



NORTHEAST PARTNERS IN AMPHIBIAN AND REPTILE CONSERVATION

2007 Annual Meeting
Mountain Lake Biological Station, VA
August 20th – 22nd, 2007

Oral Presentation Abstracts

Presentation abstracts are arranged chronologically to match the presentation order in the agenda.

Major Threats Session

Forest Management Practices and Amphibians: Threats and Opportunities -

Presentation by Dr. Carola Haas (Virginia Tech)

Most of the northeastern United States is forested, and most forested land is held by private landowners. How this forest is managed has a major influence on the quality of habitat for herpetofauna. Certain forest management practices can have detrimental effects on amphibians, but lack of management may also cause problems. With the loss of natural fire regimes, artificial disturbance processes are sometimes necessary to maintain habitats. With the prospect of global warming, we can expect major changes in northeastern forests without active management. This talk will review major effects of forest management including road building, prescribed fire and fire suppression, disturbance of wetland habitats, and silvicultural practices. I will also discuss the results from the first 8-14 years of an ongoing research project, the Southern Appalachian Silviculture and Biodiversity Study. In this study we compared the response of plethodontid salamanders to 7 silvicultural regimes and found a negative response to all canopy removal but a positive response to mid-story removal using herbicides.

Maryland Route 30 Hampstead Bypass: Planning and Design of a Green Highway -

Presentation by Bill Branch (MD State Highway Administration)

The Maryland Route 30 Bypass at Hampstead, Carroll County, Maryland is a long awaited safety and congestion relief project proposed by the Maryland State Highway Administration (MD SHA). However, an unanticipated challenge arose during the final stages of design and prior to the submittal of state and federal environmental construction permit applications. Late in 1997, the northern population of the bog turtle (*Clemmys muhlenbergi*), was listed as a threatened species under the Endangered Species Act. The rural residential and agricultural lands surrounding Hampstead provide essential habitat for this rare turtle. While many saw this as potential threat to the project, others saw this as an opportunity for a creative approach for habitat and species protection.

This presentation will discuss the process that was undertaken to study the potential conflicts between road construction and the protection of a federally threatened species, the engineering design decisions made in order to add additional protections for the turtle, and the development of a habitat management plan which insures the future protection of the bog turtle and its habitat.

Environmental issues and processes need not be a wedge driven between competing interests. Inclusion and dialog throughout the coordination and design process is showing that a consensus can be built that not only results in a better project but also serves to insure the long term viability of a valuable natural resource. This "green" highway approach may provide a blueprint for resolving similar conflicts in the future.



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Influence of Breeding Ecology on Blood Hg Concentrations in Four Species of Turtles - Presentation by Dr. William Hopkins (Virginia Tech)

Mercury (Hg) is a relatively well studied pollutant due to its global distribution, toxicity, and ability to bioaccumulate and biomagnify in food webs; however, little is known about bioaccumulation and toxicity of Hg in turtles. Total Hg (THg) concentrations in blood were determined for 552 turtles in four different species (*Chelydra serpentina*, *Sternotherus odoratus*, *Chrysemys picta*, and *Pseudemys rubriventris*) from a Hg-contaminated site on the South River, VA USA and upstream reference sites. Methylmercury (MMHg) and selenium (Se) concentrations were also determined on a subset of samples. Because the feeding ecology of these species differs drastically, stable isotopes of carbon (13C) and nitrogen (15N) were employed to infer the relationship between relative trophic position and Hg concentrations. Significant differences were found among sites and species, suggesting blood can be used as a bioindicator of Hg exposure in turtles. We found differences in THg concentrations in turtles from the contaminated site which were consistent with their known feeding ecology; *C. serpentina* *S. odoratus* > *C. picta* > *P. rubriventris*. This trend was generally supported by the isotope data which suggested individual turtles were feeding at more than one trophic level. MMHg followed similar spatial patterns as THg and was the predominant species of Hg in blood for all turtles. Blood Se concentrations were low in the system, but a marginally positive relationship was found between THg and Se when species were pooled. Blood THg concentrations for the turtles in our study are some of the highest reported in reptiles, necessitating further studies to investigate potential adverse effects of these high concentrations.

