
**Abstract from the 92nd Annual Technical Meeting
of the Oklahoma Academy of Science
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EFFECTS OF FIRE ANTS (*SOLENOPSIS INVICTA*) ON GERMINATION AND GROWTH OF PEANUT (*ARACHIS HYPOGAEA*) SEEDLINGS. Roger Nelson¹, Stanley Rice², and J. T. Vogt³. ¹Carl Albert State College, 1507 S. McKenna, Poteau, OK 74953; ²Department of Biological Sciences, Southeastern State University, Durant, OK 74701; ³USDA, ARS Biological Control of Pests Research Unit, Box 67, Stoneville, MS 38751.

Imported red fire ants (*Solenopsis invicta*) can damage the seeds of peanuts (*Arachis hypogaea*). This study investigates the effects of various degrees of ant damage on the germination and growth of peanuts. Shelled raw peanuts were exposed to fire ants, which damaged them from zero to one hundred percent (weight basis). The seeds and seed remnants were planted in a mixture of potting soil and perlite, and grown under fluorescent lights. All peanuts with less than five percent damage germinated. Most peanuts with less than twenty percent damage germinated; however, damage as little as five percent could prevent germination. Damage in excess of twenty percent prevented germination. The variation in the effects of damage in the five to twenty percent range probably depended on fungal infection as a result of loss of seed integrity. Fire ant damage can therefore significantly reduce agricultural productivity.

**Abstracts from the 93rd Annual Technical Meeting
of the Oklahoma Academy of Science
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LACK OF POPULATION GENETIC STRUCTURE IN THE BAT FLY (*TRICHOBIUS MAJOR*) IN OKLAHOMA AND TEXAS. Kendra S. Byrd¹, Gregory M. Wilson¹, William Caire¹, and Ronald A. Van Den Bussche². ¹Department of Biology, University of Central Oklahoma, Edmond, OK 73034; ²Department of Zoology, Oklahoma State University, Stillwater, OK 74078.

The bat fly, *Trichobius major*, is an obligate ectoparasite which resides for most of its life on the cave myotis, *Myotis velifer*. Previous studies have addressed distributional, behavioral, ecological, and morphological aspects of *T. major* populations in western Oklahoma. Because these studies did not reveal significant differences among bat flies from widely separated localities, it was postulated that there was adequate gene flow among cave localities. Because *T. major* are "poor fliers," it was assumed that movement of bat flies among cave localities probably was accomplished via the obligate host, *M. velifer*. However, no one has examined the population genetic structure and gene flow of bat flies using molecular techniques. Our goal was to use sequence data for a 450 base pair fragment of the cytochrome oxidase I (COI) gene of the mitochondrial genome (mtDNA) to infer population genetic structure and gene flow of *T. major* in Oklahoma and Texas. Preliminary results of our DNA

sequence data for 37 individuals from nine widely separated cave localities revealed no mtDNA sequence variation. Our findings suggest that the COI gene included in our study is not evolving at a rate appropriate to infer population genetic structure for *T. major*. Future efforts will focus on finding a segment of the mtDNA genome that exhibits a more rapid mutation rate than the COI gene. In addition, we plan to incorporate bi-parentally inherited nuclear markers (i.e., microsatellites, AFLP, and SNPs) to more accurately infer population genetic structure of *T. major* over a wider geographic area.

RESULTS OF THE 2004 BAT BLITZ, UWHARRIE NATIONAL FOREST AND PEE DEE NATIONAL WILDLIFE REFUGE, NORTH CAROLINA. Michelle L. Cameron¹, Chris T. McAllister¹, Stephanie F. Barclay¹, Matina Kalcounis-Rueppell², Joy O'Keefe³, and Mary Kay Clark⁴. ¹Department of Biology, Texas A&M University-Texarkana, Texarkana, TX 75505; ²Biology Department, University of North Carolina at Greensboro, Greensboro, NC 27402; ³Department of Forestry and Natural Resources Clemson University, Clemson, SC 29634; and ⁴Research Lab, North Carolina Museum of Natural Sciences, Raleigh, NC 27607.

