

## SPEAKER ABSTRACTS

### **Ecology and Status of Wood Turtles in Central New England**

Jones, Michael T. (Mass. Division of Fish and Wildlife)  
& Paul R. Sievert (University of Massachusetts Amherst)

Wood turtles (*Glyptemys insculpta*) are of conservation interest rangewide. Recent studies in Quebec, Connecticut, and other locations indicate that declines are underway across a broad area. From 2004 — 2009 we investigated the ecology of wood turtles in Massachusetts and New Hampshire. We equipped 193 adult wood turtles with radio transmitters and tracked them up to five years, and evaluated population structure at 34 discrete stream segments on 22 named streams. We investigated the influence of seasonal flooding, agricultural practices, road density, and landscape on the seasonal movements of individual turtles and on population structure and density. In addition, we explored the relative influence of age, size, and sex on the survival, movements, and reproduction of adult turtles. To do so, we developed a novel method of aging turtles based on shell-wear rates derived from multiple digital photographs. We revisited 150 year-old reports of extremely dense wood turtle populations in eastern Massachusetts by Thoreau, Agassiz, and Tenney, and infer from our survey results that these populations have been decimated. Population density in our central New England study area ranges from 0 — 40.4 adult wood turtles / river-kilometer. Population density is highly variable within watersheds. Population density is negatively correlated with active agriculture at both riparian and watershed scales. While some populations appear to be secure, our population modeling indicates that on average, wood turtle populations in western Massachusetts may be declining by as much as 11.2 % annually. These results and their conservation implications will be presented. Conservation priorities for the species in the region will be addressed.

### **Predictors and Consequences of Highway Road-Kill Hotspots for Freshwater Turtles**

Tom A. Langen  
Dept. of Biology, Clarkson University

Freshwater turtles are subject to road mortality, and have life histories that may cause populations to decline when subject to road-kill. In 2006 and 2007, I quantified road kill of three freshwater turtle species (*Emydoidea blandingii*, *Chrysemys picta*, *Chelydra serpentina*) by repeated driving surveys throughout the active season of the turtles along a rural 160 km highway transect within the St. Lawrence Valley of New York State, USA. I estimated the annual toll in road-kill along these roads, and demographic modeling incorporating these estimates indicated that road mortality was high enough to result in long-term population declines near the surveyed highways. Turtle road mortality was

highly clustered. I compared road and ecological features in the vicinity of the 160 road-killed turtles to random points along the highway transect. Road-kill sites were most strongly associated with nearby (within 100 m) large wetlands embedded within a forest matrix, along highways with relatively high traffic volumes. Wetland configuration was important: causeways (nearby wetlands on both roadsides) had higher densities of road mortality than similar sites where road mortality was limited to one roadside, and causeways with certain landscape and road attributes had the highest road-kill toll. This confirms other studies of mine which indicate that road-kill for turtles and other herpetofauna is highly associated with causeways. These results also indicate that hotspots of turtle mortality can be predicted easily and accurately using GIS coverages of wetlands, traffic volume, and land use.

**Population genetic variation determines susceptibility to experimental chytridiomycosis in *Lithobates yavapaiensis*, the Arizona lowland leopard frog**

Anna Savage  
Cornell University

The fungal disease chytridiomycosis is implicated in the decline or extinction of over two hundred amphibian species worldwide. Susceptibility to chytridiomycosis is known to vary across amphibian species, both within taxonomic groups and among sympatric species. However, two central epidemiological questions about host disease dynamics remain unclear: (1) Does variation in chytridiomycosis susceptibility occur within a species? and (2) If intraspecific variation in susceptibility occurs, does it have a genetic basis? To answer these questions, I performed experimental chytridiomycosis infections on lab-reared individuals of *Lithobates yavapaiensis* (Ranidae) collected from five natural populations in Arizona, USA. All individuals became infected with the chytridiomycosis-causing fungus *Batrachochytrium dendrobatidis* within seven days of exposure. After thirty days, infected frogs from three populations had 0% survival, while infected frogs from the remaining two populations had 27% and 41% survival, respectively. There was a significant effect of source population on chytridiomycosis survival, but no effect of replicate group or mass at the time of infection. Fourteen-locus microsatellite genotyping of all infected individuals confirmed that frogs from each source population were significantly genetically differentiated. Relative risk calculated for all microsatellite loci across individuals within each genetic group identified one allele that was associated with a significant reduction in the likelihood of dying from chytridiomycosis. This association indicates linkage with a gene region contributing to chytridiomycosis resistance in *Lithobates yavapaiensis*, and provides a target for future functional genetic studies of chytridiomycosis susceptibility across amphibian species.

