

RECENT INVASION OF THE GREEN TREEFROG, *HYLA CINEREA*, INTO UPLAND REGIONS OF SOUTHEASTERN UNITED STATES. **Nathan L. Parker**, *Center for Field Biology, Austin Peay State University, Clarksville, TN, 37044, USA*

The distribution of the Green Treefrog, *Hyla cinerea*, has historically been considered closely tied to the Atlantic and Gulf Coastal plains of the southeastern United States. Surveys of sites in Kentucky and Tennessee conducted beginning June 2006, combined with historical data indicate that this species has been progressively invading upland ecoregions adjacent to the Coastal Plain in the period 1975-present, with much of the expansion occurring in the last 10 years. Formerly known only from the lowermost 65 river miles and from a small stretch near river mile 370, populations of this species may now be present throughout the lower 420 river miles of the Tennessee River in Kentucky, Tennessee, and Alabama. Dramatic range expansions have also occurred in the Cumberland and Ohio valleys in Tennessee, Kentucky, and Indiana, and in the Piedmont of South Carolina and Georgia. Efforts are made to describe the probable historical and current ranges of the species and possible reasons for its recent range expansion.

GEOGRAPHIC DISTRIBUTION OF THE SPRING PEEPER (*PSEUDACRIS CRUCIFER*) IN WEST TENNESSEE. **Helen A. Messer, Laurie D. Bennie, and Brian P. Butterfield**. *Freed-Hardeman University, Henderson, Tennessee*. The spring peeper (*Pseudacris crucifer*) is a chorus frog that is found throughout much of the eastern United States. However, *P. crucifer* has not been reported from 18 of 26 west Tennessee counties. We suspected that the apparent absence of *P. crucifer* from much of west Tennessee is a function of sampling error. Therefore, we predicted that searches of these counties would indicate that *P. crucifer* is widespread in west Tennessee. However, it is possible that they never existed in or have become extirpated from much of west Tennessee. The latter possibility would be of particular interest because of the recent awareness of amphibian declines globally. Therefore, it was important to determine the current distribution of *P. crucifer* in west Tennessee. The study was conducted during the breeding season of *P. crucifer* between the months of February and April, during 2005 and 2006. In order to determine the distribution, we drove to each of the counties in west Tennessee to listen for calling frogs. A Tennessee road atlas was used to identify areas where *P. crucifer* would typically be found including woodland areas, wetland areas, and areas where there are small semipermanent ponds with surrounding vegetation. When calling frogs were located, locality data and audio recordings and/or photographs were collected. Our goal was to find at least one frog population in each county. Once *P. crucifer* was found in a county, priority was given to the counties not yet documented. We documented *P. crucifer* from 16 of 18 counties surveyed. We were unable to locate *P. crucifer* from Crockett and Dyer counties. We also documented *P. crucifer* in 5 additional counties in middle Tennessee including Davidson, Lawrence, Lewis, Hickman, and Maury counties.

**New Amphibian Records for Three East Tennessee Counties and Other Data on herpetofauna in TWRA's Region IV.**

Scott A. Dykes and Pete Wyatt, Tennessee Wildlife Resources Agency.

New County records for Western Lesser Siren (*Siren intermedia*), Tiger Salamander (*Ambystoma tigrinum*) and Green treefrog (*Hyla cinerea*) have been documented within the last year in East Tennessee. Other interesting data, such as snake behavior under cover objects and information on a newly discovered population of the Yonahlossee salamander (*Plethodon yonahlossee*) will be discussed.

## **A System to Track Exotic Herps in Tennessee**

Lisa Powers, Froghaven Farm

With the dramatic increase in the importation, transport, breeding and sale of exotic reptiles and amphibians as pets and the increased importation of tropical plants and fruits (agents of transport); the possibility of exotic amphibians and reptiles escaping and becoming established in Tennessee has increased in recent years. Additionally, the deliberate (although illegal) release of captive animals into the wild poses a potential hazard to native ecosystems. The THS has established a new system for reporting, confirming and tracking exotic herp species in Tennessee. The author will outline this new THS program and ways to assist the program as well as how to report to the system.

