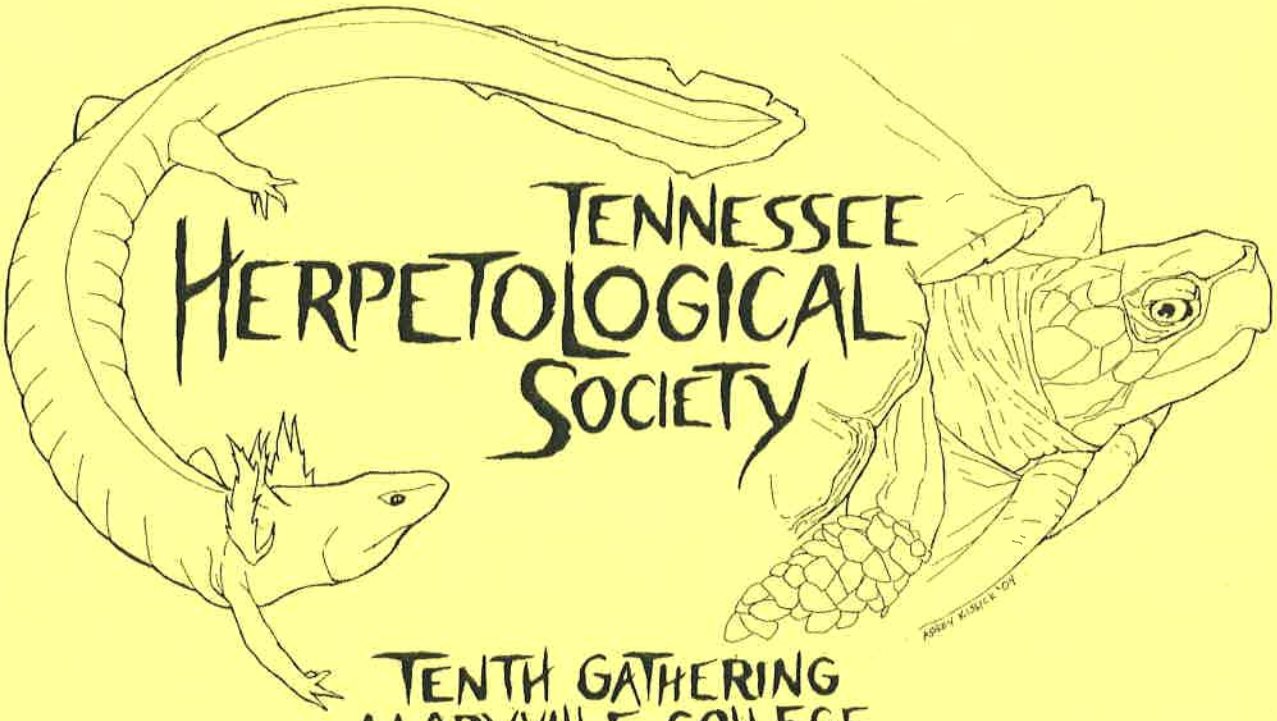

TENTH GATHERING
MARYVILLE COLLEGE
7-9 OCTOBER

10th Gathering
Tennessee Herpetological Society
at Maryville College

Lawson Auditorium – Fayerweather Hall Basement
Thursday October 7, 2004

- Noon – 1:00pm: Registration ($15.00; Students free)

- 1:00pm-1:30: Welcome and Introduction: Robert Naylor, Vice President of Academic Affairs and Dean of the College, Maryville College; Pete Wyatt, President of Tennessee Herpetological Society (TWRA); Ben Cash, Assistant Professor of Biology, Maryville College.

- 1:30-2:30: KEYNOTE ADDRESS:
  - CONSERVING BIODIVERSITY: PROTECTING HOTSPOTS AS WELL AS HOTSHOTS. DR. CARLOS CAMP, PIEDMONT COLLEGE, GA.