Species Conservation Session

Diamondback Terrapin Habitat Creation Project - Presentation by Holly Niederriter (Delaware Division of Fish and Wildlife)

Diamondback terrapins (*Malaclemys terrapin*) have been documented attempting to cross a 4-lane 55-mph highway separating Rehoboth Bay from ocean dune habitat in Delaware Seashore State Park. Fencing was erected in recent years that appeared to deter most females from crossing the road. However, some still tried to make the trek and much of the nesting habitat previously used was no longer accessible. In an attempt to mitigate for the loss of the nesting habitat as well as keep females from attempting to cross the road, two new nesting habitats were added on the bay side of the road.

Monitoring was conducted in 2005 and 2006 to determine 1) if females would find and use the sites and 2) if the nests would be as successful as other bayside nesting habitats. The two new sites and five known nesting sites were visited daily during the nesting and emergence seasons. Data collection included approximately one hour of observation at each site at least 5 days/week (to observe nesting directly and document nest locations) and recording number of live and depredated nests. Hatch season data collection included number and location of hatches as well as number of depredated nests.



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Preliminary results indicate that females found and used the nesting areas. Nine nests hatched and none were depredated at one new site in 2005. In 2006, 21 of 31 nests documented at that site were depredated (68% hatched). Twenty of 32 nests hatched at the other new site in 2006 (site not built until 2006). A chi-squared test comparing proportion of nests that hatched one or more eggs was not significant among new and existing nesting sites, indicating that the newly created sites were equally as successful as others monitored. A G-test, however, was highly significant, suggesting that success among individual sites is variable. Structure of habitat and amount/type of vegetation may affect amount of nest depredation. Further years of data may indicate increased predation at new sites over time. Future data collection should include surveys for spring-emerging nests.

Hard Times for a Suburban Viper: The Canebrake Rattlesnake in Virginia -

Presentation by Alan Savitzky (Old Dominion University)

The Timber Rattlesnake (*Crotalus horridus*) is widely distributed throughout forested regions of eastern North America. Although no longer recognized as a subspecies, the distinctive populations of the southeastern Coastal Plain are often referred to as canebrake rattlesnakes. Canebrakes have generally been regarded as less vulnerable than more northern populations, but rapid suburban development in the southern states is resulting in the increasing loss of rattlesnake habitat. In 1992 canebrakes were designated as endangered by the Commonwealth of Virginia, and radio-telemetric studies of their movements and habitat use were initiated that year. Canebrakes share many ecological and behavioral attributes with more northern populations, including annual movements across large areas of forested habitat, use of open sites for gestation and other thermally demanding activities, and extensive mate-searching movements by reproductive males. Although northern populations commonly hibernate communally in rocky outcrops, such habitat is unavailable to canebrakes, which hibernate primarily in rotting tree stumps, where tunnels remain after the roots decay. The large areas required for annual movements, together with the episodic use of edge and open habitats and the long movements of reproductive males, place the snakes at special risk in the rapidly urbanizing region of southeastern Virginia and presumably elsewhere within the Coastal Plain of the southeastern United States.

Evening banquet presentation

Natural History of the Mountain Lake Area and some Herpetological Research at the Station - Presentation by Dr. Henry Wilbur (University of Virginia)

Mountain Lake Biological Station at 1160 m elevation in the Allegheny Mountains is adjacent to wilderness areas of the Jefferson National Forest and the Wilderness Conservancy at Mountain Lake that include northern hardwood forests, spruce bogs, and old growth Hemlock-Yellow Birch forests. At lower elevations there are southern Appalachian cove forests, limestone caves, and agricultural land in the New River Valley. These ecological communities support a diverse amphibian fauna that is enhanced by the station's location on the divide between the New (Mississippi) and James (Atlantic) drainages. Herpetological research at the station over the last 75



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years has extended from life history and behavioral studies to experimental investigations of the interactions between salamanders, crayfish, and trout in headwater streams. My talk will set this research history in the contexts of regional natural history and current ecological theory as applied to conservation issues.

Management and Inventory Session

State Wildlife Grants in Action for Herps: a case study - Presentation by Chris Urban (PA Fish and Boat Commission)
Abstract not available.