The third annual Bat Blitz took place August 1-5, 2004 in the Uwharrie National Forest and Pee Dee National Wildlife Refuge of the Piedmont region of North Carolina. This cooperative effort involved 47 volunteers from 11 states who came together to gather much needed distributional information on bats of the region. The event organizers represented the Southeastern Bat Diversity Network, the University of North Carolina at Greensboro, North Carolina State Museum of Natural Sciences, and Clemson University. The Beth Haltiwanger Retreat Center on Badin Lake, situated in the midst of National Forest Land in Montgomery County, served as headquarters. Over 30 sites in three counties (Anson, Montgomery and Randolph), were surveyed over three trap nights and a total of 77 vespertilionid bats within five species were collected, including 53 eastern red bats, *Lasiurus borealis*, one Seminole bat, *L. seminolus*, 12 eastern pipistrelles, *Pipistrellus subflavus*, six evening bats, *Nycticeius humeralis*, and five big brown bats, *Eptesicus fuscus*. In addition to the above species, echolocation calls of the southeastern myotis, *Myotis austroriparius*, and Brazilian free-tailed bat, *Tadarida brasiliensis*, were recorded to develop a call library for the Piedmont. Samples obtained from bats included tissue (from wing punches for DNA analysis), hair, feces, and ectoparasites. As planned, one evening was set aside as "media night" and several local county papers as well as the *Charlotte Observer* and the *Raleigh News and Observer* covered the event to disseminate positive information to the public. A CNN television crew taped a four minute story on the Bat Blitz and it was aired on August 14 and 15 on the *Next@CNN* program. The fourth annual Bat Blitz is planned for the summer of 2005 in the western part of the Ouachita Mountains of Arkansas.

STATISTICS APPLIED TO TULSA FORENSIC PALYNOLOGY. V. Dimicelli¹ and W. Stout². ¹Computer Science and Mathematics Department and ²Biology Department, Oral Roberts University, 7777 S. Lewis Ave., Tulsa, OK 74171.

The purpose of this project is to analyze pollen samples in light of Locard's Exchange Principle. A preliminary study was done during the 2001-2002 school year. Data were collected from different material at different locations around Tulsa, Oklahoma. Pollen counts were then recorded from these samples by the use of microscopic reticle counts. Three reticle

counts were taken from each slide. The counts were then converted to percentages of the area of the slides so that Analysis of Variance could be used to determine statistically significant differences among sites and among materials within sites and between data collection time periods (24 hours versus 72 hours). A subsequent study was done during the 2003-2004 school year. The data collection methods were the same as in the preliminary study. However, the counts were used as opposed to the percentages in the analysis of the data. This was done so that the Kruskal-Wallis Method of analysis could be applied to determine if there were any statistically significant differences between sites, as well as between materials and between data collection time periods. Samples were paired off and compared. In the preliminary study, a significant difference was found in amount of pollen on polyester versus cotton. Also, significant differences were found between samples taken at 24 hours and at 72 hours for some material at some of the sites. In the subsequent study, significant differences were found between the control slide and several other samples with respect to *Ambrosia* sp. pollen count. This confirms that the predominant pollen species identified during the experimental periods was *Ambrosia* sp., commonly known as ragweed. Grass pollen was also identified as the secondary predominant species, therefore significant differences were found between the control slide and two other samples with respect to grass pollen. These results have little forensic relevance within Tulsa, due to the prevalence of these two pollen species in the Tulsa area. Finally, a significant difference was found between the control slide and one other sample each with respect to *Franseria* sp., *Xanthium* sp., *Quercus* sp., and *Eupatorium* sp. The significant differences found between the control slide and the 72 hour cotton sample with respect to *Franseria* sp., the control slide and the 24 hour silicon jelly sample with respect to *Quercus* sp., and the control slide and the 24 hour polyester sample with respect to *Franseria* sp. would be helpful to forensic researchers since these pollen types are more likely to be associated with specific regions and times of the year. Currently, new data have been collected and are being analyzed. More readings are being taken from each slide than in the first two studies in order to increase the reliability of the statistical analysis. In all of the studies there were eight sites from which data was collected. Locations were in both rural and urban areas in Tulsa.

