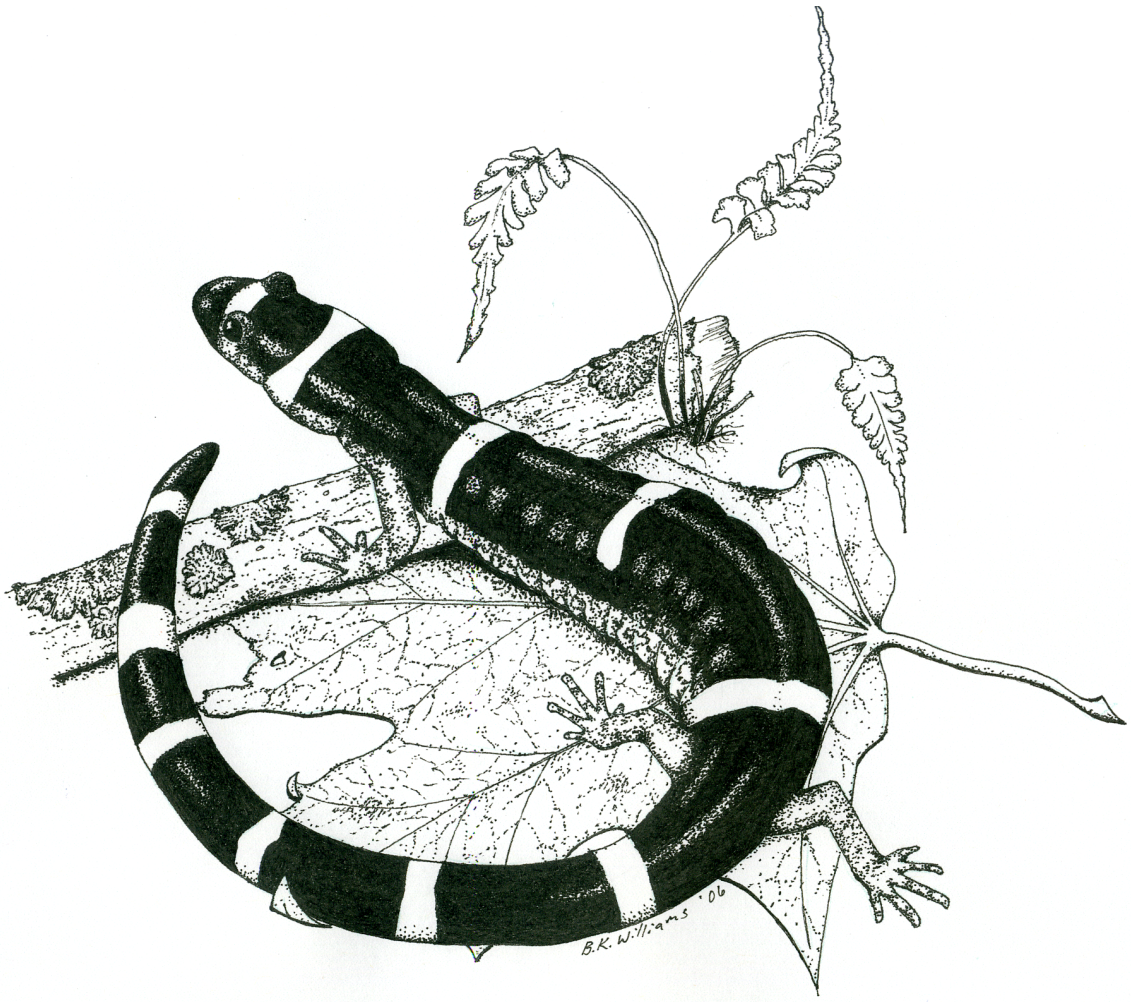
Missouri Herpetological Association



Newsletter

Number 20
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MISSOURI HERPETOLOGICAL ASSOCIATION NEWSLETTER NO. 20

Contents

Cover art: *Ambystoma annulatum* by Bethany Williams

INTRODUCTION

The Twentieth Annual Meeting of the **Missouri Herpetological Association** was held 29-30 September 2007 at Missouri State University **Bull Shoals Field Station**, Taney County, Missouri. This organization is designed to provide herpetologists in Missouri and surrounding states with an opportunity to meet and exchange ideas regarding current efforts in research and other professional activities. High on the list of priorities is to provide students, involved in research at either the graduate or undergraduate level, (1) the chance to interact with senior herpetologists, and (2) an outlet to present, in a semi-formal setting, the results of their labors.

This newsletter is the result of a decision made at the inaugural meeting to provide a means of publicly acknowledging papers presented at this and subsequent annual meetings. Further, the newsletter will inform the herpetological community of new distribution records of Missouri's herpetofauna, additions to the bibliography dealing with the state herpetofauna and provide an outlet for the publication of short notes dealing with the natural history of Missouri amphibians and reptiles.

ANNOUNCEMENTS

21st Annual Meeting of the Missouri Herpetological Association

The Twenty-first Annual Meeting of the **Missouri Herpetological Association** will be held on 28-29 September 2008 at the **Reis Biological Station**, Crawford County, Missouri. A "call for papers" and registration materials will be sent electronically in mid-July. For more information please contact **Jeff Briggler** at:

Missouri Department of Conservation
P.O.Box 180
Jefferson City, MO 65102-0180
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MHA Spring Field Trip

The 2008 spring field trip is scheduled for the weekend of April 26-27. Information detailing location of the field trip will be sent to MHA members and posted on the MHA website in late March. The field trip is open to anyone with an interest in amphibians and reptiles.

MHA on the Net

The Association has an official site on the Internet. Point your browser to http://www.moherp.org/ for copies of current and past publications and to view photos and information from past field trips and meetings. Send ideas, suggestions, comments, and content to the Webmaster (webmaster@moherp.org).

Wanted

We still need artwork for future cover illustrations. Any form native to the state is acceptable; however, taxa described from Missouri type specimens and state species of conservation concern are particularly desirable. The taxa described from Missouri type specimens that haven't appeared on past covers are: *Acris crepitans blanchardi, Eurycea* (*Typhlotriton) spelaeus*, *Nerodia fasciata confluens*, *Carphophis vermis*. Anyone wishing to contribute drawings for future issues can send submissions to

Richard Daniel at:

Division of Biological Sciences
114 Lefevre Hall
University of Missouri
Columbia, MO 65211
E-mail: danielr@missouri.edu

Summer Field Course in Conservation Biology, with an Emphasis on Amphibians and Reptiles

A field course in Conservation Biology will be offered at the Lakeside Laboratory from June 2nd to June 27th 2008. Lakeside Lab is located in Northwestern Iowa, along the intersection, from east to west, between the Eastern Deciduous Forest and Great Plains, and along the intersection, from north to south, between the recently glaciated Lakes Region and the older, better drained, and more variable stream systems associated with Missouri and Mississippi River uplands.

A combination laboratory and field course, Conservation Biology examines the history of the Upper Midwest from the retreat of the latest glaciers to the present day. Northwest Iowa is a landscape of lakes, wetlands, prairie, and oak savannah; it is also a place of intense agriculture, an area of concentrated summer tourism, and it hosts a wind farm. In this context, native ecosystems will be compared against altered ecosystems, and the processes of restoration will be measured against these extremes. Students will participate in a habitat restoration and should bring rugged clothing, sturdy boots, heavy canvas gloves, and a hard hat.

