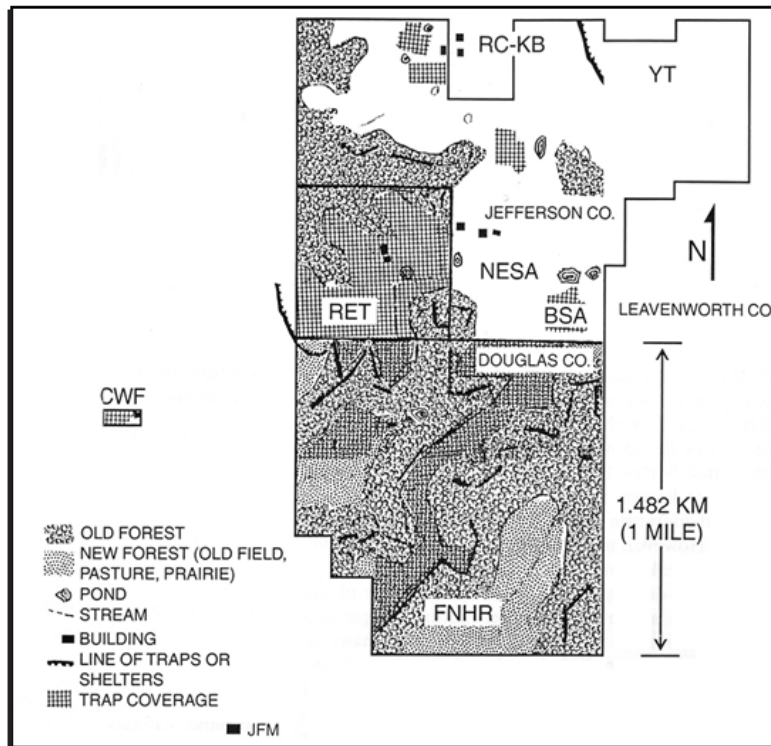


# *JOURNAL OF* KANSAS HERPETOLOGY

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*Front Cover:* Map of the most ecologically studied site on earth. The tracts comprise the KU Ecological Reserves, where Henry S. Fitch has conducted unprecedented mark-and-recapture studies from 1948 to the present. Reprinted from *A Kansas Snake Community: Composition and Change over 50 Years*, by Henry S. Fitch and published by Krieger Publishing Company, Malabar, Florida (1999).

# *Journal of Kansas Herpetology*

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### REPORT ON THE KANSAS HERPETOLOGICAL SOCIETY 30th ANNUAL MEETING

The *Kansas Herpetological Society* held its 30th Annual Meeting at Science Hall, Emporia State University, in Emporia, Kansas, on 8–9 November 2003. Over 90 participants (Figure 1) attended scientific paper sessions to listen to 21 talks on amphibians, turtles, and reptiles by scientists and students from across the nation.

During its business meeting, the KHS voted David Oldham (Labette Community College, Parsons) as president-elect (Figure 2), Eric Kessler (Blue Valley North High School) as treasurer, and Mary Kate Baldwin (Topeka Collegiate School) as secretary. Eva Horne (Kansas State University) currently is president-elect and takes office as president on 1 January 2004. Greg Sievert (Emporia State University) served as president during 2003, and hosted the meeting this year.

During the Society business meeting, William Busby

(KHS Awards Committee) announced that Sean M. Daly, a graduate student at Emporia State University, was this year's recipient of the *Howard K. Gloyd-Edward H. Taylor Scholarship* (Figure 3). The scholarship of \$100.00 honors the memory of two great herpetologists (and KHS Distinguished Life Members) with strong ties to Kansas. Gloyd was born in Ottawa, Kansas, and attended both Kansas State University and the University of Kansas, and Taylor graduated from Garnett (Kansas) High School and was a faculty member for decades at the University of Kansas. Next, Travis W. Taggart awarded two *Alan H. Kamb Grants for Research on Kansas Snakes* to Dustin Wilgers, Kansas State University (Figure 4) and James Daniel, Pittsburg State University (Figure 5). The \$100.00 grants honor the memory of longtime KHS member Al Kamb of Lawrence.