PLEISTOCENE MAMMOTHUS TUSK FRAGMENT DISCOVERED IN WESTERN BEAVER COUNTY, OKLAHOMA. Elizabeth Duncan, Amy Sheldon and Misty Morrow. Department of Biology, Oklahoma Panhandle State University, Goodwell, OK 73939.

Previous research shows that the only Pleistocene sites in the Oklahoma Panhandle are in central Beaver County and the far northwestern corner of Cimarron County. The Texas Co. road crew discovered a mammoth tusk fragment in a gravel pit on privately owned land in the western most part of Beaver County, Oklahoma on April 28. They notified OPSU. Work in the gravel pit was halted around the discovery, until the removal of the tusk. The sedimentary setting in the pit was a high energy, sediment loaded stream. The tusk was totally isolated from any other skeletal elements and was identified as a Pleistocene *Mammuthus* sp. The tusk is thought to have belonged to an older animal due to pre-mortem erosion of the side and end of the tusk. The significance of the discovery is that it indicates that Pleistocene fauna especially elephants must have roamed throughout the Oklahoma Panhandle area.

USE OF 3-D MODELING AND 3-D COMPUTER ANIMATION TO CREATE REALISTIC VIDEO GAME LEVELS AND SPECIAL EFFECTS IN MOVIE SEQUENCES Charles Frisby, Oklahoma Panhandle State University, Goodwell, OK 73939.

In the entertainment aspect of U.S. economy, two extremes are movies and video games. Learning how to use computer software such as Maya, Adobe After Effects and Unreal Editor, has enabled me to create playable video game levels in Rainbow Six 3: Raven Shield, and also create movie sequences with effects that rival today's CG (Computer Generated) used in many movies such as Resident Evil, and Spiderman. In my video game level Texas County Detention Center, I have set the stage for a counter-terror assault on terrorist in control of the jail, and in some scenarios a hostage must be rescued. The level is basically an exact replica of the actual jail. After playing the level, and exploring, it's like you have actually been there. In my movie clip, Interstellar Drive By, a Star Wars like sequence is created using Maya and Adobe After Effects. In the sequence you see two ship flying through space; one scans the other, powers up and blows it away. By mastering the art of 3-D Modeling and 3-D Computer Animation you have no limitations to what you can create.

SECOND REPORT OF THE SOUTHERN PAINTED TURTLE, *CHRYSEMYS DORSALIS* (TESTUDINES: EMYDIDAE), FROM TEXAS, WITH COMMENTS ON ITS GENETICS. Chris T. McAllister¹, Jonathan P. Fuller¹, and Michael R. J. Forstner². ¹Department of Biology, Texas A&M University-Texarkana, Texarkana, TX 75505; ²Department of Biology, Texas State University, San Marcos, TX 78666.

The southern painted turtle, *Chrysemys dorsalis* (Agassiz, 1857) is a medium-sized emydid turtle that ranges from western Tennessee south through Alabama and Mississippi and westward to eastern Arkansas, Louisiana, Oklahoma, and Texas. Near the northeastern border of Texas, there are Oklahoma records of *C. dorsalis* in the extreme southeastern part of the state in McCurtain County and from Caddo Parish in northwestern Louisiana; however, the species has not been previously collected in adjacent southwestern Arkansas or extreme northeastern Texas. At the western limit of its range, there appears to be only a single genuine report of *C. dorsalis* from Texas, a specimen collected from a site near Longview on the Sabine River, Gregg County (deposited in the West Texas A&M University Collection as WTSU 6773). Other reports of *C. dorsalis* in Texas are based on "sight" records by wildlife biologists from Harrison and Marion counties (Caddo Lake) and Shelby County (Toledo Bend Reservoir). On 24 June 2004, one of us (JPF) collected an adult male *C. dorsalis* (carapace length = 10.5 cm) from the road in northeastern Texas in Bowie County, vicinity of Barkman Creek. Both physical and genetic characterization of the specimen was subsequently completed. Internal examination was unremarkable and the specimen did not harbor parasitic gastrointestinal helminths nor coccidian oocysts in the feces. Genetic evaluations were completed by comparing the mtDNA D-Loop sequences from this specimen with the rangewide samples available on GENBANK. Phenotypically and genotypically the specimen is a typical *C. dorsalis*. The voucher specimen was deposited in the Arkansas State University Museum, Herpetological Collection as ASUMZ 28641. Thus far, additional trapping with hoop nets at the site yielded only three common snapping turtles, *Chelydra serpentina serpentina* (Linnaeus, 1758), 44 red-eared sliders, *Trachemys scripta elegans* (Wied, 1838), and a single eastern river cooter, *Pseudemys concinna* (LeConte, 1830). Our report represents only the second genuine voucher of *C. dorsalis* from the state and suggests that a relatively small disjunct population occurs in the northeastern corner of Texas.

