maximum distance between successive captures may exceed eight kilometers. Juveniles and adults disperse with equal propensity. However, the three extant localities of Fowler's toads in Canada are further apart than the minimum distance required for genetic cohesion via dispersal. Evidence from mitochondrial DNA control region sequences shows that there has been little historic genetic exchange among the localities along the northern shore of Lake Erie.

LANDSCAPES WITH REPTILES: SNAKES AND ROCKS IN AN URBAN MATRIX

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Growth of urban areas results in loss of habitat for wild species, but diverse species can persist in such landscapes, especially if remaining habitat patches are large. The valley of Sixteen-Mile Creek in Oakville, Ontario is a striking example of such a situation. Despite housing development to its edge, numerous species of native wildlife, both small and large, inhabit the valley. Among these are six species of snakes, including one (the water snake, *Nerodia sipedon*) apparently no longer found anywhere else in the Greater Toronto Area. The six species are distributed unequally along the valley's length. For example, the water snake, although abundant, is confined to the southern part of the valley, which has had the longest exposure to urban development. Among key features that support this fauna are: 1. fairly limited development so far in the valley bottom, save for public walking paths; 2. an abundance of cover, especially rocks. All six species are usually found under rocks, sometimes in aggregations of either single or mixed species. However, propensity to use cover varies within and among species as a function of body size. Size of rock used also is correlated with size of snake. Manipulation of this kind of cover is thus a potentially valuable management and restoration tool.

ACTIVITIES OF THE OREGON SPOTTED FROG RECOVERY TEAM

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The Oregon spotted frog (*Rana pretiosa*) is Canada's most endangered amphibian with an average effective population size of 371 over four years of survey at three occupied sites. A recovery team was formed in 1999 and includes 15 individuals representing 12 organizations and/or branches of government. The team's long-term goal is to improve the Oregon spotted frog's long-term chances for survival and prevent its extinction, and to reclassify the species from endangered to threatened. A draft recovery plan is in place and suggests this species can be reclassified once 20 occupied sites with a total area of occupancy of 250 hectares and an average effective population size of 100 individuals at each site is established.

Recovery activities correspond with recovery objectives and fall under the general categories; survey, monitor, protect, populations, habitat, research, husbandry, species introductions, and education. Information resulting from specific recovery activities such as habitat creation and enhancement projects, radio-telemetry and habitat use study, annual monitoring, etc., is presented. A brief synopsis of funding sources is also presented.

REGIONAL STABILITY OF SPECIES RICHNESS AND INCIDENCE IN A HIGHLY DYNAMIC AMPHIBIAN FAUNA

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It is widely accepted that many local amphibian populations fluctuate drastically. Numerous studies now also suggest that many amphibian species exhibit metapopulation dynamics. However, there are few studies of long-term spatial and temporal trends in amphibian communities. Furthermore, an unresolved debate in ecology concerns whether communities behave more as equilibrium or non-equilibrium systems. Determining whether amphibian communities are stable, and if so, the scales at which it applies, has important implications for conservation. We studied patterns of species richness, incidence, and turnover in 35 pond communities in southwestern Ontario from 1992 to 2002. We conducted repeated annual surveys at 35 sites to construct accurate local species lists that could be compared spatially and temporally. Since 1992, we observed 14 species and generally highly dynamic local populations. Some species were common (eg. *Rana clamitans*, *Pseudacris crucifer*) while others were extremely rare (eg. *R. palustris*, *Ambystoma* spp.). Only one species showed any trend in incidence with time; annual incidence of spring peepers rose monotonically from 62% to 97%. This increase appears to be the result of a drought-induced shift from temporary ephemeral ponds to more permanent bodies of water. Turnover at local sites was high (average 17%) but did not differ among years or show any trend with time. Although local (re)colonizations and extinctions appeared to be common, they tended to balance out at larger spatial scales. Despite the high turnover, local species richness (average 4.2 ± 0.08) did not differ among years or show any trend with time. Since the mid-1800s southwestern Ontario has experienced much habitat loss and many local extirpations of amphibian populations have occurred. The region continues to be highly disturbed by intensive agriculture and urbanization. However, although the surviving fauna is highly dynamic, it appears to function as an equilibrium system and to be stable at the regional scale. Our studies emphasize the efficacy of using a metapopulation framework for understanding the dynamics of amphibians and highlight the fact that conservation efforts must operate at larger regional scales.

CONSERVATION OF FIVE-LINED SKINKS IN ONTARIO: GENETIC AND ECOLOGICAL PERSPECTIVES.