## **MECHANISMS OF LARVAL COHORT SUPPRESSION AND POPULATION FLUCTUATION IN TIGER SALAMANDERS**

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The mechanisms underlying population fluctuation have been well studied in mammals and insects but less research has focused on amphibians. Yet, the current global decline of amphibians requires that we understand these mechanisms, and be able to distinguish between anthropogenically induced declines and natural population fluctuations. We have followed a population of the Arizona tiger salamander, *Ambystoma tigrinum nebulosum*, over 16 years and through two cycles of population fluctuation, which is typified by the production of "boom" cohorts followed by suppression of larval recruitment by paedomorphic adults in this cohort. We tested two hypotheses for this suppression, cannibalism and resource depression, using a series of meso- and microcosm experiments. We found significant direct (mortality) and indirect (behavior, diet, growth rates) effects of cannibalism by larger larvae and paedomorphic adults on hatchling and 1st-year larvae, suggesting that both cannibalism and the threat of cannibalism play a large role in suppression of larval cohorts. In contrast, paedomorphic adults showed no substantial effects on larval survival, diet, or growth via resource depression, in part because paedomorphic adults reduced availability of large benthic invertebrates, while hatchlings fed primarily on smaller benthos and zooplankton. However, current experiments suggest that hatchlings can be impacted by cohorts of larvae that are more similar in size and diet. Our results lend insight into the mechanisms underlying fluctuations in this population, and suggest that a better understanding of natural population fluctuations will aid amphibian conservation efforts.

**The Effects of Nitrate Pollution on Fluctuating Asymmetry in American Toad Tadpoles**  
Julia Earl and Howard Whiteman

Fluctuating asymmetry (FA) examines the frequencies within a population of minor deviations from perfect bilateral symmetry. FA may be a useful conservation tool for evaluating population stress, but the effects of various environmental stresses need to be evaluated to determine the reliability of FA. Toxicity is a stress of increasing concern in various organisms, especially amphibians, whose permeable skin readily absorbs foreign substances. To examine the influence of toxicity on FA, American Toad (*Bufo americanus*) tadpoles were exposed to nitrate at constant concentrations of 0, 1, 2.5, and 5 mg/L N-NO<sub>3</sub> and pulses of 5 mg/L at three different stages of development. At the termination of the experiment (30 days), individuals were weighed, staged, and photographed. Eye width (EW), the distance from eye to nare (EN), and snout-to-vent length (SVL) were determined using image analysis. None of the tadpoles from the nitrate treatments differed from the control tadpoles in developmental stage, body mass, SVL, or body condition, suggesting that 5mg/L N-NO<sub>3</sub> may not be a concentration high enough to elicit a negative response. Directional asymmetry was found in both EW and EN. After correcting for directional asymmetry, no difference was found among the treatments. Traits exhibiting directional asymmetry are not ideal for examining population stress levels, and therefore, American Toad tadpoles may not be suitable for FA analyses. Post-metamorphic individuals, which have more bilateral traits, may be more useful in further studies of FA in this species.

**The Nesting Ecology of a Disjunct Population of the Four-Toed Salamander, *Hemidactylium scutatum*, in Northeast Tennessee**

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**ABSTRACT:** The nesting ecology of a disjunct population of Four-toed Salamanders, *Hemidactylium scutatum*, in Northeast Tennessee was studied during the 2006-breeding season. Observations were made nightly to observe migration of *H. scutatum*, which began on March 9. Suitable nesting habitat was searched and 55 nests were discovered in 7 species of moss with *Climacium americanum* and *Bryoandersonia illecebra* the most common. Nests with less than 40 eggs were classified as products of a single female and joint nests had more. A total of 39 nests (70.9%) were single and 16 (29.1%) were joint. The mean number of eggs per nest was 33.51. Single nest had a mean of 24.23 eggs per nests and joint had a mean of 56.13 eggs per nests. Regression analysis showed no relationship between snout vent length (SVL) or total length (TL) and egg production. Forty-one (74.5%) nests were located under a forest canopy and 14 (25.5%) were found in an open power-line clearing. A chi-square goodness-of-fit test showed that more eggs were in open areas than expected (chi-square 7.6396,  $p=0.005$ ). Female *H. scutatum* in open areas were larger than those in the forested areas 35.13 mm SVL vs. 32.15 mm SVL. A more persistent source of water in the open area could explain why more fit females chose to nests in the open areas. Female *H. scutatum* were guarding 38 (69%) of nest. A chi-square goodness-of-fit test showed no more eggs than expected in guarded nests than nests without females. Weekly observation of nests did not cause females to abandon nests as only 5% of females originally present at nests