ENDOPARASITES OF HURTER'S SPADEFOOT, *SCAPHIOPUS HURTERII*, AND PLAINS SPADEFOOT, *SPEA BOMBIFRONS* (ANURA: PELOBATIDAE), FROM SOUTHERN OKLAHOMA. Chris T. McAllister¹, Charles R. Bursey², D. Bruce Conn³, Zachary D. Ramsey¹, and Stephanie F. Barclay¹. ¹Department of Biology, Texas A&M University-Texarkana, Texarkana, TX 75505; ²Department of Biology, Pennsylvania State University-Shenango Campus, Sharon, PA 16146; and ³Department of Biology, Berry College, Mount Berry, GA 30149.

Little is known about the parasites of North American spadefoot toads (family Pelobatidae), particularly those of Hurter's spadefoot, *Scaphiopus hurterii* Strecker, 1910, and the plains spadefoot, *Spea bombifrons* (Cope, 1863). One possible reason for this paucity of information is, unlike other anurans, these toads are explosive breeders and are often reclusive, usually only coming out of underground burrows following torrential rainfall. One such event occurred in the vicinity of the University of Oklahoma Biological Station in Marshall County, Oklahoma, on the evening of 23 April 2004, when 14 *S. hurterii* and 3 *S. bombifrons* were collected for parasitological examination. Specimens were placed in plastic bags on ice and returned to the laboratory within 24-48 hr for necropsy. The entire gastrointestinal tract (including the liver, spleen, and gall bladder), lungs, coelomic cavity and reproductive organs were examined for protozoan and helminth parasites. Blood smears were examined for hematozoa and fecal samples for coccidia. Eight of 14 (57%) *S. hurterii* harbored infections, including three (21%) with the opalinid protozoan, *Protoopalina* sp. in the rectum, three (21%) with the ciliophoran protozoan, *Nyctotherus cordiformis* in the rectum, three (21%) with tetrathyridia of the cyclophyllidean cestode, *Mesocestoides* sp. in the mesenteries, liver, and coelomic cavity, four (29%) with eight males and seven females (mean intensity \pm 1 SD = 3.75 ± 4.19 , range 1-10) of the trichostrongyloid nematode, *Oswaldocruzia pipiens*, in the small intestine, and one (7%) with eight female ascarid nematodes, *Cosmocercoides variabilis*, in the rectum. Five (36%) harbored multiple infections of protozoans and helminths. Two of the three (67%) *S. bombifrons* harbored *Mesocestoides* sp. in the liver and mesenteries. None of the toads of either species had hematozoa in the blood or coccidian oocysts in the feces. All of these helminths represent new host records for these taxa, including the first report of *Mesocestoides* sp. from any species within the family Pelobatidae.

SYNTHETIC LETHAL ANALYSIS AND MAPPING OF YEAST CELL CYCLE MUTANTS. Saima Mirza¹, Anna Ballew², and Tim Stearns². ¹Department of Biochemistry and Molecular Biology, Oklahoma State University, OK 74078; ²Department of Biological Sciences, Stanford University, CA 94305

In the budding yeast *S. cerevisiae*, cell cycle events are regulated by the essential cyclin-dependent kinase, Cdc28p. Cdc28p interacts with each of nine stage-specific cyclins which activate their target proteins at different points of the cell cycle. However, the exact mechanism and function of Cdc28p is not well understood. To address this deficiency, a screen was performed with EMS mutagenized yeast to find mutations that are synthetic lethal with a temperature sensitive allele of *CDC28*, *cdc28-4* (*syc* mutants) (1). Several of the genes mutated in the *syc* mutant strains have been mapped. The primary goal of this project was to investigate the interaction of a previously identified *syc* mutant, *stu2*, with the various cyclins by a synthetic lethal screen. In addition to the mapped strains, some *syc* mutants have yet to be characterized. We performed complementation analyses to identify the candidate gene in one of these strains and developed another genome wide method for analyzing *CDC28* function: a non-allelic non-complementation assay.