The herpetofauna of this area is well known. Highlights include the turn-of the-century (19th to 20th) commercial collections of 20 million leopard frogs/yr, the pioneering surveys of Frank Blanchard in the 1920s, and more recent findings that bear on the global problems of amphibian malformations and declines. We will visit the only known prairie rattlesnake populations in Iowa.

For information about Lakeside Lab (soon to be updated for 2008) see: http://www.continuetolearn.uiowa.edu/lakesidelab/

For more information about the course, contact Mike Lannoo at:

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Herpetological Conservation and Biology

Volume 3, issue 1 of HCB, a free online journal, has been released. Please feel free to check out HCB and its articles on the ecology, life history, conservation, and management of amphibians and reptiles. The journal is open access and freely available at <http://www.herpconbio.org/>.

Abstracts of Papers Presented at the 20th Annual Meeting of the Missouri Herpetological Association

Bull Shoals Field Station
29-30 September 2007

REPRODUCTIVE ECOLOGY OF A SUBURBAN POPULATION OF SMALL-MOUTHED SALAMANDERS (*Ambystoma texanum*): YEAR SIX.

Mark S. Mills[1], Teffany N. Sample[2], Jennifer L. Godfrey[3], Sandra Mosquera[1], Mariah L. Carter[1], and Matthew C. Klein[1]

[1]Division of Math & Science, Missouri Valley College, Marshall, MO 65340
[2]Department of Biological Sciences, Arkansas State University, Jonesboro, AR 72467
[3]Department of Biology, University of Missouri, St. Louis, MO 63121

This is the sixth year of our study of the reproductive ecology of the small-mouthed salamander, *Ambystoma texanum*. We completely enclosed a small (250 m^2), ephemeral, man-made pond on the campus of Missouri Valley College with a drift fence and pit-fall traps in early February 2002 and continued to monitor the fence daily during the breeding seasons through 2007. A total of 982 adult salamanders entered the pond over the six seasons. The dates we collected the first breeding adults varied from 17 February to 12 March, and breeding adults continued to arrive through early May; however, most arrived in March even in years when the pond was dry. Sex ratio (males:females) of breeding adults varied from 0.36-3.0, but was near unity when summed over the six years. Recruitment (number of juveniles exiting the pond) ranged from zero (2 of 6 years) to 452. We observed a trade-off between number and size of juveniles leaving the pond: the 31 juveniles that left the pond in 2007 were approximately 1.5 times longer and 4 times heavier than the 452 juveniles that exited in 2004. Breeding and recruitment were closely associated with the hydroperiod of this pond. Years with successful recruitment had hydroperiods of 122 or more days and the pond filled before or during February. Years without recruitment had hydroperiods of 74 or fewer days. This study highlights the fluctuating nature of amphibian populations and particularly year-to-year variation in recruitment and its relationship to pond hydroperiod.

TADPOLES WITH BAD TEETH: DOES AMPHIBIAN CHYTRID AFFECT ANURAN LARVAE?

Kevin G. Smith, Ché Weldon, Werner Conradie and Louis H. du Preez
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The fungal pathogen *Batrachochytrium dendrobatidis* contributes to the global decline of amphibians. Although mortality from *D. dendrobatidis* infections occurs primarily in postmetamorphic individuals, infected tadpoles may suffer reduced growth and developmental rates as a result of oral chytridiomycosis, possibly affecting adult fitness. We conducted a field study in which we examined South African tadpoles for oral chytridiomycosis and compared the body sizes of infected and uninfected individuals of two species, *Heleophryne natalensis* and *Strongylopus hymenopus*. Presence of *B. dendrobatidis* was determined by microscopic inspection of mouthparts. Infection prevalence was high in both species, 62.5% and 38.6%, respectively, and infected individuals were significantly larger in both species. The inclusion of developmental stage in the analysis of *S. hymenopus* body size eliminated the relationship between body size and infection status, suggesting that differences in body size were not due differences in growth, but to differences in developmental stage of infected larvae. These results suggest that larvae at more advanced developmental stages are more likely to be infected with *D. dendrobatidis* and that infection in larval amphibians may be dependent on time or developmental status of larvae. Contrary to the results of past studies, there was no evidence that oral chytridiomycosis resulted in decreased growth of tadpoles, despite the occurrence of oral abnormalities in infected individuals of one species. Because

tadpole performance can subsequently affect anuran populations and because tadpoles can act as reservoirs of infection, a better understanding of the interactions of *D. dendrobatidis* and larval amphibians is important to our understanding of this emerging disease.

INFLUENCE OF STRESS SECRETIONS FROM THE OZARK HELLBENDER (*Cryptobranchus alleganiensis bishopi*) ON FEEDING BEHAVIOR OF NATIVE AND NON-NATIVE FISHES: PRELIMINARY DATA

Brian Gall and Alicia Mathis
Department of Biology, Missouri State University, Springfield, MO 65897

Ozark Hellbender populations have endured extensive declines over the last 30 years. The declines may be attributed to a number of causes including changes in habitat and water quality, over harvesting, disease, and increases in predation. We examined whether natural secretions from the skin of adult hellbenders might inhibit foraging behavior of native and nonnative fishes. We mildly agitated adult Ozark hellbenders until they produced a white milky skin secretion. Fishes were placed individually into testing tanks. After a habituation period we introduced aliquots of the secretion or a blank control stimulus followed by five prey items (small fishes). At the time of submission of this abstract, n = 6—15 trials/species/treatment. Two native fishes (spotted bass, *Micropterus punctulatus*, and banded sculpin (*Cottus carolinae*) responded to water conditioned by agitated hellbenders by taking longer to strike and approach the prey than fish in control treatments. One non-native fish (brown trout, *Salmo strutta*) responded to water conditioned by agitated hellbenders by approaching prey faster than fishes in the control treatment. At this point in our study, we see no indication of effects of hellbender secretions on feeding behavior of Ozark bass (*Ambloplites constellatus*), smallmouth bass (*Micropterus dolomieu*), or rainbow trout (*Oncorhynchus mykiss*). Overall, our preliminary data suggest that at least two native fishes are inhibited by the hellbender secretions, whereas one non-native fish (brown trout) are stimulated by the hellbender secretions.

HERPETOLOGY HALLOWEEN: UNNATURAL OCCURRENCES AT THE MISSOURI/KANSAS BORDER

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[2]Division of Biological Sciences, University of Missouri, Columbia, MO 65211

Museum records for amphibians and reptiles tend to affirm some basic observations about collections: a) uncommon species are often over-represented, b) collectors exhibit an affinity to their own state and an aversion to nearby states, c) geographic areas with higher diversity tend to be over-represented for all species, and d) cultural differences between states affect collecting activity. These biases often result in a "shadow effect" at state borders with ecoregion boundaries appearing to be less influential than they must be in reality. Here, we present a brief history of Missouri herpetology and museum collections and compare herpetological collection data from western Missouri and eastern Kansas. Several distribution anomalies are readily apparent at the state border but not all of these are easily explained by the "shadow effect". Furthermore, distributions of some species in Missouri are often elucidated by also considering their distribution in Kansas. As a result of this analysis, we specifically recommend: a) exploring the western and northern prairie regions of Missouri for species that appear to be rare or absent in Missouri yet common or present in Kansas; and b) interrogating other state collection localities—particularly Iowa, Arkansas, and Oklahoma—for potential herpetofaunal populations in Missouri.