abandoned their nests during the surveying period. On 14 May, the first larva of *H. scutatum* was discovered in the flooded forest. Only 4 larvae from 1843 original eggs were found which indicated a reproductive failure for the disjunct population. Precipitation in May was 5.2 cm less than the average, which caused pools to dry before larvae had metamorphosed.

### **FROG VIRUS 3 PREVALENCE IN *RANA CLAMATINS* AND *RANA CATESBIANA* TADPOLE POPULATIONS INHABITING CATTLE-ACCESS AND NON-ACCESS WETLANDS ON THE CUMBERLAND PLATEAU**

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Frog virus 3 (FV3) has been associated with most of the reported amphibian die-offs in the United States. It is hypothesized that anthropogenically induced stress may increase pathogen prevalence in amphibian populations by compromising immunity. Cattle grazing in wetlands may induce stress in resident tadpole populations by altering water quality. Therefore, we compared FV3 prevalence in green frog (*Rana clamitans*;  $n=80$ ) and American bullfrog (*Rana catesbiana*;  $n=101$ ) tadpoles inhabiting 8 cattle-access and non-access wetlands on the Cumberland Plateau, Tennessee. Tadpoles were collected during winter, summer and fall 2005, and FV3 infection was tested using standard viral isolation techniques, PCR amplification, and gel electrophoresis for verification. Frog virus 3 was verified in both tadpole species and treatments. Prevalence of FV3 was greater ( $P=0.02$ ) in green frog tadpoles residing in cattle-access (45%) versus non-access (15%) wetlands. No difference was detected ( $P=0.78$ ) between treatments in FV3 prevalence for bullfrog tadpoles. A seasonal trend in FV3 prevalence also existed, with prevalence greater ( $P<0.02$ ) in the fall and winter than in summer for both species. In addition, FV3 prevalence decreased significantly ( $P=0.005$ ) as Gosner stage increased in bullfrog tadpoles. No trend was detected ( $P=0.872$ ) between FV3 prevalence and developmental stage for green frog tadpoles. Our results suggest that cattle use of wetlands may increase prevalence of FV3 in tadpoles, although this effect may depend on species, season and developmental stage.

### **INFLUENCES OF CATTLE ON CUMBERLAND PLATEAU AMPHIBIANS**

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Amphibians are declining globally in response to anthropogenic stressors. Agricultural cultivation and deforestation negatively influence amphibian populations; however, few studies have quantified the impacts of cattle grazing in temperate wetlands on resident amphibians. A natural experimental design existed at the University of Tennessee Plateau Research and Education Center, where 4 wetlands have been exposed to cattle grazing for >10 years and 4 additional wetlands in close proximity have never had direct cattle access. Therefore, we measured species richness and relative abundance of postmetamorphic amphibians at each

wetland twice per week from March–August 2005 using capture data from pitfall traps. We also measured shoreline vegetation once per month and water quality twice per month at each wetland. Relative abundance of green frog (*Rana clamitans*) metamorphs was 3.7X greater ( $P=0.035$ ) at non-access wetlands compared to wetlands with cattle access. Although significant differences in amphibian species richness were not detected ( $P=0.24$ ) between treatments, we captured 9 species at cattle-access and 13 species at non-access wetlands. Plant height and percent vertical and horizontal cover were 70%, 20% and 10% less ( $P<0.03$ ), respectively, in cattle-access wetlands. Ammonia, turbidity and specific conductivity were 3.2X, 4X and 1.6X less ( $P<0.004$ ), respectively, in non-access wetlands. Our results suggest that cattle may negatively influence green frog populations through reduced metamorph recruitment. Relative abundance of green frog metamorphs may have been less in cattle-access wetlands, because cattle negatively influenced shoreline vegetation and water quality. In addition, a concurrent study documented that frog virus 3 prevalence was greater in green frog tadpoles inhabiting cattle-access wetlands. Data analyses for 2006 are ongoing, although these initial results suggest that fencing cattle from wetlands may be a prudent strategy for amphibian conservation.