- Break – 2:30-2:50 – Lawson Atrium

- 2:50-4:10 - Contributed Paper Session I
  - 2:50-3:10 – Movements and Diel Activity of *Sternotherus minor peltifer* in Whiteoak Creek, Houston and Humphreys Counties, Tennessee: a preliminary report. Joshua R. Ennen and A. Floyd Scott, Austin Peay State University, Clarksville, TN.
  - 3:10-3:30 – Survey for the Tennessee Cave Salamander, *Gyrinophilus palleucus*, In Middle Tennessee. Brian T. Miller and Mathew. L. Niemiller, Middle Tennessee State University, Murfreesboro, TN.
  - 3:30-3:50 – Comparative Demography of the Tennessee Cave Salamander (*Gyrinophilus palleucus*) in Middle Tennessee. Matthew L. Niemiller and Brian T. Miller. Middle Tennessee State University, Murfreesboro, TN.
  - 3:50-4:10 – Post-glacial history of the Eastern gartersnake (*Thamnophis s. sirtalis*) in the Great Lakes region: evidence from mitochondrial DNA. John S. Placyk, Jr.[1], Gordon M. Burghardt[1,2], Randall L. Small[3], Richard B. King[4], and Gary S. Casper[51]; Dept of Ecology & Evolutionary Biology, Univ of Tennessee, Knoxville, [2]Department of Psychology, Univ of Tennessee, Knoxville, [3]Department of Botany, University of Tennessee, Knoxville, [4]Dept of Biological Sciences, Northern IL University, DeKalb, IL, [5]Vertebrate Zoology Section, Milwaukee Public Museum, Milwaukee, WI.

- 4:10-5:10 - General Membership Meeting/Elections (held in Lawson Auditorium).

- 6:00-10:00 - Bar-B-Que Social and Annual Auction – House-in-the Woods

Friday October 8, 2004 Morning, Contributed Paper Session II – 9:00am-10:20

- 9:00-9:20 – **A Herpetofaunal Inventory of the Hatchie National Wildlife Refuge in Haywood County, Tennessee.** Jonathan W. Stanley and Brian P. Butterfield. Department of Biology, Freed-Hardeman University, Henderson, TN.
- 9:20-9:40 – **Herpetofauna of Fort Donelson National Battlefield, Stewart County, Tennessee: A Preliminary Report.** Jon M. Davenport and A. Floyd Scott. Department of Biology and Center for Field Biology, Austin Peay State University, Clarksville, TN.
- 9:40-10:00 – **TWRA Wildlife Diversity Division Multiple Species Inventory: An Overview of the Herpetological Inventory.** Mark Thurman, Chris Simpson, Scott Dykes and Brandon Wear; Tennessee Wildlife Resources Agency.
- 10:00-10:20 – **Surgical Procedures For Implantation Of Radio-Telemetry Transmitters In Timber Rattlesnakes.** Danny L. Bryan, Cumberland University, Lebanon, TN.

- Poster Session and Break – 10:20-11:00 – Lawson Atrium

- 11:00 – Noon – Contributed Papers (Session II cont)
  - 11:00-11:20 – **Thermal Ecology of Corn Snakes (*Elaphe guttata guttata*) in Eastern Tennessee, USA.** Elise Watson, Andrew Heffern and Kristie Fox. Clinch River Environmental Research Organization, Oak Ridge, TN.
  - 11:20-11:40 – **Stress and the Slider Turtle: Integrating Physiology, Ecology and Behavior.** Ben Cash, Maryville College, Maryville, TN.
  - 11:40-12:00 – **Problems Associated with Listing Secretive Species for Protection Under the Endangered Species Act.** Lee A. Barclay, Supervisor, Tennessee Field Office. U.S. Fish and Wildlife Service, Cookeville, TN.