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Eastern Ontario's only lizard, the five-lined skink (*Eumeces fasciatus*) is found solely in two disjunct series of populations: southern Ontario (including Point Pelee National Park and Pinery and Rondeau Provincial Parks), and the southern Canadian Shield extending from Georgian Bay to St Lawrence Islands National Park. Most existing ecological data for these populations, including trends of decline, derive from long-term research in Point Pelee National Park. However, the conservation status of Canadian populations remains unclear; particularly as it pertains to genetic distinctiveness of southern and Shield populations and habitat usage of the latter. We have initiated and will discuss preliminary results from a study to address these data gaps using habitat data and tissue samples for 340 individuals from 11 populations.

Gross habitat features clearly differ tremendously between the southern and Shield populations. Southern Ontario populations are generally found within broadleaf deciduous forests with fertile soils and a relatively mild climate, while Shield populations occur in mixed deciduous/coniferous forest overlying acidic soil with patches of exposed granite outcrops. To see whether microhabitat features mirror these obvious large-scale habitat differences between northern and southern Ontario populations we used a series of 1m² quadrats to quantify proportion of different habitat elements (e.g. loose rock, lichen, leaf litter). Using a Classification and Regression Tree (CART) approach, we determined that in skink-occupied habitats loose rock cover is the single most important predictor of skink presence across Shield populations. This result parallels findings for southern Ontario where woody debris for cover was found to be an integral microhabitat feature (Hecnar and M'Closkey 1998).

For the genetic portion of our study, we have developed primers for a series of species-specific di- and trinucleotide microsatellites. We will use data from these high-resolution DNA markers and from mitochondrial DNA sequence to quantify the apportionment of genetic diversity across hierarchical levels, from within populations to range-wide, and will discuss the conservation importance of our preliminary findings.

THE NATURAL HISTORY OF THE GRASS SNAKE (*NATRIX NATRIX*) AT A SITE IN SOUTHERN ENGLAND.

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Although most squamates at high latitudes are viviparous, the oviparous grass snake (*Natrix natrix*) almost reaches the Arctic Circle in Scandinavia. As part of a study of the reproductive ecology of this species, we have collected data on its general natural history at a site in southern England. Grass snakes are abundant at this site, but are fairly inconspicuous because of their colour, their frequent association with dense vegetation, and their rapid escape response. However, once caught, grass snakes usually exhibit some degree of death-feigning behaviour before attempting to escape again. Like most other natricines, grass snakes are strongly sexually dimorphic: females grow to larger sizes than males, have bigger heads, and have shorter tails. Prey consist mostly of anurans, especially the introduced *Rana ridibunda*, but other kinds of prey also are taken. Our work on reproductive ecology is still in the early stages, but grass snakes lay large clutches of small eggs that produce small offspring; natural nest sites are presently unknown at this site.

NORTHERN LEOPARD FROG REINTRODUCTION PROJECT

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The northern leopard frog (*Rana pipiens*) was once a common and widespread species found throughout central and southern Alberta. During the late 1970s, the leopard frog experienced a dramatic decline over much of its historic range in Alberta. Today, existing leopard frog populations remain isolated and fragmented and are primarily restricted to the southern portion of the province. In 1996, the leopard frog was designated as "Threatened" under Alberta's *Wildlife Act*.

In 1998, the Alberta Fish and Wildlife Division began to explore the feasibility of a leopard frog reintroduction project. In response to a minimal potential for the leopard frog to re-colonize formerly occupied areas of its range, a pilot reintroduction project was initiated in 1999 at the Raven Brood Trout Station near Caroline, Alberta. The project involved the captive rearing of leopard frogs from egg stage of development to metamorphosed frog.

The primary objective of the project is to strategically re-establish leopard frogs at pre-selected sites in the upper Red Deer River and North Saskatchewan River drainages. Over the course of the study, a total of three release sites have been selected. All captive-reared leopard frogs are marked with a Visual Implant Elastomer (VIE) tag upon metamorphosis, providing an externally visible identification mark. This tagging system allows for the assessment of the survival success at each release site and the ability to monitor the dispersal of released frogs. Different tag colors and rear foot combinations help identify the year of release for each frog.

In 2001, several leopard frogs released in previous years were located at the first release site near Caroline, representing the first occurrence of leopard frogs in that area in nearly 50 years. The following spring at least three leopard frogs were heard calling from a pond within the same release study area and one leopard frog egg mass was observed. Two unconfirmed leopard frog observations have been recorded, in 2002, from the second release site near Rocky Mountain House, Alberta. Leopard frogs were released at a third pilot release site near Red Deer Alberta in 2002. Over-winter survival success at this new site will be assessed in the spring of 2003.