TURTLE COMMUNITY STRUCTURE IN AN URBAN OZARK STREAM

Ben Anders and Don Moll
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Turtles are among the most ubiquitous freshwater vertebrate fauna, yet their relative abundances in aquatic communities have gone largely unacknowledged. We sampled the turtle population in a 100m segment of South Creek, Springfield, MO, to determine the minimum biomass contribution. Turtles were sampled by baited hoop netting from June through July 2007, with captured animals having mass, carapace length and plastron length recorded prior to unique marking and release. A total of 648 trap hours resulted in the capture of 126 specimens across 6 species weighing a total of 189.03kg, the most abundant of which were slider turtles (*Trachemys scripta*) (65% total specimens, 33% total mass) and snapping turtles (*Chelydra serpentina*) (28% total specimens, 63% total mass). These data suggest that the turtle community contributes a significant proportion of the stream's consumer biomass, and implies that its role in energy flow and nutrient cycling within this ecosystem is of considerable importance.

TURTLE COMPOSITION AND DEMOGRAPHY AT BIG OAK TREE STATE PARK, WITH AN EYE ON THE FUTURE

Brad. M. Glorioso and **Allison J. Vaughn**
Missouri Department of Natural Resources, Big Oak Tree State Park, East Prairie, MO 63845

Amid the sea of agriculture in southeast Missouri lies Big Oak Tree State Park, a 1,029 acre remnant bottomland forest and swamp that once covered the bootheel region. As dictated by the park's Natural Resource Management Plan, a mark-recapture turtle study began in late spring 2007 to determine species composition and populations within the park. As of 12 September 2007, using various methods of capture in the 22 acre lake and surrounding moat, 1137 total captures were made, comprising 927 individual turtles. Seven species were found: *Trachemys scripta*, *Chelydra serpentina*, *Chrysemys picta, Sternotherus odoratus*, *Apalone spinifera*, *Pseudemys concinna*, and *Graptemys pseudogeographica*. Nearly 82% (756) of all individuals were *T. scripta*, with the next most abundant being *C. serpentina*, with 68 individuals. Schnabel estimates the following population sizes: *T. scripta* (2230), *C. serpentina* (143), *C. picta* (147), *S. odoratus* (133), and *A. spinifera* (28). Only two individuals of *P. concinna* and one of *G. pseudogeographica* were captured. The sex ratios were only significantly different from equality for *C. serpentina* in favor of males ($p=0.03$) and *A. spinifera* in favor of females ($p=0.003$).

The natural hydrology of the bootheel region has been highly affected by Mississippi River levees and a plethora of drainage ditches, including some that border and bisect the park. Recently, as part of the St. John's-New Madrid Floodway Project, the U.S. Army Corps of Engineers purchased 1,800 acres of cropland contiguous with the park. The newly acquired land will become part of Big Oak Tree State Park, and go into reforestation and wetland restoration. The manmade 22 acre lake and surrounding moat will be removed in favor of restoration of the ca. 100 acre historic sedge-dominated swamp known as Grassy Pond. The lower-lying areas, including Grassy Pond, will be flooded seasonally using pumps from the Mississippi River to simulate natural flood cycles. The turtle trapping effort during this study has failed to produce a number of species that were surely present before the habitat was so severely altered. It has also produced compositions that were somewhat unexpected, namely the dominance of sliders and the relative lack of painted turtles and stinkpots, which are abundant at Reelfoot Lake, a mere 13 miles to the south. With the changes in store for the area, natural colonization and proliferation may take place over time for some species not found in this study or found in low numbers. There will also be the potential for reintroduction of some species, if necessary. Although generally unknown, it is hoped that through the Floodway Project, turtle populations and composition at Big Oak Tree State Park will more closely approximate natural populations before human disturbances.

THE UNSEEN CONSEQUENCES OF TURTLE RACING

Alex Heeb
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Turtle racing is an event that is held at county fairs, community celebrations and other events in the U.S. It is done by placing turtles in the middle of a circle, with the first turtle to walk outside the circle being the winner. Box turtles (Terrapene carolina and T. ornata) caught from the wild are the most frequently used species. Although the decline of certain North American turtle species has been well publicized, little attention has been paid to turtle races as a possible contributing factor. I conducted phone and internet surveys to determine how many turtle races there are. I also attended turtle races and heard reports from people who had also attended races. Conditions at the races were found to be highly unsanitary and were detrimental to the turtles needs. Most of the turtles are not returned to their home ranges and are sometimes released en masse, often in habitat unsuitable for survival. My survey identified approximately 520 turtle races with about 85 in Missouri. Based on attendance data from multiple races I estimate that nationwide, over 26,000 box turtles are taken from the wild annually for turtle races. In Missouri, I estimate over 5,000 turtles are used for races annually. I discuss conditions at races, how races may be the starting point for new diseases, mortality, etc. I also discuss management options that could reduce the impact of turtle racing on turtle populations. Finally, I discuss a radio telemetry study that I am conducting on box turtles released after races.

COMPARATIVE PHYLOGENETIC ANALYSIS IN POPULATIONS OF THE WESTERN COTTONMOUTH (*Agkistrodon piscivorus leucostoma*) DISTRIBUTED IN THREE NORTH AMERICAN DRAINAGE BASINS

Ryan D. Combs and Mark L. McKnight
Biology Department, Missouri State University, Springfield, MO 65897

The western cottonmouth is distributed in three major North American drainage basins. Using a molecular phylogenetic analysis, Knight et al. (1992) observed that western cottonmouths were highly divergent from both eastern and Florida cottonmouths yet the degree of divergence among populations of the western cottonmouth remains unexplored. During the Pleistocene ice-ages populations of cottonmouths were confined to southern refugia in both Texas and Florida (Van Devender and Conant 2000). It is thought that post glacial dispersal patterns using stream corridors have resulted in the present biogeographic assemblage of populations in different drainage basins. Here I use the molecular marker mitochondrial cytochrome b in a molecular phylogenetic analysis to test the hypotheses: 1) that post-glacial dispersal into confined drainage basins has caused genetic divergence between populations of western cottonmouths, and 2) to determine if the western cottonmouth was restricted to one or more Pleistocene ice-age refugia. Phylogenies produced using Maximum Likelihood (ML) and Bayesian phylogenetic inference show that drainage basins have not caused genetic divergence among populations of western cottonmouths. While the mismatch distribution combined with my phylogenetic data suggests that two Pleistocene refugia may have been present.

VARIATION IN ANTIPREDATOR BEHAVIORS OF THE WESTERN COTTONMOUTH, *Agkistrodon piscivorus*, AS A RESULT OF TEMPERATURE, SIZE AND REPRODUCTIVE CONDITION.