- Noon – 1:30 - Lunch – on your own (there are options on campus)
  - Pearson's Dining Hall
  - Isaac's in Bartlett Hall

- 1:30 – 3:00 – Contributed Paper Session III
  - 1:30-1:50 – Long-term Memory in a Cognitive Task by Turtles (*Pseudemys nelsoni*). Karen Davis and Gordon Burghardt, University of Tennessee, Knoxville TN.
  - 1:50-2:10 – Effects of Experience on Prey Preference in Adult Eastern Gartersnakes *Thamnophis sirtalis* from Three Island Populations. Lauren E. Kirby, John S. Placyk, Jr., Gordon M. Burghardt; University of Tennessee, Knoxville TN.
  - 2:10-2:30 – TBA

- Break – 2:30-3:00 – Lawson Atrium

- 3:00 – 4:00 - Panel Discussion – Research and Management on Public Lands in Tennessee.

Saturday October 9, 2004 - Field Trip to Great Smoky Mountains National Park

- Leaves Sutton Science Center parking lot at 9:00 a.m.
  - Please sign up on sheets in Lawson Auditorium

KEYNOTE PRESENTATION

CONSERVING BIODIVERSITY:
Protecting Hotspots as well as Hotshots

Dr. Carlos Camp
Piedmont College
Demorest, GA

Current strategies for conservation of animal diversity in the United States focus heavily on protecting individual species. Whereas this approach is effective in providing legal protection for many forms, particularly charismatic mega-fauna, small, secretive animals are often overlooked and underrepresented in these efforts. Because a majority of the planet's animal diversity is found in speciose groups of small forms (e.g., arthropods), conserving biodiversity requires appropriate strategies for protecting such groups. An effective approach is to identify hotspots of diversity and analyzing the underlying environmental correlates of this diversity. Such analyses allow for the protection of species-rich sites rather than species *per se*, enabling a significant number of species to be simultaneously protected including those that might be as yet undescribed. The lungless salamanders of the family Plethodontidae lend themselves as a case study in the analysis of diversity. This family, comprising 60+ % of all known salamander species, has centers of diversity located in eastern and western North America and in the neotropics. Plethodontids are characterized by high genetic differentiation without concomitant morphological divergence, making species-dependent conservation strategies difficult to apply. Taken together, rainfall, which makes environmental energy available to plethodontids through foraging, and topographic heterogeneity strongly predict patterns of plethodontid species diversity. Rainfall also significantly predicts patterns of genetic diversity within populations. Moreover, genetic divergence among populations is extraordinarily high across topographically heterogeneous landscapes. Both species and genetic diversity in the Plethodontidae are highest in the southern Appalachians where topographic heterogeneity converges with high levels of rainfall. This includes areas of southeastern Tennessee, southwestern North Carolina, northern Georgia, and northwestern South Carolina. Setting aside mesic woodlands (e.g., hardwood coves) in these and other areas of relatively high diversity as "diversity reserves" would ensure the conservation of a maximum level of genetic diversity as well as a maximum number of individual species.

Contributed Paper and Poster Abstracts (in alphabetical order)

Problems Associated with Listing Secretive Species for Protection Under the Endangered Species Act.

Lee A. Barclay, Supervisor, Tennessee Field Office. U.S. Fish and Wildlife Service, Cookeville, TN 38501.

The U. S. Fish and Wildlife Service (FWS) is often petitioned to list rare species pursuant to the Endangered Species Act, sometimes under the mistaken belief that rareness alone justifies listing and the resultant protection under the Act. In fact, listing requires a finding that the species in question is not only rare, but under significant threat from activities such as habitat loss, competition from non-native species, or over-collection. The issue is complicated when secretive species, particularly relatively wide-ranging ones, are involved. The inability to accurately assess population numbers and sizes of secretive species such as *Ophisaurus* glass lizards makes their potential protection under the Act unlikely. Where wide-ranging secretive species are suspected to be declining in numbers at a precipitous rate, hard data must be generated through research partnerships across the species' range if the species is to be listed under the Act and the decline abated.

Amphibians of Springs and Spring-fed Bodies of Water of the Western Pennyroyal Karst Ecoregion in North-Central Tennessee. [POSTER]

Timothy D. Brown and A. Floyd Scott. Department of Biology and Center for Field Biology, Austin Peay State University, Clarksville, TN, 37040.