Figure 1. Participants attending the 30th annual meeting of the Kansas Herpetological Society at Emporia State University, Emporia, Kansas, on 8–9 November 2003. Photograph by Suzanne L. Collins.

At the start of the Saturday night KHS auction, Larry L. Miller, Northern Hills Junior High School (Figure 6), was chosen as the sixth recipient of *The Suzanne L. and Joseph T. Collins Award for Excellence in Kansas Herpetology*. Larry was selected for this honor by the KHS Awards Committee, which judged his 2003 color image of an Eastern Racer (*Coluber constrictor*) to be the best of forty-one photographs of a Kansas amphibian, turtle, or reptile shown during the competition displayed earlier in the day. For his exquisite image, Larry Miller was given a commemorative certificate and a check for \$1,000.00 by Dan Fogell, *University of Nebraska at Omaha* and a former recipient of award. *The Collins Award* is the largest biological award given annually in the state of Kansas, and the largest annual presentation made nationally for research on (even-numbered years) or photography of (odd-numbered years) amphibians, turtles, and reptiles. Judges for *The Collins Award* in 2003 were William Busby (Kansas Biological Survey, Lawrence), Robert Powell (Avila University, Kansas City, Missouri), and Travis W. Taggart (Sternberg Museum of Natural History, Fort Hays State

University, Hays).

Featured speaker at the two-day event was Steven J. Beaupre (University of Arkansas, Fayetteville; Fig. 7). Steve spoke about his long-term study of the Timber Rattlesnake in the Ozarks. His talk was well received and generated much interest about these serpents, which are found in much of eastern Kansas.

Speakers for the scientific paper sessions on Saturday included (in order of presentation): Henry S. Fitch (University of Kansas, Lawrence, on Timber Rattlesnakes in Leavenworth County), George R. Pisani and Henry S. Fitch (University of Kansas, Lawrence, on a telemetric study of Timber Rattlesnakes), Daniel Fogell (University of Nebraska, Omaha, on Nebraska Copperheads), James Daniel (Pittsburg State University, on the search for Kansas Cottonmouths), Todd Y. Montandon and Richard Kazmaier (West Texas A&M University, Canyon, on Texas Indigo Snake range and movement), Curtis J. Schmidt, Richard S. Hayes (Sternberg Museum of Natural History, Fort Hays State University) and William Busby (Kansas Biological Survey) on the



Figure 2. Current and newly-elected officers of the Kansas herpetological Society. Front row (L–R): Suzanne L. Collins (past-president), Greg Sievert (president), Eva Horne (president-elect for 2003), David Oldham (president-elect for 2004). Back row(L–R): Travis W. Taggart (editor), Eric Kessler (treasurer), Mary Kate Baldwin (secretary), and Jay D. Kirk (field trip chairperson). Photograph by Joseph T. Collins,



Figure 3. At the Society Business Meeting on Saturday, 8 November, a pleased Lynnette Sievert accepts from KHS Awards Committee member William Busby the 2003 *Howard K. Gloyd-Edward H. Taylor Scholarship* on behalf of Sean M. Daly, for his research while a student at Emporia State University. Photograph by Suzanne L. Collins.

herpetofauna of Saline County, Travis W. Taggart and Curtis J. Schmidt (Sternberg Museum of Natural History, Fort Hays State University, on the distribution and status of Kansas herpetofauna), Erik M. Bartholomew and William J. Stark (Department of Biological Sciences, Fort Hays State University, on the effects of fire and grazing on reptiles), Dustin Wilgers (Kansas State University, on reptiles and amphibians in a fire-disturbed prairie), Dwight R. Platt (Bethel College, North Newton, on snake sex ratios), Richard T. Kazmaier (West Texas A&M University, Canyon, on the demography of Texas Tortoises), Trisha Crabill and Abigail Dinsmore (Towson University, Maryland, on relocation of Gopher Tortoises in Mississippi).