Diane Mullich
Biology Department, Missouri State University, Springfield, MO 65897

Encounters with predators evoke defensive behaviors in many animals and defensive responses may vary according to the costs and benefits associated with different predatory contexts. In snakes, defensive behaviors may be influenced by temperature, sex, body size, and reproductive state. In response

to human antagonists, the cottonmouth, *Agkistrodon piscivorus*, has been reported to exhibit a flight response followed by a range of defensive displays which increase with the level of predatory threat. A previous laboratory study reported that level of defensive response was inversely proportional to body size in *A. piscivorus*, which was attributed to size-related differences in perception of predation risk. We utilized field and laboratory behavior trials to evaluate variation in the antipredator behavior of *A. piscivorus* as a function of temperature, body size, and reproductive condition. Paralleling the results of previous studies, free-ranging snakes initially fled if a refuge was in close proximity and otherwise immediately adopted a defensive posture, with smaller snakes tending to exhibit more animated defensive responses than larger individuals. After controlling for the effects of body size, we found no significant thermal influence on defensive behaviors in laboratory-based repeated measures trials at 15, 24, and 30 C. However, paired comparisons of 20 adult females before and after parturition revealed a strong influence of reproductive condition with individuals exhibiting significantly greater defensive responses when gravid.

THE STRUCTURE AND FUNCTION OF COPULATORY "PLUG" IN THE AFRICAN BROWN HOUSE SNAKE (*Lamprophis fuliginosus*)

Robert D. Aldridge and Samantha S. Wisniewski
Saint Louis University, Saint Louis, MO

The copulatory plug in snakes has been described as a gelatinous material that the male deposits into the female's cloaca (vagina) during copulation. This material may have an effect on the reproduction of females after copulation by discouraging courtship, or by physically preventing re-mating. Only seven snake species have been reported to have a copulatory plug. In the most thorough study of the function of the plug in snakes, the authors concluded that male *Thamnophis sirtalis parietalis* deposit a thick gelatinous plug that occludes the female cloaca after copulation, thus preventing subsequent copulation for several days. The purpose of this study is to describe and examine the role of the copulatory plug in the attractivity of the African brown house snake (*Lamprophis fuliginosus).* In laboratory trials, most mating events occurred within a one-hour, however, snakes did mate after two or more hours of courtship activity. Most copulations lasted over 4 ½ hours. Following copulation, the mated female was non-attractive for 6-8 days. A copulatory plug was not found, however, there was a clear, syrup-like viscosity, liquid material in the cloaca of all mated females. This material filled the cloaca and would drip out of the vent with palpation. The copulatory secretions were not responsible for the non-attractiveness of the female because these secretions, when placed on attractive females, did not alter their attractiveness.

SPATIAL ECOLOGY AND HABITAT USE OF GRAHAM'S CRAYFISH SNAKE, *Regina grahamii*, IN AN AGRICULTURAL LANDSCAPE

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1002 N 10th St., Albany, MO 64402

Graham's crayfish snake (*Regina grahamii*) is a highly aquatic snake found in marshes, lakes, and slow rivers. Little is known about *Regina grahamii* spatial ecology or microhabitat use. Using radio-telemetry methods, I followed three *R. grahamii* for approximately 60 days to determine activity zones, dispersal distances, and habitat characteristics of this 'crayfish obligate' species. Average activity zone size was 1.47 hectares (range 0.14-3.8 h) and average maximum dispersal distance was 206 meters (range 58-435 m). Average water depth at snake location was 13.3 centimeters. The spike-rush/smart weed vegetation zone contained 53% of snake locations while the bur-reed/river bulrush/open water vegetation zone contained 47% of snake locations. Snakes were found buried in spike-rush thatch in 35% of locations. No snakes were recorded using cover objects or burrows during the study period. Only 2 instances of open basking in vegetation above the waterline were recorded. Although preliminary, these data suggest that Graham's crayfish snake uses relatively small activity zones, but relies heavily on shallow water areas with adequate vegetation thatch for refuge. Based on trapping data, this habitat type is very productive for

crayfish as well. Wetland restoration projects designed for herpetological diversity should include extensive areas of shallow water with high thatch-producing vegetation cover such as spike rush.

NEW HERPETOLOGICAL RECORDS FROM MISSOURI FOR 2006

Richard E. Daniel[1], Brian S. Edmond[2] and Jeffrey T. Briggler[3]

[1]Division of Biological Sciences, University of Missouri, Columbia, MO 65211

[2]Computer Services, Missouri State University, Springfield, MO 65897

[3]Missouri Department of Conservation, P.O. Box 180, Jefferson City, MO 65102

The following list represents new county records accumulated or brought to our attention since the publication of Johnson (2000), Daniel and Edmond (2000, 2001) and Daniel *et al*. (2002, 2003, 2004, 2005, 2006). Publication of these records extends our knowledge of the amphibians and reptiles native to Missouri. In addition, recipients of this list have the opportunity to update checklists and distribution maps. Finally, the publication of this list allows us to acknowledge the contributions of the many individuals who have provided information or specimens.

The specimens listed below represent the first reported occurrence of the species within a given county and are based on catalogued voucher specimens or photographs deposited in a public institution. Distribution records are presented in the standardized format of Collins (1989): common and scientific name, county, specific locality (unless withheld for species of special concern), legal description of locality, date of collection, collector(s), institution and catalogue number where the specimen is deposited.

The specimens reported in this note have been deposited in the Dean E. Metter Memorial Collection, University of Missouri, Columbia, MO. Unless otherwise indicated, all distribution records are documented by post-metamorphic/hatchling fluid preserved specimens.

We would like to extend our appreciation to M. Combs, P. Frese, B. Glorioso, K. Hedgpeth, E. Horner, M. Jeppson, K. Lohraff, T. Moore, N. Muenks, and T. Nagel for generously providing information and specimens included in this note.

AMPHIBIA: CAUDATA

SPOTTED SALAMANDER
Ambystoma maculatum
Iron Co.: Crane Lake (T32N R4E S32); 25 March 2007; B. Glorioso (eggs, digital photo, UMC 1415P).
Madison Co.: Mark Twain Nat. For., For. Rd. 2124 just S Jct. Co. Rd. 409 (T32N R6E S9); 24 March 2007; B. Edmond, R. Daniel, M. Bowe, B. Glorioso, J. Edmond, A. Edmond (eggs, digital photo, UMC 1091P).
Newton Co.: Fort Crowder Conservation Area (T24N R31W S6); 24 February 2007; B. Edmond, M. Bowe (digital photo, UMC 1414P).

MARBLED SALAMANDER
Ambystoma opacum
Taney Co.: Bull Shoals Field Station, Drury Conservation Area (T22N R20W S11); 30 September 2007; B. Edmond, M. Bowe, K. Stohlgren. J. Edmond, A. Edmond (digital photo, UMC 1409P).

HELLBENDER
Cryptobranchus alleganiensis
Maries Co.: Gasconade River (T39N R9W); 21 March 2007; J. Briggler, P.Pitts, B. McKeage, K. Larson (digital photo, UMC 1149P).

DARK-SIDED SALAMANDER
Eurycea longicauda
St. Francois Co.: St. Joe State Park (T36N R5E S 20); 4 June 2007; B. Glorioso (digital photo, UMC 1349P).