### **Stream salamander diversity and abundance in urban and rural streams: a preliminary study**

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Traditionally, biological indicators of stream water quality have included aquatic macroinvertebrates and fish. Recently, stream salamanders have been incorporated as biological indicators with the development of the Stream Salamander Index of Biotic Integrity (SS-IBI), Southerland et al., (2004). The objective of this ongoing study was to compare stream salamander diversity and abundance in an urban stream, Lime Kiln (1<sup>st</sup> order tributary of the Cumberland River) with a rural stream (a 1<sup>st</sup> order tributary of Passenger Creek, which is a tributary to the Red River). Life history information on some of the salamanders was collected due to the seasonal nature of our sampling. In urban areas, streams are altered in part due to the increase of impervious surface areas, construction, storm water runoff and in some cases sewer runoff. In water quality studies of Lime Kiln, higher levels of fecal coliform and fecal streptococci were found in comparison to the Passenger Creek tributary (D.C. Dailey, personal communication). Additionally, aquatic macroinvertebrate studies have shown that Lime Kiln Creek was “moderately impaired” in all three of the sampling periods compared to the Passenger Creek tributary that was found “unimpaired” in one of the three sampling periods and “slightly impaired” in two of the three sampling periods (Emerson, 2006). To inventory the streams for salamanders we used artificial refugia (leaf litterbags). Leaf litterbags have been found to be effective in the capture of stream salamanders, especially larval forms without altering the riparian habitat or stream bottom substrate in a negative manner (Waldron et al., 2003). Six leaf litterbags (large and small) were installed in 10 m increments over a 50 m section of each stream in the Spring, Summer and Fall of 2006.

Preliminary qualitative analyses of the data indicate that there are differences in species composition between Lime Kiln and Passenger Creek tributary. Animals that have been employed as bioindicators are typically classified as either tolerant or non-tolerant. In previous studies, the salamander that was designated as “tolerant” was the most predominant species sampled at all sites. In our study, *Eurycea cirrigera* was the most abundant salamander and was found in both streams. Additionally, salamander species diversity was higher in the Passenger Creek tributary (rural stream) relative to Lime Kiln Creek (urban stream). *Desmognathus conanti*, *Pseudotriton ruber*, and *Eurycea longicauda* were collected in the Passenger Creek tributary.

## **A Student's Perspective on the Highlands Biological Field Station's *Biology of Plethodontid Salamanders***

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From the fifteenth through the twenty-seventh of May 2006 I was enrolled in the Highlands Biological Station's *Biology of Plethodontid Salamanders* course. The course was brought to my attention by the TWRA region 4 non-game unit while I was volunteering with them. This presentation is a brief summary of the content, quality and overall usefulness of the class to students and others interested in Plethodontid salamanders. The *Biology of Plethodontid Salamanders* was taught primarily in the field, and used the Highlands Biological Station as a base camp. Field trips were taken to four states within the southern Appalachians: Tennessee, North Carolina, South Carolina and Georgia. Lectures were given to supplement these trips. The instructor was Dr. Stephen G. Tilley of Smith College. At times, wildlife photographer and illustrator Dave Dennis accompanied the class in the field. Topics discussed were current theories of salamander evolution, behavior and identification techniques. As a student with a profound interest in herpetology, I will discuss my perceptions of this course.