Speakers for the scientific paper sessions on Sunday morning included: Kiyoshi Sasaki (Oklahoma State University, Stillwater, on the ecology, behavior, and conservation of *Gloydius blomhoffii*), Brian Edmond and Richard Daniel (Missouri Herpetological Association, on the Missouri Herpetological Atlas), Neil Bass (Whiteman Air Force Base, Missouri, on herpetofaunal response to glade restoration in Missouri), Eva Horne and Natalie Pheasant (Kansas State University, on agonistic behavior of the Great Plains Skink), John T. Ewing and David K. Saunders (Emporia State University, on resistance to lysing of erythrocytes in Bullfrogs), Joshua Lynn Jagels (Pittsburg State University, on Spring Peepers in Bourbon County), Chad Whitney (Johnson County Community College, on herpetological ob-



Figure 4. Dustin Wilgers, Kansas State University, accepts from KHS Awards Committee member Travis Taggart (right) the first of two *Alan H. Kamb Grants for Research on Kansas Snakes* at the KHS Business Meeting on Saturday, 8 November 2003. Photograph by Suzanne L. Collins.



Figure 5. James Daniel, Pittsburg State University, received the second of two *Alan H. Kamb Grants for Research on Kansas Snakes* at the KHS Business Meeting on Saturday, 8 November 2003. Photograph by Suzanne L. Collins.



Figure 6. Larry L. Miller (left) was the sixth recipient of *The Suzanne L. & Joseph T. Collins Award for Excellence in Kansas Herpetology* for his exquisite image of an Eastern Racer (*Coluber constrictor*), judged the best of forty-one entries at the 30th annual meeting of the Kansas Herpetological Society at Emporia State University, Emporia, Kansas, on 8–9 November 2003. Here, Larry displays his winning image as he receives a commemorative certificate and a check for \$1000.00 from Dan Fogell, the 2001 recipient of this award. Photograph by Suzanne L. Collins.

servations during 2003), and Jason T. Moore (Topeka Zoo, on environmental enrichment of amphibians and reptiles in captivity).

Abstracts for all of these talks appear elsewhere in this issue of the *Journal of Kansas Herpetology*.

The Saturday evening KHS auction (Figures 8–14) netted about \$1,540.00 for the Society treasury, spurred in part by the excellent offering of original artwork by Eva Horne and Ted Leonard, generous donations of herpetological publications by Suzanne L. Collins (CNAH) and herpetological color photography by Larry L. Miller (Kansas Heritage Photography), and also by the hard work of auction assistants Ginny Weatherman and John Stoklosa, who so ably assisted KHS auctioneer Joe Collins.

Meeting Chairperson and KHS President Greg Sievert deserves the enthusiastic thanks and appreciation of the entire KHS membership for putting together

a great meeting. And, of course, we cannot let go unnoticed the diligent and unflinching efforts of Mary Kate Baldwin (KHS Secretary) and Eric Kessler (KHS Treasurer); both kept us afloat financially through their dedicated work (Figure 2). Finally, our thanks to the students—attendance was substantially bolstered at the meeting when twelve students, staff, and faculty from Bethel College (one talk), Johnson County Community College (one talk), Emporia State University (one talk), Fort Hays State University (three talks), Pittsburg State University (two talks), Kansas State University (two talks), and the University of Kansas (two talks) presented papers at this meeting. Hopefully, these and other colleges and universities in Kansas and neighboring states will try to make such a showing at future meetings.

In 2004, the Society will meet in Manhattan (talks and coffee, free beer and auction) under the auspices

of Eva Horne, who will serve as KHS President during that year. For more precise information on the 31st Annual Meeting of the KHS in November 2004, bookmark and regularly check the KHS meeting web site (updated constantly as new information becomes available) at

<http://www.ku.edu/~khs/AnnualMeetingInfo.html>



Figure 7. KHS President Greg Sievert (left) and featured speaker Steven J. Beaupre pose near the Emporia State University Science Building. Steve spoke on Timber Rattlesnakes in the Arkansas Ozarks. Photograph by Suzanne L. Collins.



Figure 8. Corinne Edds helped organize the ESU live exhibit and enjoyed handling this harmless Milk Snake. Photograph by Larry L. Miller.



Figure 9. KU student Ginny Weatherman enticed much money from the auction crowd with her skillful snake handling. Photograph by Larry L. Miller.



Figure 10. KU student John Stoklosa displayed a T-Shirt that went for over \$60.00. Everyone was smiling in this pose. Photograph by Larry L. Miller.





Figure 11. This Crawfish Frog was one of many attractions at the live exhibit. Photograph by Larry L. Miller.