GROTTO SALAMANDER
Eurycea spelaea
Ripley Co.: roadside spring, Co. Rd. 7-AA (T24N R1E S18); 2 June 2007; M. Bowe, B. Edmond (larvae, UMC 7992-7993).

COMMON MUDPUPPY
Necturus maculosus
Maries Co.: Gasconade River (T39N R9W); 21 March 2007; J. Briggler, P. Pitts, B. McKeage, K. Larson (digital photo, UMC 1150P).

CENTRAL NEWT
Notophthalmus viridescens
Cape Girardeau Co.: Trail of Tears State Park (T32N R14E S22); 2 October 2007; B. Glorioso (digital photo, UMC 1287P).
Lawrence Co.: Paris Springs Conservation Area (T29N R25W S29); 5 May 2007; B. Edmond, M. Bowe (digital photo, UMC 1291P).

AMPHIBIA: ANURA

AMERICAN TOAD
Bufo americanus
Scott Co.: General Watkins Conservation Area (T28N R13E S22); 30 May 2007; B. Glorioso (digital photo, UMC 1401P).

FOWLER'S TOAD
Bufo fowleri
Ralls Co.: Mark Twain Lake, Indian Creek Campground (T55N R7W S20); 20 July 2007; B. Edmond, J. Edmond, A. Edmond (digital photo, UMC 1390P).

EASTERN NARROWMOUTH TOAD
Gastrophryne carolinensis
Dade Co.: Corry Branch Glade (T32N R26W S35); 6 May 2007; B. Edmond, M. Bowe (digital photo, UMC 1324P).
Dent Co.: White River Trace Conservation Area (T34N R7W S29); 12 July 2007; J. Briggler, R. Chapman, L. Hughes, J. Braunecker, N. Girondo (larvae, UMC 7988).

COPE'S GRAY TREEFROG
Hyla chrysoscelis
Shannon Co.: Rt. OO Jct. Co. Rd. 491/493 (T27N R6W S7); 3 July 2007; M. Bowe, B. Edmond (verified by call, UMC 7991).

GREEN TREEFROG
Hyla cinerea
Mississippi Co.: Rt. A, 0.3 mi. S Jct MO 102 (T23N R16E S13); 22 June 2007; B. Glorioso (digital photo, UMC 1316P).

SPRING PEEPER
Pseudacris crucifer
St. Francois Co.: St. Joe State Park (T36N R5E S 20); 4 June 2007; B. Glorioso (digital photo, UMC 1279P).

WESTERN CHORUS FROG
Pseudacris triseriata
Benton Co.: Hi Lonesome Prairie Conservation Area T43N R21W S23); 24 April 2007; J. Briggler, J. Sternburg (digital photo, UMC 1152P).

BULLFROG
Rana catesbeiana
St. Francois Co.: St. Joe State Park (T36N R5E S 20); 4 June 2007; B. Glorioso, T. Turpin (digital photo, UMC 1228P).

BRONZE/GREEN FROG
Rana clamitans
Mississippi Co.: Charleston, Hillhouse Park (T26N R16E S4); 19 April 2007; B. Glorioso (digital photo, UMC 1321P).

SOUTHERN LEOPARD FROG
Rana sphenocephala
Madison Co.: Mark Twain Nat. For., For. Rd. 2124 just S Jct. Co. Rd. 409 (T32N R6E S9); 24 March 2007; B. Edmond, R. Daniel, M. Bowe, B. Glorioso, J. Edmond, A. Edmond (digital photo, UMC 1205P).
Maries Co.: Spring Creek Gap Conservation Area (T40N R8W S34); 21 May 2007; J. Briggler, J. Demand, K. Larson (larvae, UMC 7989).
Scott Co.: General Watkins Conservation Area (T28N R13E S22); 21 May 2007; B. Glorioso (digital photo, UMC 1249P).

REPTILIA: SAURIA

BROAD-HEADED SKINK
Eumeces laticeps
Cedar Co.: Rt. A at Bear Creek (T34N R25W S10); 27 May 2007; M. Bowe, B. Glorioso, B. Edmond (digital photo, UMC 1336P-1337P).
Mississippi Co.: Big Oak Tree State Park (T23N R16E S13); 2 June 2007; B. Glorioso (digital photo, UMC 1350P).
Pulaski Co.: Fort Leonard Wood; 14 June 2007; K. Lohraff (digital photo, UMC 1106P).

GROUND SKINK
Scincella lateralis
Scott Co.: General Watkins Conservation Area (T28N R13E S22); 30 May 2007; B. Glorioso (digital photo, UMC1230P).

REPTILIA: SERPENTES

WESTERN COTTONMOUTH
Agkistrodon piscivorus
Barry Co.: Flat Creek (T24N R25W S26); 7 July 2007, B. Edmond, M. Bowe (digital photo, UMC 1258P).
Henry Co.: (T41N R25W S7); 28 November 2007; D. Anstine (digital photo, UMC 1105P).

WESTERN WORM SNAKE
Carphophis vermis
Wright Co.: Cedar Gap Conservation Area (T28NB R16W S27); 9 September 2007; M. Bowe, B. Edmond (UMC 1381P).

EASTERN RACER
Coluber constrictor
Mississippi Co.: Charleston, Hillhouse Park (T26N R16E S4); 21 April 2007; B. Glorioso (digital photo, UMC 1371P).

TIMBER RATTLESNAKE
Crotalus horridus
Butler Co.: UMC Forestry Camp, University Forest Conservation Area (T26N R7E S17); 1 May 2007; K. Larson, K. Kelly, J. Briggler (digital photo, UMC 1167P).
Dallas Co.: Lead Mines Conservation Area (T36N R18W S35); 3 May 2007; C. Smith (digital photo, UMC 1107P).
Harrison Co.: Tombstone Creek, 2.2 km WSW Melbourne (T62N R26W S27); 21 April 2006; P. Frese (digital photo, UMC 1089P).
Madison Co.: Mark Twain Nat. For., Little Grass Mountain (T32N R6E S17); 22 April 2007; D. Hocking, R. Daniel, B. Edmond, UMC Herp. Class (digital photo, UMC 114P).

WESTERN RAT SNAKE
Elaphe obsoleta
Ripley Co.: Rt. J, 0.1 mi. N Jct. Co. Rd. 160W-21A (T24N R1W S31); 3 June 2007; B. Edmond, M. Bowe (digital photo, UMC 1342P).

PRAIRIE KINGSNAKE
Lampropeltis calligaster
Taney Co.: Skyline Dr. (T24N R17W S26); 12 May 2007; B. Edmond, R. Daniel (digital photo, UMC 1207P).

RED MILKSNAKE
Lampropeltis triangulum
Gentry Co.: Albany, College St. (T63N R30W S19); 5 September 2006; H. Frese, G. Frese (UMC 8002).
Lafayette Co.: 3 mi SW Odessa (T48N R28W); 20 April 2006; M. Jeppson (digital photo, UMC 1108P).