Urban Herpetology: Challenges and Opportunities for Education, Research, and Conservation

Presentation by Dr. Michael Dorcas (Davidson College, NC)

In North Carolina, urbanization has resulted in loss of habitat for many species of amphibians and reptiles. The rates of urbanization in some areas rival those of any area in the United States. Although situated in an area undergoing unprecedented urban growth, we have developed a successful undergraduate-based herpetological research program at Davidson College. Due to the various threats posed on herpetofauna in urban areas, many unique research opportunities exist for conservation-oriented research. For example, we are currently conducting herpetofaunal studies involving large-scale, experimental habitat manipulations with many replicates- studies not possible in most circumstances. During this talk, I will discuss these studies and efforts to involve the local community in herpetofaunal research and conservation.

Stream Salamander Occupancy in Dendritic Ecological Networks: Is branchy better?

Presentation by Evan Grant (USGS)
Abstract not available.

Role of Reptiles and Amphibians in Conservation Medicine

Presentation by Dr. Joy Ware (Virginia Commonwealth University)

Conservation medicine is a rapidly evolving field that focuses on the interactions and impacts of the health status of wildlife, humans, and the environment on each other. In the past, primary emphasis has been placed on diseases of mammals, birds, and fish. However, on-going studies from multiple investigators demonstrate that there are connections between the health and disease status of reptiles and amphibians and some human diseases, in addition to the value of reptile and/or amphibian disease as environmental indicators. This presentation will include an overview of these types of projects, as well as our on-going investigations of lizards and Lyme disease, skin lesions in snakes at three Virginia wildlife refuges, and diseases of amphibians.



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Evening presentation

The Civil War, Virginia's Battlefields, and Reptiles and Amphibians

Presentation by Dr. Joe Mitchell (Mitchell Ecological Research)

The Civil War battles that occurred on Virginia soil devastated the state economically, psychologically, and ecologically. Many of these sites are sacred ground and most are now owned and protected by the U.S. National Park Service. Despite the fact that they are maintained primarily as historical sites and managed for their cultural and historical importance, these lands also support a high diversity of amphibians and reptiles.

Forests have regrown and matured in many areas, trenches in which many men died and are now wetlands, and streams that were once in agricultural lands have healed to some extent. Beavers occupy many of these stream corridors and provide habitat for many herp species. Virginia's Civil War battlefields in many ways act as islands of habitat in an increasingly expanding sea of urban sprawl. I will review these issues relative to Civil War history and show that amphibian and reptile conservation is enhanced by the protection of these sites.



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Poster Abstracts

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Fecal Analysis of the Diet of the Canebrake Rattlesnake, *Crotalus horridus*, in Southeastern Virginia

Scott M. Goetz, Robert K. Rose, and Alan H. Savitzky

Department of Biological Sciences, Old Dominion University, Norfolk, VA 23529

The Timber Rattlesnake, *Crotalus horridus*, is widely distributed in forested habitats of the eastern United States. The southern Coastal Plain populations, commonly called the Canebrake Rattlesnake and formerly regarded as a distinct subspecies, differ from more northern populations morphologically and ecologically. The Canebrake morph reaches its northeastern limit in southeastern Virginia, where the Commonwealth of Virginia lists the Coastal Plain populations as Endangered. We studied the diet of *Crotalus horridus* from Coastal Plain populations in Virginia by analyzing fecal samples collected incidentally during a 15-year radio-telemetry project. We examined over 35 fecal samples and compared hair, claws, and skeletal remains of mammals to reference samples from study specimens. Approximately 60% of identifiable prey items were gray squirrels (*Sciurus carolinensis*). Other prey included rabbits, mice, voles, shrews, and birds. A few fecal masses contained the remains of more than one prey species. The preponderance of squirrels in fecal samples is consistent with observations of ambushing and predation by telemetered snakes.

Estimating the distribution and occupancy of vernal pool breeding habitat in the Northeastern United States.