Figure 13. Dan Fogell and Dennis Ferraro enjoyed the free refreshments and found much humor in watching the auction participants. Photograph by Larry L. Miller.



Figure 12. Travis Taggart and John Lokke exulted over a treasure from their successful auction bid. Corinne and David Edds (rear) were uncertain. KHS president Greg Sievert (right) was dubious. Photograph by Larry L. Miller.

Figure 14 (below). Joe Collins pledged allegiance to incoming KHS president Eva Horne. Once again, Eva's wonderful artwork was a hit at the auction. Photograph by Larry L. Miller.



ABSTRACTS OF PAPERS PRESENTED AT THE 30TH ANNUAL MEETING OF THE  
KANSAS HERPETOLOGICAL SOCIETY, 8–9 NOVEMBER 2003,  
SCIENCE HALL, EMPORIA STATE UNIVERSITY

From Climate Change to Climbing Snakes: Long Term Studies on Timber Rattlesnakes in the Ozarks  
*Steven J. Beaupre, University of Arkansas, Fayetteville*

A major challenge facing animal population ecologists is understanding and predicting the effects of climate change. Long-term effects of climate change on biological systems will manifest themselves through mechanistic connections among environmental factors (e.g., food, temperature), time-energy budgets of individuals, and life history. Large pitvipers are excellent model systems for the study of environmental influence on time-energy allocation and life history. I describe the results of a long-term mark-recapture and radio telemetry study of the responses of the Timber Rattlesnake (*Crotalus horridus*) in northwest Arkansas to critical environmental factors. Specifically, I describe (i) an array of measurements made possible by radio-telemetry, (ii) a modeling exercise that attempts to integrate complex physiological responses to environmental factors, and (iii) an experimental manipulation of food availability (supplemental feeding). Long-term monitoring of body temperature, feeding rates, energy expenditure, and behavior allows an assessment of the effects of natural environmental variation on growth and reproduction. Although a work in progress, results to date suggest an over-riding influence of food limitation on growth and reproduction. Imperiled Timber Rattlesnake populations may benefit most from landscape management practices that enhance small mammal availability.

Trailing Timber Rattlesnakes in Leavenworth County, Kansas: Contrasts with Eastern U. S. Populations\*\*  
*Henry S. Fitch, University of Kansas, Lawrence*

In northern New York near the range limits of *Crotalus horridus*, females take 9 or 10 years to reach sexual maturity, and then reproduce only at intervals of years. In the time required for one New York generation, a pair of snakes in Kansas could become great-great-grandparents with hundreds of descendants. In New York, hibernacula are on talus slopes and the snakes make long and purposeful migrations, concentrating there in fall and dispersing in spring, but ours move about casually when they emerge, and there is no migration. All five adults of our telemetered snakes were consistent in keeping to timbered outcrops, with an abundance of dead brush, logs and

loose rocks for hiding places, but the two immature snakes were most often found away from rock outcrops coiled in the grass. One of them was found climbing in trees on many occasions.

Telemetric Study of Timber Rattlesnakes (*Crotalus horridus*)\*\*  
*George R. Pisani and Henry Fitch, University of Kansas, Lawrence*

Six Timber Rattlesnakes were trailed for an entire activity season, beginning within days of Spring emergence when transmitters were implanted. Young and adults show markedly different movement patterns, with young ranging over far wider areas and very different habitats. Aspects of orientation and hypotheses for the 2004 season will be discussed.

The Copperhead in Southeastern Nebraska  
*Daniel Fogell, University of Nebraska at Omaha*

Demographic and morphometric data for Copperheads (*Agkistrodon contortrix*) in Gage County, Nebraska, have been collected since 1998. Since southeast Nebraska represents the northwestern boundary of their total distribution, Copperheads are confronted with resource limitations that may not be as severe at the center of their range. Suboptimal habitat may result in smaller animals and reduced reproductive success. Demographic and morphometric statistics will be presented for the Gage County Copperhead population, and these data will be compared with published data for a less peripheral population in Kansas.