USING A CASE EXAMPLE TO ILLUSTRATE SOFTWARE DEVELOPMENT. Mark Moore, Oklahoma Panhandle State University, Goodwell, OK 73939.

The presentation will take the listener through the steps of creating a piece of software to solve a problem faced by the faculty of the CIS department at OPSU. We will look at five steps used in creating a solution to the problem by using the case example of the EZ-Advisee program that I developed. The steps are: Identifying the Problem, Analyzing the Problem, Creating a Solution, Solution Development and Implementation. Tools used in the solution are Visual Basic 6.0 and Access 2003.

PRELIMINARY REPORT DINOSAUR TRACKWAY IN THE DAKOTA SANDSTONE AT BLACK MESA STATE PARK. Misty Morrow, M. Amy Sheldon, Elizabeth Duncan. Department of Biology, Oklahoma Panhandle State University, Goodwell, Oklahoma 73939.

In July 2002, dinosaur trackways were found in Black Mesa State Park. The park is located in the Oklahoma panhandle in Cimarron County. The tracks are located in a layer of oscillation ripple marks in Dakota Sandstone bed. The ripple marks indicate that a stationary body of water was present. The Dakota Sandstone trackway bed is approximately thirty feet above the contact with the Purgatorie Formation. The formation has an estimated age of 96 million years. Four types of dinosaur tracks have been uncovered. Two distinct categories of Sauropod-like trackways are present. One trackway is of very large tracks (approximately 20 cm in diameter); the other trackway is smaller (approximately 8.5 cm in diameter). The third trackway conforms to the trackway produced by Ornithopods. The fourth trackway is very a small unidentified set of tracks. All of these dinosaurs seemed to use the same body of water as a resource since their trackways are close together and on the same bedding plane.

SEASONAL AND SPATIAL PATTERNS IN THE FACTORS LIMITING PRIMARY PRODUCTION IN AN EASTERN OKLAHOMA RESERVOIR. Amanda Norvell and James K. Schooley. Department of Natural Sciences, Northeastern State University, Tahlequah, OK 74464.

Phytoplankton production can be influenced by several different factors, including nutrients and physical characteristics of the lake. These limiting factors include phosphorus, nitrogen, and light. The purpose of this study is to determine which of these factors, or a combination of factors, limit phytoplankton production in Tenkiller Ferry reservoir in northeast Oklahoma. The current paradigm for this lake, and our null hypothesis, is that it is phosphorus limited. Four sites (which included riverine, transitional and lacustrine zones) were sampled during the lake growing season (March to November) for three years (2001-2003). Six metrics that were developed by Walker (1986) and Scheffer (1998) and currently in use by the Kansas Department of Health and Environment were applied to each Tenkiller surface water sample to determine, if possible, the factors limiting primary productivity. These metrics are: non-algal turbidity; light availability in the mixed layer; partitioning of light extinction between algae and non-algal turbidity; algal use of phosphorus supply; light availability in the mixed layer for a given surface light; and shading in the water column due to algae and inorganic turbidity. Only in the middle of the 2002 growing season did phosphorus limitation dominate the entire lake. In the early part of 2002, as well as

all of 2001 and 2003, nitrogen and light, rather than phosphorus, were the dominant limitations of phytoplankton production.

PLANKTONIC VELIGER DENSITY AND POSTPLANKTONIC JUVENILE SETTLING RATES IN TWO ESTABLISHED POPULATIONS OF ZEBRA MUSSELS IN OKLAHOMA WATERS. Valerie A. O'Brien, Sam Ziara and James K. Schooley. Department of Natural Sciences, Northeastern State University, Tahlequah, OK 74464.