## **PARC's Important Herp Areas: Progress Toward Identifying a Network of Priority Habitats for Amphibians and Reptiles in the United States**

Phillip deMaynadier  
Maine Dept. of Inland Fisheries and Wildlife

Reptiles and amphibians are experiencing exceptional declines among North American vertebrates with habitat loss and fragmentation among the leading threats to both groups. The goal of an Important Herp Area (IHA) system is to identify valuable habitat for priority herpetofauna throughout the U.S. using a system informed by scientific criteria and expert review. Over the last year, the National Partners in Amphibian and Reptile Conservation (PARC) IHA Task Team has worked to produce a draft set of model criteria and associated implementation plans that could be used for designation of IHAs in each state. Model criteria draw on the concepts of species rarity, regional species richness, and landscape integrity as tools for shaping the boundaries of potential IHA candidates. It is anticipated that each regional PARC organization will form a task team to take charge of the IHA site selection process for individual states within their region. By introducing the IHA concept, model selection criteria, and a proposed organizational structure for implementation, this talk hopes to stimulate critical feedback and support for initiating a national model for IHAs that targets limited conservation resources toward portions of the landscape most valuable to reptiles and amphibians.

## **Is Head-starting the Eastern Box Turtle a Viable Conservation Tool?**

Nicholas Frederick  
Virginia Commonwealth University

Throughout its range, the status and conservation of the eastern box turtle (*Terrapene carolina carolina*) has been in question. Many long term studies have documented population declines, while others are exploring the “ghost population” theory, populations of older adults with low or no recruitment. Of the many management techniques applied to the recovery and conservation of turtles, head-starting is one of the most controversial. However, new methodologies may be improving the success of head-starting some turtle species.

In our study, we obtained twenty captive-bred, two-year old eastern box turtles. These turtles were the prodigy of a local population that was rescued from a future shopping mall site. We based our methodologies on those used in the translocation of gopher tortoises (*Gopherus polyphemus*). Ten turtles were released without any treatment, while the other ten turtles were penned at the study site in belief that they would imprint on the site and reduce their initial movement patterns. Initial long-distance movement patterns



are expected when wildlife is introduced into a new habitat. Unfortunately, this movement pattern often results in mortality from various causes. The study site is a 141-hectare (350-acre) mixed hardwood- pine forest. The penned turtles were only supplemented water and hibernation sites. Only those food resources that naturally occurred inside the pen were available. The circular pen had a surface area of 729 square meters [30.5 meters (100ft.) in diameter].

To date, all twenty turtles survived their first winter. Some turtles are exhibiting reproductive behavior, which is highly unusually at their age. We suspect the captive diet of their first two years expedited sexual maturity. Overall, the health of the turtles appears to be good. Although the initial results are positive, only continued long-term monitoring will determine if head-starting eastern box turtles is a viable conservation tool.

### **Ecological-based Landuse Planning: Challenges and Opportunities**

Andrew J. Raus, AICP  
Bergmann Associates

Land use planning statutes and regulatory frameworks in New York State are based upon a home rule organizational structure creating a fragmented and often complex system for managing environmental and habitat conservation objectives. Local municipalities, required to enforce the State Environmental Quality Review Act (SEQRA), frequently do not have the training to understand how site specific projects will impact regionally significant habitats and ecosystem function. We will discuss how regional planning initiatives, tools such as GIS and public education and awareness can help improve the success of environmental system conservation and restoration at the local governmental level.

### **Natural history, aesthetics, and conservation**

Harry Green  
Cornell University

Darwin's "descent with modification" combined with Kant's distinction between "beauty" and "sublime" provide a framework for biologically sublime aesthetics, by which we more fully appreciate organisms and their environments. Natural history provide a nexus for integrating research, teaching, and conservation in that broader cultural framework, and thus for addressing the severe environmental challenges we now face. I will illustrate these claims with examples from the biology of amphibians and reptiles, with emphasis on exciting new discoveries about their evolutionary relationships and natural history.



## **Operation Shellshock**

Lieutenant Richard Thomas  
DEC's Bureau of Environmental Crimes Enforcement

Lieutenant Richard Thomas of DEC's Bureau of Environmental Crimes Enforcement will be providing a presentation on Operation Shellshock, the Department's four year effort to identify, infiltrate, and impact the illegal black market in New York's native reptiles and amphibians. Lt. Thomas served as the lead Investigator during the operation, including working in a covert capacity for two and a half years. Operation Shellshock revealed substantial commercialization of native species including timber rattlesnakes, eastern massasauga rattlesnakes, spotted turtles, North American wood turtles, snapping turtles, box turtles, hognose snakes and even salamanders. Lt. Thomas and his partner's efforts, with assistance from the Pennsylvania Fish and Boat Commission, the United States Fish and Wildlife Service, and several other State, Federal and Canadian Agencies, led to arrests relating to rattlesnakes smuggled into and out of Canada, snapping turtles by the thousands sold illegally to China, and imperiled species sold over the internet and under the table at large reptile shows. Lt. Thomas will be stressing the continued success of Operation Shellshock through a heightened awareness among both the herp "culture" and the public to the ecological value of our indicator species and the concept of biodiversity.