The Search for the Cottonmouth (*Agkistrodon piscivorus*) in Southeast Kansas\*\*  
*James Daniel, Pittsburg State University, Pittsburg*

The Cottonmouth (*Agkistrodon piscivorus*) is a medium to large pitviper that is dark in color and has a banding pattern that fades in adults. It is a semi-aquatic snake often found away from water. It can be found in almost any aquatic situation within its range and is often very abundant. Habitat in southeastern Kansas differs from the rest of the state due to its close proximity to the Ozark Plateau. The Cottonmouth is one of several species that is on the edge of its range in southeastern Kansas because of the unique combination of geography, habitat, and cli-

mate. The Cottonmouth has not been seen in Kansas since 1991, when two specimens were found about two weeks apart and about three miles apart near where Highway 96 crosses the Spring River in Cherokee County. Since then, there have been no documented sightings of this species in Kansas. There have been other reports than these two, but those have been discredited. There is a strong interest among herpetologists to find additional Cottonmouths in Kansas. My field work is designed to find out whether the two Kansas snakes collected in 1991 were specimens from Missouri that migrated across the state line in search of a winter den site or if the this species does naturally occur in the southeastern part of the state and is just elusive. It is possible that the Cottonmouth naturally occurs in southeastern Kansas, but has been overlooked because there have been no long-term studies that encompass the entire activity season of this species. In my field work, I will be using GIS to develop a model to predict where to find the Cottonmouth in Cherokee County, Kansas, using information about its habitat requirements from in the literature and from state herpetologists in surrounding states where this species is known to exist.

Home Range and Movements of Texas Indigo Snakes in the Western Rio Grande Plains, Texas.

*Todd Y. Montandon and Richard T. Kazmaier, West Texas A&M University, Canyon*

The state-threatened Texas Indigo Snake (*Drymarchon corais erebennus*) has been poorly studied throughout its geographic range in southern Texas. In May 2002, we initiated a radiotelemetry based study on Chaparral Wildlife Management Area in southern Texas. The area is typical of the Mesquite-Acacia thornscrub communities that dominate the western Rio Grande Plains ecoregion. Monitoring of 13 radiotransmitted Texas Indigo Snakes from 19 May 2002 to 4 September 2003 (4,058 radiodays) resulted in 3,108 radiolocations that were incorporated into a GIS for spatial analysis. Across all locations, distance moved per day averaged 51 m for males and 86 m for females. Maximum daily distance moved was 1.5 km. Home ranges estimated by the minimum convex polygon method averaged 173 ha (range 66-270 ha) for six individuals monitored for greater than one year. Our data highlight the need for long-term monitoring of Texas Indigo Snakes to establish stable home range estimates and indicate large areas of suitable habitat are required for management of this very mobile species.

A Herpetological Survey of the Smoky Hill Air National Guard Range, Saline County, Kansas\*\*

*Curtis J. Schmidt & Richard S. Hayes  
Sternberg Museum of Natural History, Fort Hays State University, Hays  
& William Busby  
Kansas Biological Survey, University of Kansas, Lawrence*

The Smoky Hill Air National Guard (SHANG) Weapons Range is a 33,873-acre military training facility located in southwest Saline County whose primary mission is to provide realistic target arrays to American and allied aircrews. Approximately 144 targets are used for a wide variety of air to ground operations by all divisions of the armed forces. The land is broken up into an impact area surrounded by agricultural leases and wildlife management areas. In 2002, the Kansas Biological Survey was contracted to conduct baseline floral and faunal surveys of the SHANG. We conducted the herpetofaunal inventory from May through October 2003, spending a total of 128 person-hours searching available habitat and 181 vehicle-hours driving the 53 miles of gravel and dirt roads. Drift fence arrays comprised of silt fencing, funnel traps, and pitfall traps also were used. During the inventory, we recorded 822 observations on 34 herpetological species, including five species previously undocumented in Saline County.

The Distribution and Status of the Kansas Herpetofauna: A Two-Year Study

*Travis W. Taggart and Curtis J. Schmidt  
Sternberg Museum of Natural History, Fort Hays State University, Hays*

In the course of the next two years, we will conduct a herpetofaunal inventory throughout Kansas. The objectives of the survey will be to 1) identify new localities, determine population status estimates, and characterize habitat preferences for imperiled species of the Kansas herpetofauna, 2) collect and curate tissues of these species for use in future genetic research, and 3) construct an online database system to record the results and make them available to others as needed. The proposed surveys will enable a greater understanding of the distribution and natural history of the Kansas herpetofauna with a long-term goal of identifying SINC species. Our findings also will provide additional support for policy directive, regulatory decisions, and species management. The internet-based database system will provide instantaneous access of data compiled in this study by wildlife officials, managers, and researchers.