COMPARISON OF INDUCED EFFECT OF ORGANOPHOSPHATE (MALATHION) AND A PYRETHROID (CYPERMETHRIN) ON CHOLINESTERASE ACTIVITY IN LIVER, KIDNEY AND BRAIN OF THE INDIAN GARDEN LIZARD *CALOTES VERSICOLOR* DAUDIN

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Experiments were carried out to find the induced effect of organophosphate (malathion) and pyrethroid (cypermethrin) on the enzyme (cholinesterase) of Indian Garden Lizard *Calotes versicolor* Daudin. Two different concentrations 0.1 and 1% were used and the cholinesterase activity was estimated, in liver, kidney and brain. It was decreased up to 20 and 35% in liver, 27 and 54% in kidney and 8.7 and 38% in brain. In the case of malathion the decrease of cholinesterase activity was found as 30.27 and 66.97% in liver, 58.46 and 65.09% in kidney and 9.23 and 5.42% in brain, respectively.

SEARCHING FOR THE JEFFERSON SALAMANDER: HOW TO FIND AND IDENTIFY *AMBYSTOMA JEFFERSONIANUM*

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The Jefferson salamander (*Ambystoma jeffersonianum*) is a member of the mole salamander family. It became nationally threatened in November 2000, warranting the development of a recovery plan within two years of its listing. Jefferson's salamander is restricted to undisturbed, mature hardwood forests adjacent to fishless breeding ponds in southern Ontario. This habitat type is quickly disappearing. Development in existing habitats of this type, such as the Oak Ridges Moraine and the Niagara Escarpment, is now being challenged by the presence of Jefferson's salamanders. Efforts are being made to find old and new Jefferson salamander populations for the purposes of drafting a recovery plan and to avoid developing over important breeding and migration habitat. Because they are very rarely observed, little is known about their population distribution and abundance. There are several reasons why finding and identifying Jefferson's salamander can be problematic. The adults are very secretive, living in burrows and under forest debris, and can be found above ground for very limited periods of time throughout the year. Their involvement with other members of the *Ambystoma* genus in a unisexual hybrid complex complicates their identification. I will be presenting methodology used to find and identify *A. jeffersonianum* and members of the hybrid complex. Tips for identifying Jefferson's salamander adults and egg masses from other members of the genus will be provided. Focus will be on field methodology, and early season versus late season field sampling techniques will be covered. Lab methodology (raising larvae and allozymes) will also be touched upon.

THE GARDEN OF EDEN REVISITED: SNAKES, SEX AND SCENTS IN MANITOBA!

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My students and I have been studying the reproductive biology of the red-sided garter snakes of Manitoba for 20 years. Reproduction in snakes seems to be dependent on the production and perception of sex pheromones. One question we are examining is how chemical communication systems evolved in vertebrates by examining both the diversity of chemical signals and the underlying physiological and endocrinological mechanisms involved in their production and expression. Using state-of-the-art chemical techniques, we have isolated, identified, and synthesized the first pheromone in a reptile, the red-sided garter snake, *Thamnophis sirtalis parietalis*. Pheromones are thought to be potent reproductive isolating mechanisms. We have been exploring the role of variation in the sex attractiveness pheromone system of the red-sided garter snake. We now know that with a single tongue-flick, a male garter snake can determine not only whether another snake is a member of its own species, but also if it is a male or female, a female from the male's own den versus another den, a large female versus a small female (larger females produce more young), and whether a female is likely to reproduce this year or store his sperm for a following year. We are now expanding these studies to investigate a syntopic congener, the Western plains garter snake, *Thamnophis radix*.

Along with my collaborator, Rick Shine, our work on the garter snakes has examined fundamental questions such as male body size and mating success, size-assortative mating, mating plugs, female mimicry, antipredator tactics, thermoregulatory behavior, migratory behavior and others. Along with collaborators Steve Arnold, Mike Pfrender and Suzanne Estes, we are investigating the mechanisms by which female choice operates in this model species as well as the role inbreeding plays in the population genetics of these dens. We hypothesize that females may not be able to choose a particular male out of her hundreds of suitors; however, she may be able to choose how many times she mates. We are currently investigating the phenomenon of multiple mating, paternity analyses, and sperm competition in this species.

THE DESIGN OF AN ARTIFICIAL SNAKE DEN: RED-SIDED GARTER SNAKES IN THE INTERLAKE REGION OF MANITOBA, CANADA.

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This research investigates the design of artificial snakes dens (ASD's) as a means of providing a critical and limiting habitat resource for Red-sided garter snakes (*Thamnophis sirtalis parietalis*) in the Interlake region of Manitoba, Canada. Preliminary background research resulted in an understanding of: den requirements of the Red-sided garter snake, the characteristics of natural dens, and design precedents regarding artificial snake den design. This background research was used to determine a set of preliminary design guidelines for the design of ASD's. Subsequently, these guidelines were used to facilitate an interdisciplinary, participatory and collaborative workshop on designs for ASD's. The workshop focussed on preliminary designs for "landowner" and "research" artificial snake dens (LASD's and RASD's). The results of the background research and design workshop were used to propose conceptual designs for both a LASD and a RASD. Finally, based upon background research, the design workshop, and additional research, 38 design guidelines for LASD's and an additional 11 guidelines for RASD's were derived. The research suggests that the implementation of artificial snake dens could provide an important means of sustaining the Interlake population of Red-sided garter snakes. The research also suggests that the implementation of artificial snakes dens could be combined with opportunities for ecotourism and further research, particularly the formation of a National Centre for Herpetological Research.