### **Is there a golden toad in Tennessee's future?**

Betsie B. Rothermel

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Most of us are familiar with the story of the golden toad (*Bufo periglenes*), a geographically restricted species of Costa Rican cloud forest that went extinct in 1989. About 10 years later, a new species of chytrid fungus, *Batrachochytrium dendrobatidis*, was discovered on the skin of dead and dying frogs in Central America and other areas. Chytridiomycosis is now recognized as an emerging disease of amphibians and has been strongly implicated in population declines of golden toads and other species on several continents. Prior to 2004, several cases of chytrid infection had been confirmed in the Southeastern U.S., but only one chytrid-related mortality event had been documented. In 2005 and 2006, I conducted preliminary surveys for chytrid in 11 amphibian species at sites in three physiographic regions: Congaree National Park in South Carolina (Coastal Plain), Chattahoochee River National Recreation Area in Georgia (Piedmont), and a site in the upper Tallulah River watershed in Georgia (Blue Ridge). Skin swab samples of postmetamorphic anurans ( $n = 74$ ) and salamanders ( $n = 20$ ) were submitted to a molecular lab for testing via PCR assay, a method that can detect very low levels of infection. At Congaree, 76% of pickerel frogs (*Rana palustris*) were found to be infected, though all appeared to be healthy at the time of capture. At Chattahoochee, 25% of frogs (3 *Rana catesbeiana* and 1 *R. clamitans*) were infected, but did not show signs of disease. At the Tallulah River site, 70% of eastern newts (*Notophthalmus viridescens*) were infected. One adult pickerel frog and one dead adult wood frog (*R. sylvatica*) also tested positive. These results suggest *B. dendrobatidis* is established within otherwise protected areas and is probably widespread in the Southeast. Although mass die-offs have not been observed in the Southeast, researchers should take steps to avoid spreading this pathogen to vulnerable populations and should incorporate disease surveys into existing amphibian monitoring programs. Of particular concern is the threat this pathogen may pose to salamanders in the Southern Appalachians, many of which have restricted ranges and inhabit areas with climatic conditions favorable to *B. dendrobatidis*. Thus, I believe there is a great need for information

concerning the prevalence of chytrid in such habitats and the susceptibility of plethodontid salamanders to chytridiomycosis.

### **Another Status Report on Progress Toward an Atlas of Reptiles in Tennessee.**

*A. Floyd Scott and William H Redmond, Austin Peay State University, Clarksville, Tennessee and Dog Hill Farm, Maury City, Tennessee.*

After eight years of sporadic work on the project, we have finally finished collecting data and are in the process of developing distribution maps and species accounts for an *Atlas of Reptiles in Tennessee*. Visits to 25 museum collections to verify identifications and gather data on geographic distributions have yielded 9,827 records, representing 10,738 specimens. A survey of the literature (including the gray literature and abstracts only) identified 412 documents, going back to 1835, that include 2851 references to reptile occurrences within the boundaries of the state. The literature includes reports of 63 species of reptiles in Tennessee, but only 56 are considered native to the state. The other seven were likely based on encounters with escaped exotics, misidentified specimens, or corrupted locality data. Museum specimens with Tennessee locality data represent 57 species, only one of which (*Tropidoclonion lineatum*) though correctly identified and accompanied by reasonably complete locality data, is hard to accept. The number of literature reports (which peaked in the 1930s) and museum records (which peaked in the 1970s) for the 96 counties across the state are in reasonable agreement, with some notable exceptions. This is also the case with the number of species reported per county in the literature compared to the number vouchered in museums. Funding for this project came from three sources: Austin Peay State University's Center for Field Biology, the Tennessee Wildlife Resources Agency (CARA funds), and the Tennessee Herpetology Society.

### **Seasonal movements of two species of Emydid turtles on Reelfoot Lake, TN**

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Movements were recorded for Painted turtles (*Chrysemys picta dorsalis*) and Red-eared Sliders (*Trachemys scripta elegans*) from May through August at Reelfoot Lake (Lake County, TN). Female turtles were trapped using hoop nets and X-rayed to determine egg counts. A total of twenty were originally selected for telemetry. Radio-transmitters were attached to the posterior scutes of the carapace of ten Painted turtles and ten Red-eared Sliders. The turtles were then returned to the lake and their locations determined approximately every two days using a receiver and a handheld GPS unit. When possible, attempts were made to recapture and X-ray the telemetered turtles to obtain updated egg counts. Red-eared Slider turtles were found to have moved more frequently and with greater distance than the Painted turtles. Also, the Painted turtles selected habitats closer to shore, rarely venturing into deeper water. The project is ongoing, and winter aestivation sites will be determined and compared along with thermal body temperature data.