## **POSTER ABSTRACTS**

### **Potential Impacts of Urban Development on Vernal Pools in Dutchess County, New York**

Anne Duperault  
University at Albany

In the Northeast, vernal pools are typically seasonal pools that often occur in forested landscapes and are important habitat for invertebrates and amphibians. Because of their size, seasonality, and isolation, vernal pools can be challenging to locate and protect. In New York, most vernal pools are not protected under the state's Freshwater Wetlands Act and their locations are poorly known. This lack of basic information on vernal pool locations presents a critical challenge for those municipalities that want to conserve these pools. Using an existing datalayer of 631 vernal pools in six towns in Dutchess County, New York, and several potential build-out scenarios, I conducted a Geographic Information Systems (GIS) analysis to determine which pools are most threatened by residential development. Specifically, I considered pools that are in areas that have the

greatest potential residential density to be most threatened. I also investigated development alternatives such as conservation subdivision. The overall objective of this project is to provide these municipalities with a priority list of vernal pools to target for conservation and to help guide conservation-minded development designs.

### **Effects of Road Deicers on Survival and Behavior of Larval and Adult Wood Frogs**

Lisa. Hazard\* and K. Kwasek

\*Montclair State University

Use of road deicers (primarily NaCl) in the northeastern U.S. has increased dramatically over the last century. Salts applied to roads can travel considerable distances from the site of application, and may contaminate local watersheds to levels above 100 mM. Amphibians that breed in vernal pools early in the spring, when salt levels could still be high, may be especially vulnerable to increased salinities. We integrated responses of larval and adult wood frogs (*Lithobates sylvaticus*) to increased salinity to determine whether adult frogs would be able to detect and avoid salinities that would be detrimental to them or to their offspring. Tadpoles were raised in groups at concentrations ranging from 0-200 mM NaCl. No tadpoles at higher concentrations survived to metamorphosis. At low salinity, tadpoles had slightly higher mortality and lower growth and development rates than control animals. Adult frogs were mildly dehydrated to induce thirst, then placed in a shallow dish of water ranging from 0-500 mM NaCl. Location (in or out of the dish) and behavior (moving, standing, sitting, or water absorption response) were recorded during a 10-minute trial. In contrast to arid-adapted anuran species, the wood frogs showed no aversion to salt, remaining in even 500 mM NaCl for the full 10 minutes. Mass loss during the 10-minute trials increased with increasing salinity. The results have important ecological implications. Tadpoles showed sublethal effects even at relatively low concentrations and high mortality at higher concentrations, but adult wood frogs may not be capable of evaluating the salinity of potential breeding sites, leaving this species potentially vulnerable to increased mortality or subtler sublethal effects due to road salt runoff.

### **Can Turtle Crossing Signs be an Effective Tool in Reducing Turtle Road Mortality?**

Abbie Rupp\*, James Flaherty, Angelena Ross, and Glenn Johnson  
SUNY Potsdam

Blanding's turtles, a Threatened Species in New York State, are notorious for suffering high levels of road mortality caused by terrestrial migrations to breeding, wintering or summering habitat. Loss of just a few adult female Blanding's turtles from a local population can have huge negative impacts on population viability. Mitigation measures



designed to reduce the impact of roads on wildlife populations, such as barriers and ecopassages over or under roads, are very expensive. Warning signs designed to alter driver behavior by reducing speed or increasing awareness may be effective to reduce mortality. Here we present data on hotspots of Blanding's turtle road mortality in northern New York detected over the period 2003-2008 and results of comparisons of mortality rates, average driving speed and traffic volume before and after installation of turtle crossing signs at 10 areas of concern.

### **Success and the Thermal Environment of Blanding's Turtle Nests: a Comparison of Created and Natural Nesting Habitat**

Joshua Cameron\*, Kevin McArdle, Brayton Hill,  
Michael Reynolds, Jing Bi, and Glenn Johnson  
SUNY Potsdam

The nesting behavior of the threatened Blanding's turtle was investigated in a wetland complex in St. Lawrence County from 2003-2006 where three potential nesting areas were identified. Movement patterns of telemetered gravid females indicated that one area, a large cornfield, was used exclusively for nesting. To improve nesting habitat in the other two potential nesting areas, vegetation was cleared from a 2.7 ha area in Fall 2006. In 2007 and 2008 soil temperature and nesting activity were monitored in these areas as well as a third nesting area in a different ecological setting (sand dunes). Soil temperatures were consistently higher in the cleared area than the cornfield in both years. In 2007, turtles only nested in the cornfield, but hatching success of 8 nests was only 51%. In 2008, turtles nested at both sites. Soil temperatures were again significantly higher in the cleared area. Hatching success in predator-proof nests was lower at cornfield nests (54 %) than at cleared area nests (88%) and dune nests (95%). Preliminary results from 2009 monitoring efforts will be included. This habitat improvement shows promise to increase high-quality nesting opportunities for this species.