EFFECTS OF ETHYNYLESTRADIOL ON EARLY DEVELOPMENT OF AMPHIBIANS IN A BOREAL LAKE.

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Amphibians are exposed to endocrine-disrupting chemicals that may ultimately contribute to population declines. The current study addresses the effects of a known hormone mimic on aspects of anuran development. Ethynylestradiol is a synthetic estrogen commonly detected in domestic sewage effluents. A study lake was dosed with 17 β - ethynylestradiol (EE2) at a mean

concentration of 6 ng/L, in May to October 2001 (Experimental Lakes Area, NW Ontario, Canada). Tissue thyroid hormone concentrations were assessed in cage-reared green frog tadpoles (*Rana clamitans*) from the EE2-treated lake and two reference lakes. Mean T3 and T4 concentrations were not significantly different among lakes. Growth and development rates of cage-reared green frog tadpoles were not significantly different among lakes, whereas hatch success was lower (though not significant) on the EE2-treated lake. Gonads of wild-caught mink frog tadpoles (*R. septentrionalis*) and cage-reared green and mink frog tadpoles were examined histologically. Low frequency of intersex was detected in caged (5.6%) and wild (1.6%) mink frog tadpoles from the EE2-treated lake, whereas no intersex occurred in tadpoles from the reference lakes. Few impacts of environmentally relevant concentrations of EE2 were observed for these anuran species.

SOME TECHNIQUES AND RESULTS FOR HABITAT RESTORATION FOR REPTILES AND AMPHIBIANS AT PELEE ISLAND, ONTARIO

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In the past 100 years several reptile and amphibian species have become extirpated from Pelee Island, Ontario due to habitat loss, persecution, road kill, and undetermined factors. Although a generalization, it is common knowledge that wildlife needs area (large scale habitat) and more specifically within habitats a range of microhabitat features is necessary for life history functions. For the past seven years we have created/restored both macro and microhabitat features for snakes, turtles, toads, frogs and salamanders, in efforts to stop further decline. Large-scale habitats that we have restored include prairie/old field, savanna, scrub and forest. Within this large-scale mosaic we have built and tested several microhabitat features for reptiles and amphibians including hibernation sites, "hot rocks", ephemeral wet scrapings, nesting and basking structures. Our target species include blue racer, Eastern fox snake, Lake Erie water snake, smallmouth salamander, Blanchard's cricket frog and American toad. We will present preliminary results from monitoring thus far and some brief plans and instructions on construction techniques.

BLUE RACER ROAD MORTALITY IN SOUTHWESTERN ONTARIO

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GOING SOUTH TO EXPAND THE CARCNET: PELEE ISLAND, ONTARIO, 2003

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Home to nearly 40 Species At Risk, Pelee Island, Ontario (4000 ha) also contains several unique Canadian reptiles and amphibians including the Lake Erie water snake, blue racer, smallmouth salamander, Blanchard's cricket frog (hopefully), as well as being the home of Canada's southern most human community. The 2003 CARCNET Conference will be held on Pelee Island (September 10 to 13) and the meeting will dovetail with the 3rd Annual Pelee Island Winery Endangered Species Festival (ESF) (September 14, 15). ESF is hosted by the Wilds of Pelee Island, a recently established *Outdoor Centre for Conservation* with support from the local Heritage Centre and the Pelee Island Winery. ESF was established for several reasons including the simple act of celebrating a legacy of diverse plant and animal life. Local residents and visitors are invited to experience and take pride in our rich natural life history, to learn more about our community, to laugh (at a comedy performance), to get active out-of-doors and to be artistic. We also acknowledge that small, rural communities, especially islands, in many respects share some characteristics with endangered species: small population size and isolation. The majority of Canadians live in cities and thus many are not connected with rural issues and lifestyles. Additionally, a measure of ESF's success is the calculated amount of money raised for local businesses and charities, which gives more credence to supporting natural area and species conservation. This talk will focus on the benefits of strengthening communities for improved conservation measures for reptiles, amphibians and other taxa, including other vertebrates, insects, etc. Efforts towards strengthening a multitude of community needs, results in positive outcomes for individuals, groups of people, and the environment.