## **Differences in capture rates and species composition of turtles between basking traps and baited hoop nets**

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We compared capture rates of turtles collected in basking traps to those in baited hoop nets in Standing Stone Lake. Both types of traps are commonly used to capture turtles; however, relatively few studies have attempted to compare these methods. We captured turtles using six hoop nets and 12 basking traps. Four species were captured using hoop nets and two with basking traps. When all species were considered, hoop nets collected 5.92 times more turtles than basking traps. Common snapping (*Chelydra s. serpentina*), eastern spiny softshell (*Apalone s. spinifera*), and sliders (*Trachemys scripta*) were all captured more frequently in hoop nets than basking traps. The common map turtle (*Graptemys geographica*) was the only species captured more frequently in basking traps.

## **Current Distribution of the Queen Snake, *Regina septemvittata*, in Arkansas**

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The queen snake, *Regina septemvittata*, is a wide-ranging, natricine snake in the eastern United States and Canada. However, Arkansas contains a disjunct population making it the only current queen snake population west of the Mississippi River. Very little research has been conducted with this disjunct population, but it is known that their numbers have declined dramatically in the last 100 years. Formerly, Missouri contained queen snakes, but they have been considered extirpated from that state for almost 50 years. Field work was conducted throughout the Boston Mountains of the Ozark Highlands from May 2005 to August 2006 to verify the presence of queen snakes from historic localities as well as to identify new locations containing these snakes. Five queen snakes were located in June 2005 in the Illinois Bayou watershed in Pope County. In May 2006, six queen snakes were found in the Mulberry River in Franklin and Johnson counties. Of the 11 snakes, five were kept as voucher specimens in the Arkansas State University Museum of Herpetology, and the other six were PIT tagged and released. None of the tagged individuals have been recaptured.

## **NORTHERN PINE SNAKE (*PITUOPHIS MELANOLEUCUS MELANOLEUCUS*) SURVEYS ON STATE WILDLIFE MANAGEMENT AREAS IN MIDDLE TENNESSEE**

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Northern pine snakes are a state-threatened species and being considered for federal listing. Therefore, documenting its occurrence on state wildlife management areas (WMAs) is a goal of Tennessee Wildlife Resources Agency (TWRA). Where populations are located, prudent conservation practices (e.g., prescribed burning, burrow construction) can be implemented to ensure populations are maintained above extinction thresholds. In partnership with TWRA and the University of Tennessee-Knoxville wildlife internship program, I surveyed for this species on Bark Camp Barrens WMA (Coffee County) and Bear Hollow Mountain WMA



(Franklin County) from May – August 2006. I used box and funnel traps and an X-array drift fence design to capture snakes. To date, I have had 74 captures at Bark Camp Barrens WMA with 7 species of snakes, 3 species of amphibians and 9 species of mammals. At Bear Hollow Mountain WMA, I have had 24 captures with 5 species of snakes, 3 species of amphibians, and 2 species of mammals. No occurrences of northern pine snakes were documented. I will discuss these results in greater detail, and provide thoughts on northern pine snake conservation in Tennessee.

### **Inventory and Monitoring of Snakes in a Transmission Line Right-of-Way** Ted Faust

From 1997 to 2005 we used 106 survey sites and over 26,000 coverboard lifts in order to evaluate the snake assemblage of a 1.4 km utility corridor and surrounding fields. We captured a total of 1,407 snakes representing 13 species and had an overall capture rate of 5.19 snakes per 100 coverboard lifts. The highest capture rate was in April with July being the lowest. Only 1 out of 8 species analyzed showed a significant preference for metal over wood. A comparison of the utility corridor to similar nearby habitats showed differences in species captures rates. We were also able to compare several *Lampropeltis getula nigra* (Black Kingsnake) characters (e.g., size and growth rates) found in this study to a similar one conducted ~6 km from our site. Of special interest is why the overall kingsnake capture rate (0.36/100 lifts) at our site was markedly lower than at the other site (4.19/100 lifts).