The Effects of Fire and Grazing Management on Reptiles at Quivira National Wildlife Refuge, Kansas: Preliminary Results\*\*

Erik M. Bartholomew and William J. Stark, Fort Hays State University, Hays

Fire and grazing are important management tools used for the maintenance of native vegetation in the Quivira National Wildlife Refuge (QNWR). These techniques have been in place for 30 years; however, within the last 15 years a more structured protocol has been in place. The refuge is subdivided into grazing/fire units with the objective of burning each unit on a three-year rotation. Currently, little information on relative abundance of reptiles is available on QNWR. The response of reptiles to fire is not well understood. Thus, we want to provide a quantitative assessment of the reptiles at QNWR and determine the effects of the current management regime. We have identified 12 units that have been burned this year, one year ago, two years ago, three years ago, and more than three years ago, with 3 replicates each. We will establish Y shaped-drift-fence arrays in all units using funnel traps on the ends and a pitfall in the center. In 2003, in 1057 trap nights, 160 individuals were captured, marked, and released in 11 units, 24 animals in zero year burns, 28 in units burned one year ago, 39 in units that were burned two years ago, 11 in units burned 3 years ago, and 58 in units burned more than 3 years ago. Average catch per trap night was 0.15 animals. One hundred and ninety-one animals were encountered and processed during road surveys and incidental capture. A total of 14 animals were recaptured either by driving or in traps. In 2004, we plan to increase the number of traps per unit and develop a standard protocol for monitoring breeding calls of amphibians.

Community Structure of Reptiles and Amphibians in a Fire-Disturbed Tallgrass Prairie\*\*

Dustin Wilgers, Kansas State University, Manhattan

Herpetofauna is known to change with the presence of fire in many ecosystems. Little is known on how herpetofaunal communities may change in a tallgrass prairie, not only with presence of fire, but also with differing frequencies of fire in the landscape. Two areas of three different burn frequencies were analyzed for differing herpetofaunal communities: annually burned areas, areas burned every four years, and areas burned every twenty years. Funnel traps ( $n = 216$ ) and coverboards ( $n = 132$ ) were organized in twelve transects, two transects per area. These preliminary data were compiled from a total of 15,444

total individual trap nights (9504 trap nights, 5940 board nights). A total of 132 individuals were captured, including 11 reptile and 5 amphibian species. Funnel traps accounted for 38 captures, while coverboards accounted for the majority of the herpetofaunal captures (94). Traps and coverboards captured similar species totals (traps = 12, boards = 11), but the species numbers were more even in the trap captures (Shannon-Weaver Index for traps = 6.11, Shannon-Weaver Index for boards = 3.77). The different fire frequencies also produced differences in total individuals captured (1-yr = 41, 4-yr = 51, 20-yr = 45), total number of species captured (1-yr = 12, 4-yr = 8, 20-yr = 9), and species evenness (1-yr SWI = 6.39, 4-yr SWI = 2.79, 20-yr SWI = 4.04). Amphibians represented the largest difference in species composition, all five species were found in the annually burned area, while none of the species were captured in the four-year area, and only one found in the twenty-year area. Many other species were recognized to be burn area specific, which leads to some of the differences in community structure data between differing burn frequencies in the tallgrass prairie.