IDENTIFYING CRITICAL HABITAT: GUIDANCE FROM PHYLOGENETIC, ECOLOGICAL, AND EVOLUTIONARY PERSPECTIVES

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The growing array of wildlife protection acts is forcing Canadian biologists to identify 'critical habitat' for endangered species. However, we currently lack any form of guidance that would encourage a consistent and scientifically defensible approach to this complex task. The development and application of such guidance would serve biodiversity conservation by promoting even treatment across taxa and geographic regions. Furthermore, guiding principles would increase the likelihood that valuable populations would be targeted and that functional, biologically significant parcels or networks of critical habitat would be identified. In general, critical habitat should contribute to the conservation of diversity, with particular recovery and population viability objectives differing among species. Given this, the identification of critical habitat might be best informed by a combination of phylogenetic, ecological, and evolutionary perspectives. A phylogenetic perspective would tend to prioritize the most divergent populations for protection and recovery action. An ecological viewpoint might emphasize support systems for the preservation of current diversity. Finally, an evolutionary perspective would value populations that maximize the potential for future evolution. Case studies of endangered snakes will be presented to illustrate how these complimentary viewpoints might be employed to guide critical habitat designations.

FUNDING INITIATIVES IN VIEW OF THE SPECIES AT RISK ACT

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BEHAVIOURAL RESPONSES OF THE SNAPPING TURTLE (*CHELYDRA SERPENTINA SERPENTINA*) AFTER EXPOSURE TO THE ENVIRONMENTAL POLLUTANT 4-OCTYLPHENOL

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Pollutants such as 4-octylphenol, an industrial chemical byproduct and estrogen mimic, pose a serious threat as an endocrine-disrupting agent to humans and wildlife. Our study examines environmentally relevant concentrations of water-borne octylphenol exposure to the snapping turtle (*Chelydra serpentina serpentina*). We hypothesized that hatchling snapping turtles exposed to octylphenol would exhibit poor neuro-behavioural responses, such as reduced feeding and poor motor skills. Six clutches of snapping turtle embryos from Algonquin Provincial Park (a 'pristine' reference site) were naturally incubated and excavated for laboratory studies 3 weeks prior to hatching. A sub-sample of embryos ($N_i = 84$) from each of the 6 clutches was randomly assigned to three treatments. The number of turtles used per treatment type include: negative control (well-water) $N = 24$, positive control (17 β -estradiol) $N = 30$, and treatment (4-octylphenol) $N = 30$. The 'righting-response' and the 'predator-response' were chosen as neuro-behavioural indicators. Beginning at 4 weeks post-hatch, body weight ($\pm 0.1g$) was measured biweekly with neuro-behavioral responses weekly. Treatment exposures were initiated on week 9 and ended at week 12. Body weight was also measured at 3 and 6 months post-hatch after which a sub-sample was sexed by gonadal inspection. For the righting-response, no differences within treatments were observed in the time from latency to righting and in time to complete righting. Comparisons between treatments showed that turtles righted faster when exposed to estradiol. Results are not yet available for the 'predator response' and the effect of sex. The octylphenol treatment had induced higher growth rates when compared to the control treatment. Growth following estradiol exposure did not differ from either the octylphenol or control hatchlings. Our data suggest that, at this exposure level, octylphenol did not exhibit effects on neuro-behavioral responses like those induced by estradiol. In contrast, octylphenol induced growth and appears to be a growth promoter.

THE NARCISSE SNAKE TUNNEL PROJECT: CONSERVATION THROUGH CO-OPERATION

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The Narcisse Snake Dens, with four active hibernacula, is internationally renowned as a unique natural phenomenon representing the largest concentration of snakes in the world. In the spring, following breeding, red-sided garter snakes (*Thamnophis sirtalis parietalis*) disperse to spend the summer feeding in marshes and meadows. Snakes return to the dens in late August and early September. A significant fall migration crosses Provincial Trunk Highway (PTH) # 17 immediately to the west of the Narcisse Snake Dens. Each fall passing motorists run over and kill as many as 20,000 snakes within this migration corridor. Manitoba Conservation embarked on a program of testing various mortality mitigation techniques with only limited success. In December 1998, the Narcisse Snake Mortality Advisory Group was formed to further study the snake mortality problem and develop a plan to deal with it in an effective and feasible manner. Shortly after the fall 1999 season, the advisory group was approached by a number of Manitoba Hydro employees who were familiar with the snake mortality problem on PTH #17. They felt that a solution might be achieved by installing 25 – 30 centimeter tunnels under the highway using the Corporation's horizontal boring equipment. After considerable discussion and planning, a co-operative partnership was forged to test the effectiveness of these smaller sized tunnels. Manitoba Hydro staff, with the assistance of a number of businesses and organizations, has since 2000 installed in total 12 pipes at various locations in the snake migration corridor. Drift fences have been installed to direct snakes to these tunnels, as well as an existing culvert. The effectiveness of the snake tunnel system has been monitored by capturing and counting snakes as they migrate through the tunnels. Through the cooperative efforts of Manitoba Hydro, Centra Gas and other project partners, snake mortality on PTH #17 has been reduced by approximately 75%.