BROWN SNAKE
Storeria dekayi
Madison Co.: Co. Rd. 518, 1.0 mi. N Jct. Rt. D (T33N R5E S16); 25 March 2007; R. Daniel (UMC 7978).
Mississippi Co.: Rt. A, 0.3 mi. S Jct MO 102 (T23N R16E S13); 30 August 2007; B. Glorioso (digital photo, UMC 1222P).

EASTERN GARTER SNAKE
Thamnophis sirtalis
Ripley Co.: Mark Twain Nat. For., For. Rd. 3148, 0.6 mi. W Jct. Rt. C (T24N R1E S29); 2 June 2007; B. Edmond, M. Bowe (digital photo, UMC 1183P).
Scott Co.: General Watkins Conservation Area (T28N R13E S22); 30 May 2007; B. Glorioso (digital photo, UMC 1213P). Co. Rd. 335 nr. Sand Prairie Conservation Area (T28N R15E S6); 9 September 2007; B. Edmond, M. Bowe (digital photo, UMC 1181P).

REPTILIA: TESTUDINES
WESTERN SPINY SOFTSHELL
Apalone spinifera
St. Francois.: St. Francois State Park (T38N R4E S36); 18 July 2007; B. Glorioso (digital photo, UMC 1403P).

COMMON SNAPPING TURTLE
Chelydra serpentina
Lewis Co.: US 61, 0.1 mi. N Jct. Rt. B (T60N R6W S2); 1 June 2007; J. Briggler, R. Daniel (digital photo, UMC 1135P).

WESTERN PAINTED TURTLE
Chrysemys picta
Howell Co.: US 60, 0.3 mi. E Jct. Rt. NN (T27N R8W S27); 3 May 2007; J. Briggler, K. Kelly, K. Larson (digital photo, UMC 1155P).
Ralls Co.: MO 19, 1.2 mi. NE Jct. Rt. EE (T54N R6W S8); J. Briggler, K. Larson (digital photo, UMC 1158P)
Scott Co.: MO 77, nr. Kelly School (T28N R14E S35); 27 September 2007; B. Glorioso (digital photo, UMC 1365P).
Texas Co.: MO 137, 0.5 mi. SSE Oscar (T31N R8W S8); 21 September 2007; J. Briggler (digital photo, UMC 1163P).

WESTERN CHICKEN TURTLE
Deirochelys reticularia
Wayne Co.: Rt. T (T26N R7E); May 2007; T. Moore (digital photo, UMC 1159P).

OUACHITA MAP TURTLE
Graptemys ouachitensis
Ripley Co.: Current River, Bay Mill Eddy (T24N R2E S32); 14 September 2007; J.

Briggler, R. Rimer , A.J. Pratt (digital photo, UMC 1164P).

FALSE/MISSISSIPPI MAP TURTLE
Graptemys pseudogeographica
Cape Girardeau Co.: Trail of Tears State Park (T32N R14E S22); 2 October 2007; B. Glorioso (digital photo, UMC 1323P).

MISSISSIPPI MUD TURTLE
Kinosternon subrubrum
Shannon Co.: Mark Twain Nat. For. (T27N R3W S29); 28 May 2007; B. Glorioso (digital photo, UMC1312P).

RIVER COOTER
Pseudemys concinna
Cape Girardeau Co.: Bollinger Mill State Historical Site (T31N R11E S14); 5 September 2007; B. Glorioso (digital photo, UMC 1277P).

STINKPOT
Sternotherus odoratus
St. Francois Co.: St. Joe State Park (T36N R5E S 20); 5 June 2007; B. Glorioso, (digital photo, UMC 1229P).

ORNATE BOX TURTLE
Terrapene ornata
Ozark Co.: 0.75 air mi. S Sycamore (T23N R12W S3); 18 September 2007; J. Briggler, J. Kiger (digital photo, UMC 1162P).

RED-EARED SLAIDER
Trachemys scripta
Barry Co.: MO 86, 1.8 mi. E. Jct. Rt. H (T21N R25W S27); 12 May 2007; B. Edmond, R. Daniel (digital photo, UMC 1178P).
Oregon Co.: MO 142 at Eleven Point River (T22N R2W S21); 3 June 2007; B. Edmond, M. Bowe (digital photo, UMC 1173P).

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Natural History Notes

POSSIBLE MATING MISMATCH IN MADISON COUNTY MISSOURI?

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This breeding pair of toads was observed in a shallow roadside ditch along an igneous outcropping in Madison County, Missouri on 22 April 2007 by members of a UMC Herpetology field trip. The female is clearly assignable to *Bufo americanus*. However, the identity of the male is less clear. It appears to have characteristics of both *Bufo americanus* and *Bufo fowleri*. Late April is late for the peak of *Bufo americanus* breeding activity. Male toads were not heard calling at this site or in the vicinity.

STREAM BREEDING BY THE SPOTTED SALAMANDER (*Ambystoma maculatum*) IN MISSOURI

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Ambystoma maculatum, like most ambystomatids, typically breed in fishless ephemeral woodland pools (Bishop 1943, Smith 1961, Mount 1975, Dundee and Rossman 1989, Pfingsten and Downs 1989, Petranka 1998, Trauth *et al*. 2004). However, Semlitsch (1988) reports that some *A. maculatum* populations in the Coastal Plain of South Carolina utilize sloughs and backwater areas of streams for breeding.

In Missouri this species uses a variety of vernal pools, swamps, roadside ditches and tire ruts for breeding (Sexton, *et al*. 1986, Johnson 2000). Here we make the first report of the use of streams for breeding by *A. maculatum* in Missouri.

On February 26, 2000 the junior author discovered approximately 30 spermatophores scattered on the bottom of an isolated pool formed along an intermittent stream at Bennett Spring State Park in Laclede County. No eggs or reproductive activity was observed: however, a sexually active male was found under a rock near the pool.

Stream at Bennett Spring State Park showing the location of the breeding pool (arrow) containing spermatophores.

On March 24, 2007 approximately 20 egg masses were observed below Lampher Spring near Cherokee Pass in Madison County. The egg masses were attached to submerged sticks in approximately 30 cm deep water in the spring branch near the confluence with Twelvemile Creek.

Also on this date several egg masses were observed at the base of Black Mountain in the Mark Twain National Forest approximately 2.5 km NNE of French Mills in western Madison County. The masses were resting on the bottom of a fishless pool (approximately 1 X 2 m in diameter) adjacent to Rt. E.

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NEW SIZE RECORDS FOR THREE SPECIES OF MISSOURI REPTILES

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Edmond and Daniel (2001) provided the most recent compilation of maximum size records for Missouri amphibians and reptiles. Here I present records of exceptionally large individuals of two snakes and one turtle species that exceed the published size maxima. Body size measurements were taken to the nearest mm using standard measurement techniques for snakes (snout-vent (SVL) and total length (TL)) and turtles (carapace length) given by Conant and Collins (1998). The snakes have been deposited in the Dean E. Metter Memorial Collection, University of Missouri-Columbia. The turtle is currently being maintained in the live herpetology collection at the University.

On 31 March 2007 a large DOR female *Lampropeltis calligaster* (UMC 7977) was salvaged in Maries County at the junction of US 63 and MO 68. The specimen measured prior to preservation had a SVL of 115.1 cm and a TL of 133.2 cm. The previous size record had a TL of 113.2 cm.