A survey of four springs in Robertson and Montgomery counties Tennessee was conducted May through August 2003. The four springs (2 limnocrenes and 2 rheocrenes) were all monitored weekly for amphibians and basic water quality parameters. One of each spring type was designated as "impacted" due to excessive agricultural disturbance, while the other two springs were designated as "lesser impacted." Minnow traps were used to sample amphibians in the limnocrenes, while pick sampling (hand collecting) was conducted in the rheocrenes and spring runs below limnocrenes. A total of 130 individuals was captured in the survey, all by pick sampling (except for one unidentifiable specimen of the genus *Rana*). Rheocrenes compared to limnocrenes had the greater abundance of individuals and species, and the springs (regardless of type) designated as being the most impacted displayed lower diversity. The capture of *Rana damitans* in one of the rheocrenes represents a new record for Robertson County.

Surgical Procedures For Implantation Of Radio-Telemetry Transmitters In Timber Rattlesnakes.

Danny L. Bryan, Cumberland University, Lebanon, TN, 37987.

Surgical implantation of radio-telemetry transmitters in snakes can be a stressful event and can result in infections. Using a modification of Howard Reinert's technique, I have successfully implanted transmitters with no incidence of infection and quick recovery time after surgery. The technique described maybe useful to other scientists implanting transmitters in other species of snakes who desire a lower infection rate and/or lower rates of surgical stress.

Stress and the Slider Turtle: Integrating Physiology, Ecology and Behavior.

Ben Cash, Maryville College, Maryville, TN.

We examined physiological and behavioral questions related to stress, locomotor activity and dispersal movement in the slider turtle, *Trachemys scripta*. Like many other vertebrates, slider turtles show a corticosterone response to capture and handling, characterized by an increase in plasma corticosterone concentration with handling time. In the laboratory, turtles implanted with exogenous corticosterone showed a significant increase in caged locomotor activity when compared to control animals with empty implants. In the field, the effects of the simulated drying of a pond on the behavior of *T. scripta* were measured. Turtles responded to the draining of a pond by the emigration of the majority (75%) of the experimental population. Turtles had significantly elevated corticosterone when compared to individuals captured in a control pond, where conditions were held constant. However, 25% of the experimental group did not emigrate from the pond, suggesting that there is natural variation in turtle populations when responding to habitat declines, like rapidly decreasing quality or availability. Finally, aspects of the annual cycles of corticosterone were studied in wild and laboratory-held slider turtles. Male sliders were found to exhibit both a change in baseline corticosterone and the ability to respond to handling stress throughout the period studied. Female sliders did not show a significant difference in their baseline corticosterone concentrations, but did show a difference in their stress response over the sampling period. These results show collectively that corticosterone is involved with the ability of slider turtles to respond to environmental disturbances and corticosterone may ultimately be the proximate mechanism facilitating a stress avoidance response.

Herpetofauna of Fort Donelson National Battlefield, Stewart County, Tennessee: A Preliminary Report.

Jon M. Davenport and A. Floyd Scott. Department of Biology and Center for Field Biology, Austin Peay State University, Clarksville, TN, 37040.

Fort Donelson National Battlefield is a 600-acre national park situated on the Cumberland River at Dover in Stewart County, Tennessee. Located on the western edge of the Western Highland Rim, it is a highly dissected area of ridges and ravines covered mainly by oak-hickory forest. Prior to this study, despite much work in surrounding areas, no data were available on the herpetofauna of the park. To remedy this, the following objectives were established: 1) document at least 90% of the

species expected to occur in the park, 2) describe the distribution and relative abundance of species of special concern, and 3) provide baseline information for developing a general herpetofaunal monitoring strategy. Sampling techniques being employed include cover board arrays and area searches in randomly selected plots, time-constrained searches along stream stretches, drift fences with pit and funnel traps at a vernal pond, night and day road cruising, and hand capture upon incidental encounters. During the first year of the study, 35 species of herpetofauna (16 amphibians and 19 reptiles) were documented. This represents 63% of the 56 species considered possible for the area. None of the species found so far are considered rare, endangered or of special concern by federal or state authorities. The study is ongoing and will continue through the summer of 2005. Voucher specimens will be housed in the APSU Museum of Zoology along with a Microsoft Excel file containing the raw data from the study. Funding for this study is being provided by Austin Peay State University's Center for Field Biology.