### POSTER ABSTRACTS

#### **Comparative growth and transformation of two vernal pool populations of the Spotted Salamander, *Ambystoma maculatum*, in Northeast Tennessee**

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**ABSTRACT:** Two vernal pool populations of the Spotted Salamander, *Ambystoma maculatum*, from Sullivan and Johnson counties in Northeast Tennessee were compared with regard to the effect of habitat stability on growth and transformation from larval to terrestrial forms. The first pool, in a non-forested area, was accidentally created from a borrow pit in Sullivan County along the South Holston River. Water remained in this pool until early June, at which time the mean length of larvae still present in the pool was 40.41 mm. The second pool, which was in a forested area with deep shade in Shady Valley of Johnson County, persisted until late August, at which time the mean length of larvae still present in the pool was 51.26 mm. In both populations a decrease in the mean length of larvae just prior to drying of the vernal pool suggested that transformation and migration from the pool by larger individuals occurred at that time and was stimulated by greatly reduced water levels.

**A COMPARATIVE STUDY OF SALAMANDER POPULATIONS IN THREE DRAINAGES, ONE WITH COMBINED SEWER OVERFLOW, ONE WITH SEPARATE SEWAGE AND STORM WATER CONVEYANCE, AND THE OTHER WITHOUT EITHER SYSTEM IN A RURAL SETTING.**

*Joshua L. Maloney and A. Floyd Scott. The Center for Field Biology, Austin Peay State University.*

Combined Sewer Overflows (CSOs) carry both sanitary sewage and storm-water runoff. When the carrying capacity of the system is exceeded some of the mixture of sewage and water may overflow from manholes and find its way into streams and other bodies of water in the surrounding drainage basin. This study looked at the amphibian fauna along a first-order stream in a CSO drainage basin of Clarksville, Tennessee and compared it with that of two other streams of similar size and character: 1) another urban stream in an adjacent drainage of Clarksville that had separate sewage and storm-water systems and 2) an Environmental Protection Agency reference stream in a rural setting 20 km to the southeast. Sampling involved time constrained searches that were conducted in spring, summer and fall at three sample sites along each stream from October 2004 through July 2006. Species richness of salamanders was lowest in the CSO drainage and highest in the reference stream but no significant difference was detected between or among any of the sites. Frogs were absent in both of the urban streams, but were numerous in the reference stream, representing 5 species. Abundance of individuals (excluding the frogs) was lowest in the CSO drainage, somewhat greater in the adjacent urban stream, and highest in the rural reference stream. Results indicate that amphibian abundance in an urban setting is lower in streams with CSOs than in those where sewage and storm water are conveyed separately. Also suggested is a richer and more abundant amphibian fauna in rural versus urban drainages.

**Basking Behavior of the Eastern Spiny Softshell Turtle (*Apalone s. spinifera*) in Steele Creek Park, Bristol, Sullivan County, Tennessee**

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**ABSTRACT :** The study focused on the Eastern Spiny Softshell Turtle (*Apalone spinifera spinifera*) in Steele Creek Park Lake, Bristol, Sullivan County, Tennessee. The objective was to study the basking behavior of females and males, and to determine whether large females dominated the basking sights compared to smaller males. Sample data included adult versus juvenile basking time differences and female domination over males at the basking sites. Approximately 250 hours, spanning 35 days of research and 938 trap hours, were recorded from 4 May 2004 thru 27 September 2004. During the study, 17 softshell turtles were trapped, consisting of 11 females and six males. Four of the males were captured at basking and two at non-basking sites. Seven of the females were captured at basking and four at non-basking sites. Females did not dominate males in the use of basking sites. Both males and females bask primarily between the times of 1300-1400 hours, but juveniles bask later in the day compared to adults. Individuals were generally most active during clear weather conditions.