Evan H. Campbell Grant, L. L. Bailey, S. D. Mattfeldt, P. Nanjappa

USGS Patuxent Wildlife Research Center

The status and trends of populations of vernal pool-associated amphibians in the northeastern United States are poorly understood at the landscape scale. In particular, the distribution of vernal pool habitats is not well known, due in part to their small size and temporary nature. As a result, there is no coherent integration of methods that provide inference on the status of amphibian populations and the distribution of their habitats. Here, we present a novel method for mapping and estimating the number of vernal pool habitats (using adaptive cluster sampling; ACS) at 7 National Parks and 9 National Wildlife Refuges in the Northeastern United States, and present results from the application of a proportion of area occupied (PAO) approach to estimating the amphibian occupancy of these habitats. The ACS method appears to provide reasonable estimates of the numbers of vernal pool wetlands at parks and refuges across the Northeastern United States, though initial comparisons with aerial photograph-mapped pools suggest that the ACS method may have a positive bias. In 2005, across parks and refuges, the estimated occupancy of vernal pools (accounting for detection probability) for spotted salamanders ranged from 0.465 to 1.0, and wood frogs ranged from 0.222 to 0.873. Occupancy was related to several variables at the local (pond-level), park/refuge, and landscape-level scales, including percent forest and wetland within a park/refuge, distance to nearest road, pond



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permanency and size. At the landscape scale, parks and refuges with less urbanization at in a 5 km buffer from the refuge boundary had higher occupancy of wood frogs and spotted salamanders, highlighting the importance of landscape position of these natural areas.

Association of *Plethodon cinereus* With Coverboards Across Low and High Salamander Densities

Staci F. Hudy, Sara M. Sharp, Jessica A. Homyack, and Carola A. Haas.
Virginia Tech

Abstract not available.

Patterns & Impact of Turtle Road Mortality in Northern New York

Tom A. Langen, Dept. of Biology, Clarkson University
Glenn Johnson, Dept. of Biology, SUNY Potsdam

Turtle populations are demographically sensitive to increased adult mortality, and road-kill on highways may be a significant source of mortality in adult turtles. We present some research results on large-scale spatial patterns of road mortality of turtles in northeastern New York State, and on the severity of road-kill as a major mortality factor for adult *Emydoidea blandingi* (Blanding's turtle), *Chrysemys picta* (painted turtle) and *Chelydra serpentina* (snapping turtle).

Nest Site Selection by Diamond-backed Terrapins (*Malaclemys terrapin*) on Fisherman Island, Virginia

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Susan C. Walls, USGS, Florida Integrated Science Center, 7920 NW 71st Street, Gainesville, FL 32653.

Diamond-backed terrapins (*Malaclemys terrapin*) occur in coastal marshes along the Atlantic Coast of North America and extend well into Maryland in the Chesapeake Bay, the largest estuary in North America. They also occur on the mid-Atlantic barrier islands. Most of the studies of nesting ecology have been conducted in Maryland and elsewhere, and most of these focused on habitat associations. We studied nest site selection on Fisherman Island National Wildlife Refuge, the southernmost mid-Atlantic barrier island at the mouth of the Chesapeake Bay, during 2006. In June, we flagged 48 nests that had been destroyed, most likely by raccoons, and later measured the location of each nest from edge of the nearest patch of woody vegetation (nearest 0.5 m) and scored each for the presence or absence of tree canopy, shrub canopy, no canopy, bare sand, grass cover, and herbaceous cover. Observed nests occurred in the open (56.7%), in grass (40%), and in other herbaceous cover (4%). Similarly, 37.5%, 48% and 15% of the nests were found with no canopy, below canopy shrub, and under tree canopy, respectively. Significantly more nests than expected were found in the open with no ground cover; fewer nests were observed in herbaceous



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material (other than grass). Observed distances of predator-destroyed nests from the edge of the nearest patch of woody vegetation were significantly different from a normal distribution; most were placed near the patch margin. Nest placement on Fisherman Island differs from other sites reported in the literature due to the high frequency of nests placed at and near the edge of shaded patches of woody vegetation.

Culverts and Connectivity: Measuring the Success of Culverts in Mitigating Freshwater Turtle Road Mortality.