Long-term Memory in a Cognitive Task by Turtles (*Pseudemys nelsoni*)

Karen Davis and Gordon Burghardt, University of Tennessee at Knoxville, TN, 37996.

Cognitive studies in nonvavian reptiles has received considerably less attention compared to mammals and birds. Freshwater pond turtles (Emydidae) are long-lived, can be easily conditioned with small food rewards, and prior studies have shown that they are particularly adept at visual discriminations. We developed a procedure for training 9 Florida red-bellied cooters, *Pseudemys nelsoni*, to an instrumental task (dislodging clear plastic bottles to obtain food pellets). The training phase involved stages of shaping until the animals reliably performed the task. Then the animals were tested in a 2-choice (non-correction) design on their ability to choose the bottle containing pellets. Eight of the 9 turtles learned the task and all showed a 70-100% success rate across all days. After two months of no training, 6 turtles still remembered the original task and all could perform the task after retraining. This study demonstrates in a laboratory context the long-term memory skills that may be used by emydid turtles in returning to nest sites and suggests the application of future studies to environmental conservation.

Movements and Diel Activity of Sternotherus minor peltifer in Whiteoak Creek, Houston and Humphreys Counties, Tennessee: a preliminary report.

Joshua R. Ennen and A. Floyd Scott, Austin Peay State University, Clarksville, TN, 37040.

Little information is available on the movement behavior of any of the subspecies of *Sternotherus minor*. Most published studies deal with the species as a whole and focus on other aspects of its life history and phylogeny. This paper presents the preliminary findings of an on-going investigation of movements and diel activity of a population of *S. minor peltifer* in Whiteoak Creek, a tributary to Kentucky Lake (impounded Tennessee River) in Houston and Humphreys counties, Tennessee. Using radiotelemetry and GIS technologies, 13 individuals (5 males, 8 females) are being relocated weekly and their movements plotted in relation to assorted physical and biological features in and along the stream. Repeated checks of their activity over the 24-hour cycle are also being conducted to determine diel rhythm. Based on 197 relocations, the preliminary results suggest that individuals occupy home ranges of varying length along the stream that include a variety of physical features including limestone bluffs, fallen trees, banks with exposed roots, and willow groves. At this point in the study, average home range size for females (278.0 m^2) is significantly larger (at $\alpha = 0.05$) than

that of males (101.1 m^2) ($t = 2.31$, $P = 0.041$), but the mean distance between successive relocation points for males (21.1 m) and females (28.8 m) is statistically equal ($t = 0.162$, $P = 0.878$). Also statistically equal are the number of upstream (51) and downstream (60) movements recorded for all turtles (chi square = 0.729, $P > 0.10$) and the comparative ratios of upstream to downstream movements for the sexes (32:40 for females and 19:20 for males; test of independence chi square = 0.186, $P > 0.10$). Data on frequency of movements during the 24-hour cycle suggest that females favor the period between 2000 and 0400 hours (chi square = 20.796, $P < 0.001$), while males show no preference for any time period (chi square = 3.142, $P > 0.10$). In addition to continuing to gathering data on home range, diel activity, and habitat selection, future work will also involve efforts to determine the period of winter dormancy, characterize hibernacula, and examine the relationship between water temperature and changes in activity levels over winter. Termination of field work is projected for mid-summer 2005. Funding for this project is being supplied by The Center for Field Biology at Austin Peay State University.

Effects of Experience on Prey Preference in Adult Eastern Gartersnakes *Thamnophis sirtalis* from Three Island Populations

Lauren E. Kirby, John S. Placyk, Jr., Gordon M. Burghardt; Department of Psychology; University of Tennessee, Knoxville, TN, 37996.