On 28 March 2007 Mr. Nathane Muenks salvaged a DOR adult male *Clonophis kirtlandii* (UMC 7979) near Palmyra in Marion County. It had a SVL of 34.9 cm and a TL of 42.6 cm. Edmond and Daniel (2001) did not include this species. Prior to 2006 when several individuals were discovered in Northeast Missouri (Shulse 2006, 2007), a single female specimen had been reported from the state in 1964 (Jones 1967). Based on the lack of additional specimens, Johnson (2000) considered it a species of possible occurrence and did not include it as part of the state herpetofauna.

On 28 May 2007 Mr. Drew Dittmer collected a large *Sternotherus odoratus* as it emerged from a beaver lodge in the Roubidoux Creek in Texas County near the MO 32 Bridge. The female turtle had a carapace length of 12.6 cm exceeding the previous size record of 11.7 cm.

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ASSOCIATION EVENTS IN 2007

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Introduction

For the second year, the Missouri Herpetological Association sponsored three official events: the traditional annual meeting and two field trips. A total of 48 individuals, representing 17 organizations, attended at least one of these events. Eleven scientific papers were presented during the twentieth anniversary meeting and countless conversations, anecdotes, tales, and plans were exchanged among the members attending the various events.

More than 430 individual reptiles and amphibians were observed on the two field trips, representing 43 species (6 salamanders, 8 anurans, 5 turtles, 6 lizards, 18 snakes). Individual animals collected or photographed were deposited in the University of Missouri's Dean E. Metter Memorial Collection and will thus be reported as new records where appropriate and used in future updates of the *Atlas of Amphibian and Reptiles of Missouri*.

Spring 2007 Field Trip: Truman Lake and Vicinity

The spring field trip was held the weekend of 25 - 27 May 2007 in the vicinity of Truman Lake. The purposes of the trip (in priority order) were to a) search for historical populations of the Ground Snake (*Sonora semiannulata*), b) document species found on the H. Roe Bartle (Boy) Scout Reservation, and c) search for new and updated records in the three-county area of Saint Clair, Benton, and Henry Co MO. Habitats searched included ponds, stream beds, the shores of Truman Lake, wooded hillsides, glades, and roadcuts.

Fifteen members caught more than 300 individual reptiles and amphibians, representing a total of 32 species. Most collecting activity occurred on Sat 26 May 2007, but a few species were observed or caught at the reservation the previous evening (Fri 25 May 2007) by members that arrived to camp. Also, several species were observed and photographed on the reservation on Sun (27 May 2007) morning. Finally, a subset of the participants spent a few hours in nearby Cedar Co MO, which yielded several additional animals.

The target species, S. *semiannulata*, was not located. However, the group's efforts were hindered by the lack of large tracts of suitable glade habitat. Other glade species were observed during the trip and more work is needed in the area to determine the status of *Sonora*. Eighteen species were recorded at the scout reservation (Table 1) with many common species missing from the list. At least one hillside on the reservation was an extensive but partially overgrown glade site and only a small part of the area was surveyed. More survey work on that area will very likely yield a much larger species list. Finally, several new county records were obtained. These included voucher specimens for two species, *Ambystoma maculatum* and *Pseudacris crucifer* for Saint Clair Co, and a new county record for *Eumeces laticeps* in Cedar Co. Mild temperatures and cloudy conditions characterized the weekend although it was sunny for brief periods. A thunderstorm went through the area on Sat afternoon. The complete species list along with numbers of individuals can be seen in Table 1. The spotted salamanders were represented solely from larvae observed in a pond and some anuran species numbers were augmented by larvae or by individual males calling during the weekend.

The Association would like to thank the US Army Corps of Engineers and the Missouri Department of Conservation for providing permission to use public land for the survey. Special appreciation is extended to Bob Krager, Tammy Gilmore, and Len Gilmore for providing assistance in locating collecting localities. Finally, the Boy Scouts of America and the Bartle Scout Reservation were extremely generous to provide a camping site and a large area for part of the survey. In particular, we would like to thank Judy Flett and John Christiansen for their helpful nature and hospitality.

Table 1. List of species captured or observed during the spring field trip, 25 – 27 May 2007, by county and location. A plus sign (+) indicates a species was observed in the indicated county or location. An asterisk (*) indicates that the number represents a minimum count for that species.

Species	Common Name	No	Bartle Area	Benton Co	Cedar Co	Henry Co	Saint Clair Co
Salamanders (Caudata)							
Ambystoma maculatum	Spotted Salamander	40*	+				+
Frogs (Anura)							
Bufo americanus	American Toad	40*	+			+	+
Acris crepitans	Northern Cricket Frog	30*	+		+		+
Hyla versicolor	Gray Treefrog	9	+				+
Pseudacris crucifer	Spring Peeper	8	+				+
Rana catesbeiana	Bullfrog	4	+		+	+	+
Rana palustris	Pickerel Frog	3					+
Rana sphenocephala	Southern Leopard Frog	9	+		+		+
Turtles (Testudines)							
Chelydra serpentina	Snapping Turtle	2			+		
Graptemys geographica	Common Map Turtle	1					+
Terrapene carolina	Eastern Box Turtle	24	+	+		+	+
Terrapene ornata	Ornate Box Turtle	2			+	+	
Trachemys scripta	Slider	3			+		+
Lizards (Lacertilia)							
Sceloporus consobrinus	Fence Lizard	12	+	+	+	+	+
Aspidoscelis sexlineata	Six-Lined Racerunner	13		+			+
Eumeces anthracinus	Coal Skink	3	+	+			+
Eumeces fasciatus	Five-Lined Skink	12	+		+		+
Eumeces laticeps	Broadhead Skink	3			+		+
Scincella lateralis	Ground Skink	43	+			+	+
Snakes (Serpentes)							
Carphophis vermis	Western Worm Snake	10	+	+			+
Coluber constrictor	Eastern Racer	8		+			+
Diadophis punctatus	Ringneck Snake	18	+	+		+	+
Elaphe obsoleta	Western Rat Snake	2				+	+
Lampropeltis calligaster	Prairie Kingsnake	1				+	
Lampropeltis getula	Common Kingsnake	2		+	+		
Lampropeltis triangulum	Milk Snake	2	+				+
Masticophis flagellum	Coachwhip	2		+			+
Storeria occipitomaculata	Redbelly Snake	1	+				+
Tantilla gracilis	Flathead Snake	3	+	+			+

Thamnophis sirtalis	Common Garter Snake	4	+		+		+
Virginia striatula	Rough Earth Snake	5		+			+
Agkistrodon contortrix	Copperhead	1					+

Annual Meeting: Bull Shoals Field Station

The 20th Annual Meeting of the Missouri Herpetological Association was held Sat 29 Sep 2007 at Bull Shoals Field Station near Kirbyville, Taney County, Missouri.

A total of 41 individuals, representing 16 organizations, attended the meeting. Eleven papers were presented during the regular meeting (see abstract article, this issue). A brief introduction to the Bull Shoals Field Station followed the break and a short business meeting followed the last regular presentation. Business meeting discussion topics included the date and location of the 2008 spring field trip and 2008 fall meeting. After dinner, the keynote presentation, entitled *From the Ozarks to Mount Ararat: The Saint Louis Zoo's role in amphibian and reptile conservation* was given by Jeff Ettling, Curator of Reptiles and Aquatics at the Saint Louis Zoo.