EXAMINING NORTHWESTERN ONTARIO LAKES IN TERMS OF AMPHIBIAN SPECIES RICHNESS AND HABITAT SUITABILITY.

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Understanding habitat requirements is of fundamental importance for successful protection and conservation of amphibians. However, most field research is focused on ponds or other small wetlands while lakes have been largely overlooked. This is particularly true of our study region, the Boreal/Great Lakes-St. Lawrence forests. The purpose of our study was to examine a sample of small lakes in Northwestern Ontario to determine amphibian species richness and incidence in order to assess their importance as amphibian habitat. Three major differences between lakes and smaller water bodies are size, hydroperiod, and the presence of predators (particularly fish). The species-area effect predicts that a larger area can support more species. Likewise, sites with longer hydroperiod should support more species. Therefore, we might expect a relatively high species richness value in these lakes. However, the presence of predatory fish in large permanent water bodies is likely to have a negative effect on species richness, countering any area benefit. We repeatedly surveyed 31 lakes within a 150km radius of Thunder Bay, Ontario from May-August in 2001 and 2002. We identified species by call or visually and surveys included both day and night visits. We observed 9 of 12 potential species.

The most common species were *Pseudacris crucifer* (100% incidence) and *Bufo americanus* (90% incidence). *Rana pipiens* (6% incidence) and *Pseudacris triseriata* (3% incidence) were the least common species. The average species richness for 2001 and 2002 combined was 4.29 ± 0.18 . Species richness did not differ between years ($t = -0.171$, $p = 0.87$). 51.6% of lakes had the same number of species in 2001 and 2002, 22.6% lost at least one species from 2001 to 2002, while 25.8% of lakes gained at least one species. Similarly, species richness did not differ between lakes where we observed predatory fish ($n = 21$) and lakes where we did not observe predatory fish ($n = 10$). This is likely due in part to the nature and availability of refuge habitats on the lakes. We conclude that lakes offer very suitable habitat for most amphibian species in Northwestern Ontario, even 'temporary pond species', due to their variety of habitats. Therefore lakes should not be overlooked as amphibian habitat and for amphibian conservation. This may be especially important considering continuing drought in boreal forest regions.

INFECTIOUS DISEASES AND AMPHIBIANS

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Infectious diseases have undoubtedly always played major roles in the ecology and evolution of life on earth. Host and pathogen relationships are hypothesized mechanisms for maintaining sexual reproduction, determining host population dynamics, initiating speciation in some systems and even influencing the structure of entire ecosystems. However, the need to understand host-pathogen relationships well enough to manage them has taken on new urgency as emerging infectious diseases have surfaced as major threats to human and wildlife populations alike. Increased awareness and surveillance may account for the apparent "emergence" of some diseases, but in other cases, disease dynamics have fundamentally changed, resulting in an emerging infectious disease. Mechanisms underlying these changes in disease dynamics include habitat alteration, translocation of pathogens and hosts, altered species assemblages and community structure, and climate change. The diversity of these mechanisms makes understanding changes in host-pathogen relationships a complicated affair; it is further complicated by synergistic interactions among mechanisms and a paucity of tractable model systems to study them in.

Pathogens that affect amphibians are taxonomically diverse, with remarkably variable effects on their host populations. For this reason, amphibian pathogens make an unfortunate, yet revealing, set of case studies of mechanisms that alter disease dynamics. In my presentation, I will briefly discuss some of the major pathogens that have received attention from the scientific community including *Aeromonas hydrophila*, *Saprolegnia*, chytrid fungi, trematodes and ranaviruses. Using ranaviruses as a model system, I will discuss some of the mechanisms that mediate disease dynamics and highlight how attention to infectious diseases is crucial on the part of conservation biologists and wildlife managers as well as policy makers and public educators. Indeed, these different groups must work together to address emerging infectious diseases in wildlife and ourselves.

AUTUMNAL MORTALITY AND SURVIVAL OF RANA IN SMALL ANTHROPOGENIC AQUATIC HIBERNACULA IN GRENVILLE COUNTY, ONTARIO - PITFALL TRAPS OR PREFERRED SITES?