Kelly Schmidt, Antioch University New England

Road mortality is a major threat to the persistence of amphibian and reptile populations. Freshwater turtle populations are at risk in New Hampshire due to the inability to complete their life cycle because nesting females and migrating males are often the victims of road mortality (Gibbs and Steen 2005, Aresco 2005, Burke et al. 2000). The New Hampshire Department of Transportation, The Nature Conservancy and New Hampshire Fish and Game are in collaboration with field biologists to research ways to mitigate mortality. Relative abundance estimates of painted (*Chrysemys picta*) and snapping turtles (*Chelydra serpentina*) are being made via mark and recapture work from April until September of 2007. Road surveys were conducted during the nesting season from May through July to derive "hotspots" of frequent mortality. Most importantly, correlated with this data, infrared cameras are being used to provide evidence of culvert use by turtles and other small animal species. No significant difference was found in the frequency of road mortalities between reptiles and amphibians among sites with or without culverts ($R^2 = .0019$, $p = .68$). These results suggest that research involving more variables other than culvert size need to be taken into consideration in order to create effective management plans for roads and wildlife. The key to providing connectivity between fragmented habitats lies in answering how to get wildlife across or under roadways. It is critical to understand how culverts function as passageways in the environment, particularly for already threatened taxa as freshwater turtles and other herpetological species.

Home Range and Hibernacula Fidelity of Wood Turtles in Virginia

*Sara Sweeten and Mark Hudy, USDA Forest Service, Fish and Aquatic Ecology Unit
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Habitat alterations due to urbanization, logging, and stream channelization have had major impacts on wood turtles (*Glyptemys insculpta*). Best management practices are needed in the extreme southern part of this species range to establish buffer zones and seasonal regulations for land use practices such as logging and road construction. We evaluated the home range, distance moved from stream and fidelity to hibernacula of two populations of wood turtles by weekly radio tracking 38 turtles in northwest Rockingham County, Virginia. Patchy forest, open fields, roads, and a mixture of private and public lands characterize these study areas. To date, we found a majority of the turtles were located within 30 meters of the stream, 65.1% of the time. Locations up to 60m from the stream occurred 80.5% of time. 93.5% of the time the turtles were within 90m of the stream. We observed several male turtles moving great distances, some over 11 km, potentially genetically



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connecting the two sample populations. One turtle has even moved into a different river basin. Tracking will continue through the winter in order to look at hibernacula fidelity and finalize home range information on a seasonal basis. Specific recommendations are expected Spring 2008.

Upland habitat use and movements of the eastern tiger salamander (*Ambystoma tigrinum tigrinum*) on Long Island

Valorie Titus, Brookhaven National Laboratory and Binghamton University

The long-term survival of the New York State endangered eastern tiger salamander is of special concern due to rapid development of its last remaining habitats on Long Island. Understanding the characteristics of ponds and vernal pools utilized by amphibians like the tiger salamander, as well as the upland habitats used throughout the year, is essential to the conservation and proper management of these species. A radio-telemetric study is currently underway at Brookhaven National Laboratory on Long Island, New York. Data were collected from 2004 to 2007 at three pond locations. Forty-one adults and forty-nine metamorphs have thus far been captured and implanted with transmitters. Adult animals spent an average of 47 days and metamorphs spent 23 days in burrows between surface movements. Single night movements ranged from 7 to 237m for adults and from 4 to 269m for metamorphs. Implanted animals have been lost due to predation, loss of transmitter signal, or are still being tracked. Microhabitat use appears to be in areas of low shrub cover with a fairly dense deciduous or mixed pine/deciduous canopy. Based on our findings, we feel that the current 30m buffer zone for wetlands and aquatic breeding habitats and the corridors to maintain connections with adjacent areas beyond 150m are insufficient to maintain breeding populations of tiger salamanders in New York State.

National Amphibian Atlas: on-line amphibian distribution information

*Linda Weir, Kevin Laurent, Crystalina McGrail, Mark Wimer, and Jessica Hopkins
USGS Patuxent Wildlife Research Center*

Coming soon, the National Amphibian Atlas (the Atlas) will be an on-line resource for dynamic map displays of amphibian distribution information in the United States. The Atlas will replace the static map website, ARMI Atlas of Amphibian Distributions. The new Atlas website will allow users to zoom in on the map, download map images, download reference information, and download GIS layers. In addition, the new Atlas displays species distribution information using 3 quality levels (museum specimen, published record, and presumed presence) displayed as separate colors. With your help, I'd like to improve the maps over the next few years to make the maps entirely based on museum specimens and published records.