Understanding the basic life history patterns of Oklahoma populations of *Dreissena polymorpha* is essential to developing management strategies for dealing with this invasive organism. We examined veliger density and post-planktonic juvenile settling rates of established populations of zebra mussels at Robert S. Kerr Lock & Dam and Webber's Falls Lock & Dam in the Arkansas River Navigation System. Zooplankton samples were collected at both sites at two week intervals. Preserved samples were examined under a dissecting microscope for numbers of veligers present using cross-polarized light technique. Veliger density/liter and /m₂ was calculated. Three settling boxes were placed at each site and slides with settled juveniles were collected biweekly. Mussels $\geq 250 \mu\text{m}$ were considered settled, and settling rate was calculated as number/m₂/day. Planktonic veliger density and juvenile settling rates were plotted with water quality data. Veliger density and juvenile settling rates followed differing patterns at each site, with Kerr veliger densities showing strong bimodal peaks early and mid-season and Webber's Falls having a single peak mid-season. Settling rates were in phase with veliger density at Webber's Falls, while rates at Kerr showed a two week lag between peak density and peak settling.

OVERWINTER SURVIVAL ESTIMATES AND MOVEMENT PROBABILITIES IN RELATION TO GROUP SIZE IN THE DARK-EYED JUNCO. Valerie A. O'Brien¹ and Charles R. Brown². ¹Department of Natural Sciences, Northeastern State University, Tahlequah, OK 74464; ²Department of Biological Sciences, University of Tulsa, Tulsa, OK 74104.

The Dark-eyed Junco, *Junco hyemalis*, is a winter resident in Oklahoma. While territorial in the breeding season, it forms flocks after migration to the wintering grounds. Although costs and benefits of flocking are well-studied, overwinter survival as a function of flock size has not been examined. We estimated within-season survival and movement probabilities for small (1-8), medium (9-17), and large (18+) groups of juncos using multistate statistical methods. We conducted a mark/recapture/resighting study at Oxley Nature Center in Tulsa, Oklahoma, from November, 2003 through March, 2004. Dark-eyed Juncos were captured in mist nets at three locations. Each bird was banded with a U.S.G.S. band and with a unique combination of color bands. Banded birds were then recaptured and/or resighted every 2-5 days until spring migration. The best fitting maximum likelihood model, in which group size showed no effect, estimated an overwintering survival probability of 0.9888. However, a closely ranked model did show a group effect, with birds in small and large groups having higher survival probabilities (0.9999) than those in medium-sized groups (0.9588). Within-season daily movement probabilities indicated that birds in small and large groups tended to move least, while birds in medium-sized groups moved equally between the three group sizes.

SPATIAL VARIABILITY AND RELATIONSHIPS AMONG SOIL AND FORAGE TRAITS IN A PERENNIAL COOL-SEASON GRASS PASTURE. Amy R. Radford¹, Charles T. MacKown², Reonna Slagell-Gossen¹, and Brian K. Northup². ¹Redlands Community College and ²USDA-ARS Grazinglands Research Laboratory, El Reno, OK 73036.

Manska intermediat wheatgrass [*Thinopyrum intermedium* (Host) Barkw. and Dewey], a perennial cool-season grass, is a promising alternative to annual winter wheat (*Triticum aestivum* L.) pasture for stockers in the southern Great Plains. Selected soil traits measured before the onset of grazing may be useful to assure sustained productivity of high quality forage from Manska pasutres. To assess relationships between soil and forage traits, samples in a 2-ha paddock were collected from 208 points distributed in a modified grid pattern with most spaced 5-m apart in eight rows psaced 10- to 15-m apart. Although most soil traits were poorly correlated with those of plants, soil-to-soil trait relationships could be established. Mehlich III extractable P (27-140 mg kg⁻¹) and pH (4.9-7.2) at the 0- to 10-cm depth were moderately correlated and both were corelated to elevation. Also, amounts of total soil N (7-26 kg ha⁻¹) and soil C (27-140 kg ha⁻¹) at the 0- to 10-cm depth were strongly correlated ($r = 0.90$; $P < 0.001$) and relatively more uniform (CV = 14 and 15%, respectively) among traits. Biomass was normally distributed and ranged from 470-6800 kg ha⁻¹ ($x = 550$ kg ha⁻¹; CV = 91%). Biomass and N uptake were strongly associated ($r = 0.95$; $P < 0.001$) with total available N ranging from 32 to 297 kg ha⁻¹ ($x = 103$ kg ha⁻¹; CV = 39%). Similarities in spatial distribution patterns among soil and forage traits reveal opportunities to modify management practices to improve forage biomass and composition.