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I report on two situations in which neighbours drew my attention to late November concentrations of frogs in excavations on their land, and compare these sites to survival and mortality in small holes I have dug as hibernacula. In 1993 a chlorinated swimming pool contained 92 *Rana pipiens*, of which 72 were dead and 20 alive. This was said to be an unexceptional number for this site: "Every spring there were always hundreds of frog remains in the deep end of the pool usually quite decayed..." In 2001, 331 frogs were taken from 30cm of water in a newly-dug temporary 4x1x1.5m septic tank ditch, totalling 276 *R. pipiens* (83%), 43 *R. clamitans* (13%), and 12 *R. septentrionalis* (4%); 33 were dead (10%). This was likely most of the frogs in the ditch - the remainder were presumably killed when the ditch was filled in later in the fall. From 1997-2002 I sampled a total of 418 hibernating frogs in 2 60cm-deep holes in a shallow ditch in a Pine plantation (338 *R. pipiens* [81%], 71 *R. clamitans* [17%], 6 *R. septentrionalis* [1%], and 2 *R. catesbeiana* [0.5%]). Assessing survival has been difficult, but in only one winter did all the frogs die, while in another those in one hole died and those in the other survived. Conservation implications: The chlorinated in-ground pool routinely killed hundreds of frogs. It was surrounded by a legally-required chain link fence, and a finer mesh on the lower half-metre of this fence would have excluded the *Rana*. There was something like 1 frog/litre in the septic tank ditch (and doubtful if there would have been more or fewer if leaving the ditch had been easier). Leopard Frogs are abundant here, but secure well-oxygenated hibernacula are rare. The surface and melt-water in small holes and ditches is always well-oxygenated, unlike creek and wetland water that is often anoxic. It is evidently worthwhile for Leopard Frogs to attempt to hibernate in such sites, and in my small holes survival has been something like 75%. I suggest that providing numerous metre-scale excavations as hibernacula might contribute to metapopulation connections across disturbed landscapes - especially if the excavations were sited to reduce the frequency of road crossings. I have, accordingly, enlarged some of the hibernation sites I study to 1-metre dimensions, in order to see how much this increases occupancy and survival.

Poster Abstracts:

POPULATION TRENDS AND CONSERVATION OF THE FIVE-LINED SKINK (*EUMECES FASCIATUS*) AT POINT PELEE NATIONAL PARK, ONTARIO

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The five-lined skink is an important species in terms of Canada's natural heritage because it is eastern Canada's only lizard species. It is designated as a species of 'Special Concern' by COSEWIC because of its fragmented range and evidence of historical decline. The largest

documented population occurs in Point Pelee National Park. This population is of concern because of its highly isolated nature and evidence of high level of anthropogenic disturbance (habitat degradation, collecting). We have studied the population ecology of skinks at Point Pelee since 1990. We conducted visual surveys of two 'skink hotspots' coinciding with the annual peaks of skink activity (breeding, nesting) to examine population trends and study microhabitat availability. In our earlier work, we determined that skinks show a preference for large moderately-decayed woody debris as refuges. Our surveys revealed that skink abundance declined precipitously from 1990 to 1996 coinciding with high levels of human disturbance to woody debris and evidence of illegal collection. In 1996, habitat restoration by adding suitable woody debris, and increased enforcement began. By 1997, the decline stopped and we observed an increasing trend in skink abundance. Restoration efforts have continued resulting in an even greater volume of woody debris relative to the early 1990's and record high skink abundance in 2001 and 2002. High disturbance levels and natural degradation of woody debris continues, thus requiring constant monitoring of the skink population and the availability of suitable woody debris. Detecting the decline, elucidating its causes, and determining the efficacy of restoration efforts in this population would not have been possible without long-term monitoring. Our studies indicate that microhabitat restoration for recovery of lizard populations can be successful and demonstrate that active management is necessary to promote population persistence in highly stressed and isolated areas.

INFLUENCE OF ESTROGENIC CONTAMINANTS ON AMPHIBIAN SEX DIFFERENTIATION

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Despite continued concerns over declining world amphibian populations, few studies have addressed the effects of environmentally relevant contaminants on the sexual differentiation of anurans. Leopard Frog (*Rana pipiens*) and Wood Frog (*Rana sylvatica*) tadpoles were exposed to aqueous solutions of xenoestrogens during their larval development. Results indicate that *R. pipiens* are sensitive to low concentrations of estradiol (1, 10, 50 and 100 µg/L) and ethinylestradiol (1 and 10 µg/L), producing 100% females or ovo-testes, an intersex condition with both ovarian and testicular tissue present in the gonad. Exposure of *R. pipiens* to 10 and 100 µg/L nonylphenol, a degradation product of the nonylphenol polyethoxylate class of nonionic surfactants, produced a significant increase in the incidence of ovo-testes at the highest concentration. Similar exposures of *R. sylvatica* failed to produce deviations from the expected 50:50 (Male:Female) sex ratio, however, treatment groups showed a higher incidence of atretic oocytes, as well as ovarian characteristics in the testes. These results indicate that amphibians are sensitive to low concentrations of endocrine disrupting chemicals (EDCs) found in aquatic environments. Amphibians may be exposed to EDCs from agricultural run-off of animal manure containing estrogens, as well as from sewage treatment plant effluent containing alkylphenols and steroids. These results shed some light on the potential implications of current water management practices on wildlife health.