The Association would like to extend a special appreciation to Alicia Mathis for waiving the overnight charge for everyone that stayed Saturday night at the field station.

Fall 2007 Field Trip: Drury – Mincy Conservation Area

The fall field trip was held Sun 30 September 2007 mostly at the Drury-Mincy Conservation Area (including Bull Shoals Field Station) but also in the immediate vicinity. Habitats searched included roads, ponds, spring-fed streams, stream beds, flatwoods, wooded hillsides, and glades.

Twenty-one members, representing 11 different organizations, caught more than 130 individual reptiles and amphibians, representing a total of 28 species. Most collecting activity occurred on Sun 30 September 2007, but some species were observed or caught by members Saturday.

Several new species observations were documented for the Drury-Mincy Conservation Area, including a voucher specimen for an undocumented county record (*Agkistrodon contortrix*) and one new county record (*Ambystoma opacum*).

Warm temperatures (80° F) and sunny conditions characterized the weekend. The complete species list along with numbers of individuals can be seen in Table 2. The milksnake was represented solely by a freshly shed skin. Spring peepers were heard calling at one site but were not seen.

The Association would like to thank the Missouri Department of Conservation and Missouri State University for providing permission to use public land for the field trip. Special appreciation is extended to Brian Greene for leading the field trip.

Table 2. List of species captured or observed during the fall field trip, 29 – 30 September 2007. An asterisk (*) indicates that the number represents a minimum count for that species.

Species	Common Name	No
Salamanders (Caudata)		
Ambystoma opacum	Marbled Salamander	3
Notophthalmus viridescens	Central Newt	7
Plethodon albagula	Western Slimy Salamander	2
Frogs (Anura)		
Bufo americanus	American Toad	2
Acris crepitans	Cricket Frog	44*
Pseudacris crucifer	Spring Peeper	2* (calling males)
Rana catesbeiana	Bullfrog	2
Rana clamitans	Green Frog	6
Rana sphenocephala	Southern Leopard Frog	1

Turtles (Testudines)		
Terrapene carolina	Three-toed Box Turtle	4
Lizards (Lacertilia)		
Sceloporus consobrinus	Eastern Fence Lizard	11*
Scincella lateralis	Ground Skink	4
Eumeces anthracinus	Coal Skink	1
Eumeces fasciatus	Five-Lined Skink	2
Snakes (Serpentes)		
Carphophis vermis	Western Worm Snake	2
Coluber constrictor	Racer	3
Diadophis punctatus	Ringneck Snake	6
Elaphe obsoleta	Black Ratsnake	3
Heterodon platirhinos	Eastern Hognose Snake	1
Lampropeltis triangulum	Red Milksnake	1 (skin only)
Tantilla gracilis	Flathead Snake	1
Virginia valeriae	Smooth Earth Snake	1
Agkistrodon piscivorus	Cottonmouth	1
Agkistrodon contortrix	Copperhead	2
Sistrurus miliarius	Western Pigmy Rattlesnake	1

ADDITIONS TO THE BIBLIOGRAPHY OF REFERENCES ON THE HERPETOFAUNA OF MISSOURI

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The following is a list of references dealing with the biology of amphibians and reptiles from Missouri that have been brought to my attention since the publication of Johnson (2000), Powell and Daniel (2000), and Daniel (2001, 2002, 2003, 2004, 2005, 2006). Readers are requested to notify the author of any additional references that should be included in future compilations.

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TEXAS GARTER SNAKES IN THE OZARKS?

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The snake pictured in Fig. 1, a common garter snake (*Thamnophis sirtalis*), represents an unusual color morphology for Missouri. Collected in 2005 from Webster County, Missouri, it most closely resembles a Texas Garter Snake (*Thamnophis sirtalis annectens*), but that subspecies is typically found in north-central Texas, western Oklahoma, and southwestern Kansas (Conant and Collins, 1998), at least 300 miles west and southwest of the Ozarks. Furthermore, the anterior portion of the lateral scale row is on scale rows 2 and 3 in this animal and on scale rows 3 and 4 in most *T. s. annectens* (Conant and Collins, 1998).

Figure 1: Individual common garter snake (*Thamnophis sirtalis*) from Webster County, Missouri exhibiting an unusual color morphology, at rest (top) and in a defensive posture.

Two subspecies of common garter snakes have been formally recognized for Missouri (Johnson, 2000)—Eastern (*Thamnophis sirtalis sirtalis*) and Red-sided (*Thamnophis sirtalis parietalis*)—but many snakes are not easily assignable based on the physical diagnostic characteristics and many individuals that could otherwise be assigned to one of the subspecies are not found in that subspecies' documented range.

While we find the concept of subspecies somewhat questionable in general (Edmond and Daniel, 2008) and certainly dubious for this species in Missouri, variation in many animals is often not formally documented in any other way. Thus, descriptions and range maps published for subspecies and varieties can be somewhat useful in some cases.

Preliminary reports on this color variant and a few scattered photographs indicate that a similar color variant is present at a few locations within the White River Hills ecoregion (US EPA, 2007) of southwestern Missouri, northwestern Arkansas (Roberts, 2007; RJH, 2007; Snakekid, 2007), and northeastern Oklahoma (Schmidt, 2007). It is also found as a common "town snake" in the city of Springfield (E. Bock, M. Bowe, B. Melton, pers. comm.) but not further north. Too few photographs are available to speculate what happens to the color variant as one moves into the heart of the Ozarks (*i.e.*, east and northeast of the White River Hills) or the Boston Mountains.

Individuals that resemble this animal, but outside of the White River Hills ecoregion and outside of the documented range of *T. s. annectens*, have been found in southwestern Arkansas (Manning, 2007) and southeastern Louisiana (Glorioso, 2007).

Snakes from southeastern Kansas are clearly assignable to *T. s. parietalis* (Taggart, 2007). Animals found north and west of Springfield are not easily assignable to either Missouri subspecies but also do not resemble the animal pictured here. Also, at least some individuals found in the White River Hills ecoregion of Arkansas (Manning, 2007) and Missouri do *not* exhibit this pattern.

Last spring, the senior author extended an on-line invitation to submit photographs and discuss this issue (Edmond, 2007). At this point, we would like to extend the request for photographs of live snakes (or fresh, unpreserved dead snakes) or anecdotal information that meet one of the following criteria:

1. Any *T. sirtalis* that resembles *T. s. annectens* (or the photographs above) outside of the published range of that subspecies.
2. *T. sirtalis* from any part of the Ozark Plateau or Osage Prairie / Osage Cuestas regions.

Photographs and anecdotal information may be submitted directly to BrianEdmond@MissouriState.edu. Please include collector name(s), date, county, location, and habitat association. A summary of the results will be published in a future newsletter. Photographs will be considered submitted records for the purpose of updating the Atlas of Amphibians and Reptiles (Daniel and Edmond, 2006). Refer to the "New Records" section of the Missouri Herpetological Atlas Project FAQ for more information.

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