USE OF THE BIOMARK® TAGGING SYSTEM ON THE OZARK HELLBENDER, *CRYPTOBRANCHUS ALLEGANIENSIS BISHOPI* (AMPHIBIA: CAUDATA), IN NORTHERN ARKANSAS. Benjamin A. Wheeler¹, Chris T. McAllister ², Stanley E. Trauth¹, Stephanie F. Barclay ², Zachary D. Ramsey ², and Waylon R. Hiler¹. ¹Department of Biological Sciences, Arkansas State University, State University, Arkansas 72467; ²Department of Biology, Texas A&M University-Texarkana, Texarkana, TX 75505.

The Ozark hellbender, *Cryptobranchus alleganiensis bishopi*, is a robust salamander restricted to streams of the Ozark Plateau of southern Missouri and northern Arkansas. In Arkansas, it has been reported from only four counties of the state. In 2001, *C. alleganiensis* was listed as a candidate species on the endangered species list. Populations appear to be declining in streams where this salamander was once common, especially in the Spring River of Arkansas where it is apparently nearing extirpation. Possible reasons for decline range from over collection to various types of habitat alteration. On 22-23 July 2004, we took part in a preliminary tagging study of Ozark hellbenders on the Eleven Point River, Randolph County, Arkansas. The purpose of this research was to examine the feasibility of using the Biomark® tagging system (Biomark Inc., Boise, Idaho) on this salamander. On day one, six hellbenders were collected using Scuba gear and tagged by inserting individual PIT (Passive Integrated Transponder) tags under the skin with a 12 gauge needle and released back into the river at the same locale they were collected. The tags measured 12 mm x 2.1 mm, were of 134.2 kHz ISO capacitance, and glass encapsulated. When using the FS2001F-ISO transceiver and portable reader, the read distance is reported to be about 30 cm. The following day, we returned to the site and attempted to take readings on marked hellbenders from a slowly moving jon boat. Within a search period of two hours, we were successful in locat-

ing two of the six (33%) tagged hellbenders. For the first time, this study suggests that hellbenders can be PIT tagged and located with a transceiver while in its natural habitat underwater, making handling and disturbing minimal for future population studies.

ZEBRA MUSSEL MONITORING IN THE ARKANSAS RIVER NAVIGATION SYSTEM AND RISK ASSESSMENT FOR McGEE CREEK RESERVOIR. Sam Ziara, Valerie A. O'Brien and James K. Schooley. Department of Natural Sciences, Northeastern State University, Tahlequah, OK 74464.

Zebra mussel (*Dreissena polymorpha*) populations have been established in the waters of the Arkansas River navigation system since the early 1990's. The densities of zebra mussels at Webbers Fall Lock increased from 29 to 5,339 ind/m² between the spring of 1996 and the spring of 2004. Downstream at the Kerr Lock, for the same period, densities increased from 42 to 1,341 ind/m². Growth performance of zebra mussels in the navigation system appears to normally be limited by water temperature extremes in summer and winter and by lower than optimum pH in the summer and fall. Calcium levels are most often at high enough levels to provide for good to the best possible growth. Zebra mussels have now spread to other lakes in Oklahoma and Kansas. We have not found zebra mussels in McGee Creek reservoir and it is our assessment, based on water chemistry, is that there is only a low to moderate probability of a robust and environmentally significant population of zebra mussels becoming established in this reservoir. The key limiting factors, in order of importance, are predicted to be very low calcium levels, low pH levels and expected extremes of water temperature in summer and winter.