FISH WINTERKILLS SHAPE AMPHIBIAN RECRUITMENT IN WESTERN BOREAL LAKES

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Interactions with fishes have played key roles in shaping the reproductive strategies, metapopulation dynamics, and distribution of amphibians. Declines or local extinctions of amphibian populations have frequently been linked to introductions of non-native fish species. Most information on interactions between fishes and amphibians has been generated by short-term laboratory or enclosure studies, or surveys documenting patterns of co-occurrence at the landscape level. We monitored native fish and amphibian populations at 12 north-central Alberta lakes (14 - 157 ha) over 5 years. Five lakes were dominated by large-bodied fish species, most notably piscivorous northern pike (*Esox lucius*) and yellow perch (*Perca flavescens*). Six lakes contained only small-bodied species, chiefly brook stickleback (*Culaea inconstans*) and fathead minnow (*Pimephales promelas*), and one lake was fishless. Amphibian abundance responded strongly to large changes in populations of both large- and small-bodied fish. Toads (boreal toad [*Bufo boreas*] and Canadian toad [*B. hemiophrys*]) responded to changes in abundance of large-bodied piscivores, whereas wood frog (*Rana sylvatica*), reacted more strongly to changes in populations of small-bodied fish. The most marked responses coincided with declines in fish densities due to winterkills resulting in dramatic increases in larval amphibian recruitment to metamorphosis the following summer. Within the boreal-forest landscape, periodic high recruitment events from lakes may be an important source of dispersing juvenile anurans for founding new populations or rescuing declining populations associated with smaller, less permanent waterbodies.

PATTERNS OF AGE, SIZE AND GROWTH IN CANADIAN TOAD POPULATIONS BASED ON SKELETOCHRONOLOGY

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Formerly, the Canadian toad (*Bufo hemiophrys*) was widely distributed across eastern Alberta with a range stretching 1300 km north to south. Since the 1980s, the species has nearly disappeared in the grasslands of southern Alberta, but remains relatively common in the northern forests. Demographic information on Canadian toad populations, needed to develop conservation strategies for the species, is sparse. We used skeletochronology based on phalangeal bones to determine size-at-age relationships and longevity, and to compare demographic patterns among southern and northern populations. We aged 226 Canadian toads that were captured and released during field studies or were part of museum collections. One unique sample from the Canadian Museum of Nature consisted of an entire breeding aggregation of 80 animals collected at a single southern site near Brooks, Alberta in 1962. Populations differed in size-at-age relationships at both small and large geographic scales. Moreover, individuals of the same size and sex from the same population varied substantially in age. In general, toads from Brooks tended to be larger than same-age individuals from boreal sites near Lac la Biche. Canadian toads proved long-lived with individuals > 7 years old encountered at southern and northern sites. Longevity, coupled with high fecundity and the

persistence of boreal populations despite natural inter-annual variation in breeding success, suggests that remnant Canadian toad populations in southern Alberta may have the capacity to recover if appropriate wetlands and adjacent terrestrial habitats are restored.

HABITAT USE OF THE NORTHERN PRAIRIE SKINK, *EUMECES SEPTENTRIONALIS SEPTENTRIONALIS*, IN SPRUCE WOODS PROVINCIAL PARK, MANITOBA.

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Although habitat correlations cannot be interpreted as cause-and-effect relationships, they are valuable to managers because they can help guide management of habitat for a population, a species or a community. The goal of this study is to determine the nature of habitat use by the northern prairie skink, *Eumeces septentrionalis septentrionalis*, in the sandhills region of southwestern Manitoba. As well, habitat availability and potential limiting factors will be determined to aid in the development of a management plan for the northern prairie skink in Manitoba. The sandhills region of southwestern Manitoba is characterized by an undulating topography of sandy soils supporting boreal coniferous forest, deciduous forest and grassland vegetation. Generally, northern prairie skinks have been sighted in mixed-grass prairie under artificial cover. Skinks are frequently found under and are attracted by artificial debris, however there is little information on how natural habitats are used by skinks. Without this knowledge it is impossible to predict how future habitat change may affect populations or how to best manage habitat to ensure population viability. From signs and direct observation, habitat requirements and distribution of the northern prairie skink are being established. Trials of coverboards have been undertaken, with microclimatic measures made to determine how individuals respond to the presence of these sampling tools. Continuation of observations of habitat requirements and distribution will be completed as well as additional monitoring and tracking that is deemed necessary in the following year. This poster presents a working project, highlighting some preliminary findings of the first field season.