The common gartersnake *Thamnophis sirtalis* is a generalist predator able to adapt to a variety of habitats by changing its feeding habits. This may help explain why *T. sirtalis* is the most wide-ranging snake in North America. For this preliminary study, we investigated the ability of adult *T. sirtalis* to switch between prey items to determine if efficiency in locating, capturing, and consuming prey varies based on prey type and/or experience. We examined the feeding responses of 12 wild-caught gartersnakes from three different islands in Lakes Michigan and Superior. While in captivity, snakes were originally fed a typical diet of worms, but were switched to a diet of newborn lab mice. During food preference trials with three different ecologically relevant prey items, all possible combinations of the three prey over the course of the experiment were tested. Although all prey types were consumed, the snakes showed a preference for certain prey, and these preferences differed among islands. While experience seems to have played a role in feeding responses, it is also evident that responses to some prey are stable, despite experience with other prey. These findings generally mirror those on the effects of experience on prey preferences in neonatal snakes.

Survey for the Tennessee Cave Salamander, *Gyrinophilus palleucus*, In Middle Tennessee.

Brian T. Miller and Mathew. L. Niemiller, Middle Tennessee State University, Murfreesboro, TN.

To examine the population status and better delineate the range of the Tennessee Cave Salamander, we surveyed cave streams throughout Middle Tennessee from May through September of 2004. Caves with historic records of *G. palleucus* were searched to determine: 1) if populations were extant, 2) the relative abundance of individuals in extant populations, and 3) basic habitat parameters. Also, we searched streams in caves that lacked records of *G. palleucus*, but that we thought might harbor populations that had previously gone undetected. We searched 18 caves and found 138 *G. palleucus* in nine caves. We were able to confirm extant populations at two caves within the Central Basin, two caves on the Eastern Escarpment of the Cumberland Plateau, and one cave on the Western Escarpment of the Cumberland Plateau. The numbers of individuals

encountered at each of these sites was equal to or greater than that reported from previous surveys. Additionally, we located new populations on the Eastern Highland Rim of Warren County (2 caves) and Western Escarpment (2 caves, one in Grundy County and one in Coffee County). Based on our preliminary data, populations of the *G. palleucus* complex within Middle Tennessee are stable.

Comparative Demography of the Tennessee Cave Salamander (*Gyrinophilus palleucus*) in Middle Tennessee.

Matthew L. Niemiller and Brian T. Miller. Middle Tennessee State University, Murfreesboro, TN.

We compared the age structure, based on 5mm length increments, of populations of the Tennessee Cave Salamander in Middle Tennessee. We implanted small (1mm x 2mm) alpha numeric tags (Northwest Marine Technology) into the tail of each salamander collected that exceeded 41mm in snout-vent length to determine population sizes. We found 138 Tennessee Cave Salamanders and were able to capture 94 (68% capture rate). We implanted tags into 84 salamanders and have recaptured only two tagged individuals. Four or fewer salamanders were found in most caves; however, we found 24 or more individuals in three caves (counts of 24, 41, and 48). Adults (greater than 70mm SVL) dominated each of these populations, but larvae and juveniles were found at each cave, indicating that reproduction was occurring.

Post-glacial history of the Eastern gartersnake (*Thamnophis s. sirtalis*) in the Great Lakes region: evidence from mitochondrial DNA.

John S. Placyk, Jr.[1], Gordon M. Burghardt[1,2], Randall L. Small[3], Richard B. King[4], and Gary S. Casper[5]
[1]Department of Ecology & Evolutionary Biology, University of Tennessee, Knoxville Tennessee 37996
[2]Department of Psychology, University of Tennessee, Knoxville, Tennessee 37996 [3]Department of Botany, University of Tennessee, Knoxville, Tennessee 37996
[4]Department of Biological Sciences, Northern Illinois University, DeKalb, Illinois 60115
[5]Vertebrate Zoology Section, Milwaukee Public Museum, 800 W Wells St, Milwaukee, WI 53233