Sex Ratios in Samples from Eight Snake Populations in South Central Kansas\*\*

Dwight R. Platt, Bethel College, North Newton

Sex was determined for individuals in samples taken from eight populations of snakes in Harvey County in south central Kansas in the 14 years, 1959–63 and 1966–74. Sex ratios of neonates or hatchlings of *Coluber constrictor* ( $n = 85$ ), *Pituophis catenifer* ( $n = 247$ ), *Heterodon platirhinos* ( $n = 73$ ), and *Thamnophis radix* ( $n = 890$ ) did not differ significantly from a 1:1 ratio. A neonate sample of *Thamnophis sirtalis* ( $n = 644$ ) had a slight but significant excess of males (1.20:1). Trapping samples taken from the populations of *C. constrictor* ( $n = 1086$ ), *P. catenifer* ( $n = 720$ ), *Heterodon nasicus* ( $n = 520$ ), *H. platirhinos* ( $n = 228$ ), *Arizona elegans* ( $n = 81$ ), *T. radix* ( $n = 2209$ ), and *T. sirtalis* ( $n = 2288$ ) all had a statistically significant excess of males (1.20 to 2.12:1). The May–June samples, taken during the spring mating season, were heavily biased for males (1.37 to 5.00:1). Samples taken in July and August did not differ significantly from a 1:1 ratio. Samples taken in September and October from *T. sirtalis* and *H. platirhinos* populations had a significant excess of males (1.17 to 1.91:1, but September–October samples from the other populations did not differ significantly from 1:1. A trapping sample of 100 *Lampropeltis calligaster* did not differ from a 1:1 ratio.

Demography of the Texas Tortoise: the Importance of Long-term Data

*Richard T. Kazmaier, West Texas A&M University, Canyon*

The Texas Tortoise (*Gopherus berlandieri*) is the smallest, most sexually dimorphic, and, arguably, least well-studied of the North American *Gopherus*. In the United States, Texas Tortoises are primarily restricted to mesquite-acacia thornscrub habitats of the Rio Grande Plains Ecoregion of southern Texas. I initiated a long-term study on Texas Tortoises in 1994 at Chaparral Wildlife Management Area in Dimmit and La Salle counties, Texas, to begin collection of the basic ecology and life history data necessary to allow the formulation of better management plans for this state-threatened species. As of September 2003, I have collected data from 2489 captures of 1807 individuals. Adult sex ratio is not different from 1:1 and juveniles consistently comprise about 35% of the individuals captured annually. Age was assessed using scute annuli and 9 years of recaptures support the 1 annulus per year hypothesis necessary to validate this technique for my study population. Sexual maturity is reached in 5–6 years and average clutch size is 2. Annual adult survival rates ranged 73–79% for females and 79–83% for males, depending on method of calculation. I hypothesize that the differential mortality rates between the sexes are the result of a complex interplay between nutrition and reproduction. Texas Tortoises appear to have adopted the strategy of rapid growth and early maturity to compensate for high mortality rates. Thus, Texas Tortoises have assumed a more *r*-selected ecological strategy compared to the other North American tortoises and should be managed accordingly.

Relocation of *Gopherus polyphemus* in Southern Mississippi: Will it Succeed?

*Trisha Crabill and Abigail Dinsmore, Towson University, Maryland*

There is a pressing need for well-designed, experimental studies on factors influencing the success of relocations of the gopher tortoise, *Gopherus polyphemus*. In this study, 24 tortoises were relocated from nearby development sites to a restored longleaf pine habitat on the Desoto National Forest in southern Mississippi. Tortoises were equipped with radio transmitters and placed into replicated short-term (three month) and long-term (12 month) enclosures to determine if length of penning influences relocation success. Tortoises from short-term enclosures were

released in mid-August 2003, and tortoises in long-term enclosures are scheduled to be released in June 2004. To date, about 50% of the tortoises in the short-term enclosures have left the relocation site. Analyses of movement patterns, behavioral interactions in and out of the enclosures, and physiological characteristics are currently being conducted.'

Ecology, Behavior and Conservation in Japanese Mamushi, *Gloydius blomhoffii*: Defensive Pattern and Variation in Compromised and Non-Compromised Populations

*Kiyoshi Sasaki, Oklahoma State University, Stillwater*

The Mamushi, *Gloydius blomhoffii*, is a little known member of the so-called 'Old World' pit vipers, occurring only in the Japanese archipelago. There is little doubt that the necessary and thus routine use of live Mamushi in the production of important pharmaceuticals in Japan has been a major force driving their declines. However, it is not the only one. Ever-increasing habitat loss due to human uses such as residential and agricultural development is another. Accordingly, I have gathered baseline data for my conservation effort of this species. Along with cultural background of this creature, I report sexual size dimorphism, reproduction, habitat association, and defensive behavior in free-ranging Mamushi studied in northernmost island of Japan, Hokkaido. Pattern and variation in defensive behavior in compromised versus non-compromised populations are also discussed.