### **Molecular Screen for *Batrachochytrium dendrobatidis* in New Jersey Amphibians**

Kirsten Monsen  
Montclair State University

*Batrachochytrium dendrobatidis* (Bd) is a pathogenic fungus that has been implicated in worldwide amphibian declines and extinctions. Screening animals for this pathogen usually involves invasive histological examination of skin samples. Recently Annis *et al.* (2004) developed a non-invasive PCR-based technique to screen for Bd DNA; this

technique is suitable for screening both animals and environmental samples. We used this non-invasive molecular technique to screen skin and water samples for three amphibian species native to New Jersey: *Lithobates sylvaticus* (Ranidae), *Lithobates catesbeianus* (Ranidae), and *Notophthalmus viridescens viridescens* (Salamandridae), and one non-native commercially purchased species, *Duttaphrynus melanostictus* (Bufonidae), suffering from an obvious skin infection. All animals were held in captivity for several weeks before screening. Bd was not detectable in any of our samples. All PCR reactions were run with appropriate positive and negative controls to assess assay reliability. We plan to expand our sampling to amphibians and environmental water and soil samples throughout the state of New Jersey. To our knowledge, this is the first screen for Bd in New Jersey amphibians.

### **Persecution and Slaughter of the Eastern Hellbender in North-Central Pennsylvania**

Peter J. Petokas  
Lycoming College

Sportsmen's associations, with the support of the Pennsylvania Fish Commissioners, conducted a "War on Waterdogs" during the 1930's in tributaries of the Susquehanna River West Branch in North-Central Pennsylvania. Details of planned and completed hunts were published in local newspapers along with photographs of sportsmen and slaughtered hellbenders. Sportsmen argued that hellbenders were depredating trout populations and based this belief on purported observations of small trout and trout eggs found inside hellbender stomachs, but these observations were not documented with photos and my ongoing research shows that hellbenders eat crayfish and little else. Hellbender hunts were conducted late at night and involved the use of wire traps, trotlines, and gigs. Most hellbender hunting was done by wading, but some sportsmen used boats equipped with automobile headlamps powered by batteries. One hunt yielded 160 hellbenders, of which 70 were from "one hole at one time." Other hunts yielded few or no hellbenders. One sportsmen's club paid bounties on "nearly 800" vermin (hellbenders and water snakes) captured during a single month. Large-scale persecution and slaughter also occurred in other areas of Pennsylvania and in other states. Paul and David Swanson removed over 750 hellbenders from northwestern Pennsylvania streams during the 1930's and 1940's. Hellbenders still occur in most streams where large numbers were removed, but distribution is limited and overall numbers are considerably lower than was previously reported. Public education can help eliminate the occasional slaughter of hellbenders that takes place even today.

### **Assessing Risks of Amphibian Decline Using Multiple Stressors**

Gabrielle Radik





### Ohio University

We used an integrative approach to investigate the impact of *Batrachochytrium dendrobatidis* infection and atrazine contamination on amphibian populations in Southeastern Ohio. *Rana pipiens* tadpoles were reared in aquaria and exposed to *B. dendrobatidis* and atrazine (1ppb) in a factorial design. Larval responses to atrazine and infection supported previous research, but the interactive effects were not statistically significant.

We conducted a survey of amphibian communities by testing water samples from breeding pools for atrazine, and testing tissue samples from over 200 adults of 8 amphibian species for *B. dendrobatidis* DNA. One breeding pond in Athens County was found to have atrazine contamination (0.3ppb), however none were found to be infected with *B. dendrobatidis*. The absence of *B. dendrobatidis* from this area, when it has been found in many adjacent localities, raises questions about local resistance to the pathogen, as well as the transmission patterns in North America since the first known infections of five decades ago.

### **Field Sampling and Genetic Analyses of Mudpuppies (*Necturus maculosus*) in Vermont**

Isaac Chellman

V T Cooperative Fish and Wildlife Research Unit

The mudpuppy (*Necturus maculosus*) is a large, fully aquatic salamander in the family Proteidae. Mudpuppies hold a rare (S2) status in Vermont and are classified as a high priority species of greatest conservation need in Vermont's 2005 Wildlife Action Plan. This project seeks to obtain more baseline population information on mudpuppies in the Lake Champlain basin through the development of reliable field sampling techniques. Genetic methods, including microsatellite and sequence analysis, will be conducted to investigate genetic differentiation, population structure, and effective population size. Estimates of effective population size will be compared with mark-recapture population estimates obtained from Program MARK.