The Eastern gartersnake (*Thamnophis s. sirtalis*) is believed to have been one of the primary vertebrate invaders of the Great Lakes region following the most recent period of glacial retreat. Complete ND2 mitochondrial DNA (mtDNA) sequences were analyzed to evaluate the phylogeographic pattern and population structure of *T. s. sirtalis* and to determine whether the distribution of haplotypic variants found throughout the Great Lakes region (Illinois, Indiana, Michigan, Ohio, Wisconsin) is related to the post-Pleistocene retreat of the Wisconsinan glacier. Several genetically distinct evolutionary lineages were supported by both genealogical and molecular population genetic analyses. The geographic distribution of these lineages is interpreted as reflecting post-glacial recolonization dynamics during the late Pleistocene. Specifically, an older cluster of haplotypes is found in the states below Lake Michigan (Illinois, Indiana, Ohio) with two more derived clusters extending from Indiana into the lower peninsula of Michigan and from Ohio, Indiana, and Illinois into Wisconsin and the upper peninsula of Michigan. These findings support previous hypotheses of range expansion in this region. The two more recent clusters of haplotypes come into secondary contact in the Beaver Archipelago of northeastern Lake Michigan, which leads

us to reject earlier hypotheses that this archipelago was colonized from lower peninsula populations only.

A Herpetofaunal Inventory of the Hatchie National Wildlife Refuge in Haywood County, Tennessee.

Jonathan W. Stanley and Brian P. Butterfield. Department of Biology, Freed-Hardeman University, Henderson, TN, 38340.

The Hatchie River in west Tennessee is biologically important because it is the last unchannelized river of its kind in the Lower Mississippi River Valley. The Hatchie National Wildlife Refuge (HNWR) comprises 11,556 acres on the south side of the river. Much is known about the waterfowl and other birds that utilize the refuge. Additionally, several studies have been conducted on mammals. However, little is known about the herpetofauna on the refuge. The primary objective of this study is to document the herpetofaunal species that occur within the HNWR and provide a base for future studies to build upon. Methods used in this study include dip-netting, road cruising, anuran call surveys, turtle trapping, and ground searches. To date we have documented 39 species of amphibians and reptiles within the HNWR. These species include 7 salamanders, 9 frogs, 8 turtles, 3 lizards, and 12 snakes.

TWRA Wildlife Diversity Division Multiple Species Inventory An Overview of the Herpetological Inventory

Mark Thurman, Chris Simpson, Scott Dykes and Brandon Wear; Tennessee Wildlife Resources Agency.

As part of a Comprehensive Wildlife Conservation Plan (CWCP), the Wildlife Diversity Division of the Tennessee Wildlife Resources Agency (TWRA) has begun a multiple species inventory on state managed lands. The main groups targeted in this inventory are amphibians, reptiles, small mammals and shorebirds. This presentation will describe the methods associated with the herpetological inventories.

Thermal Ecology of Corn Snakes (*Elaphe guttata guttata*) in Eastern Tennessee, USA

Elise Watson, Andrew Heffern, and Kristie Fox; Clinch River Environmental Research Organization, Oak Ridge, TN, 37830.

We used radiotelemetry to study the thermal ecology of 8 individual corn snakes (*Elaphe guttata guttata*) over a 5 yr period in East Tennessee. Snakes were normally monitored in 12 h blocks 1-2 times a week for an average of 36 days for a total of 951 data points. We recorded body temperature (T_b), ambient air temperature (T_a), habitat temperature (T_h), position relative to ground surface, activity, lighting conditions and categorical cloud cover. The grand mean T_b was 25.1 $\pm$ 1.87°C. Of the above factors only lighting conditions (sun and shade) and categorical cloud cover (26-75% and 76-100%) showed significant difference. Thermal patterns of individual snakes mirrored statistical conclusions. Results indicate when T_a was within 2 standard deviations of the grand mean T_b, snakes thermoconformed, and outside of this range, thermoregulated.