The Missouri Herpetological Atlas

*Brian Edmond and Richard Daniel, Missouri Herpetological Association*

Detailed locality maps for Missouri's amphibians and reptiles have not been summarized for more than a generation, and for amphibians have never been published in a standard format. As part of an effort to remedy this situation, we introduce the Missouri Herpetological Atlas Project (MOHAP). The goals of the project are to 1) summarize all collections in a common database format, 2) use the database to produce an atlas of locality and county maps for each species, 3) identify and collect in areas around the state that need further field work, and 4) provide technical assistance to researchers embarking on similar projects. Microsoft Access serves as a database engine and ESRI ArcView is used to create a current atlas on-demand, which is then published in Adobe's PDF format. Sample maps are used to demonstrate

the flexibility and possible research applications using this combination of tools. The authors should be contacted directly with data in new specimens or to request existing data or custom maps. The atlas is updated on an annual basis using data from current fieldwork and additional collections data. A current version can be downloaded at <http://www.moherp.org/pubs/atlas.pdf>.

#### Herpetofaunal Population Response to Glade Restoration in Dade County, Missouri

Neil Bass, *Whiteman AFB, Missouri*

Due to fire suppression, glade habitats in southwest Missouri have been overtaken by eastern red cedars. Cedar invasion of glades has been blamed for the decline of certain herpetofaunal species that inhabit glades. I have conducted herpetological surveys on two glades in Dade County, Missouri, since 2000. One glade has received no management and has approximately 90% coverage by eastern red cedar, while the other had approximately 41 ha cleared and burned in 1999. A comparison of the herpetofaunal populations on these two limestone glades and the effects of glade restoration were conducted.

#### Agonistic Behavior of the Great Plains Skink\*\*

Eva Horne and Natalie Pheasant, *Kansas State University, Manhattan*

Courtship and agonistic behaviors of only a few skink species from the genus *Eumeces* have been studied and described. In 2000, we randomly paired 20 adult Great Plains skinks (*Eumeces obsoletus*) in 30-minute trials to gain a basic description of behavioral interactions. Animals spent the majority (74–95%) of their time either motionless in a resting posture or in exploratory/escape behaviors. However, a number of interactions were observed, including move-toward (MT), run-away (RA), back-arch (BA), chase, bite, and touch. Also observed was a behavior we call nose-down-back-arch (NDBA), in which the animal performs an exaggerated BA with the tip of its nose in contact with the substrate. Skinks were most often stationary (41%) or in BA (26%) before attaining this posture. NDBA was performed 63% of the time in response to the approach of the other lizard and 19% of the time in response to a BA in the other lizard. Skinks most often ran away or returned to a resting posture after an NDBA. In contrast, skinks were most often moving toward (61%) the other animal before initiating a BA, BA was performed only

24% of the time in response to an approach by the other individual and RA occurred after only 8% of BAs. A total of 15 bites were observed, 40% directed toward individuals fleeing (RA) and 20% toward individuals in the NDBA posture. Bites were never directed toward skinks approaching (MT) or in the BA posture. The number of bites and BAs were also correlated ( $p = 0.04$ ). From these results, we conclude that NDBA may be a defensive display while BA is more likely aggressive. Other novel, but less common, behaviors are also discussed.

#### Resistance to Lysing of Erythrocytes in Bullfrogs (*Rana catesbeiana*) Adapted to Multiple Temperatures\*\*

John T. Ewing and David K. Saunders, *Emporia State University*

Osmotic fragility is the ability of a cell to resist lysing. Research has shown that there is a significant relationship in erythrocyte osmotic fragility of room temperature bullfrogs (*Rana catesbeiana*) when tested at 25°C and 5°C with erythrocytes being more resistant to lysing at 25°C. There has been little research done on cold adapted frogs to determine the osmotic fragility of their erythrocytes. The purpose of our investigation was to determine what differences, if any, occur between erythrocyte osmotic fragility in room temperature frogs, cold adapted frogs, and cold adapted frogs that were allowed to re-warm to room temperature over a period of six hours. Cells were exposed to different gradients of NaCl solutions to determine the concentration at which 50% of the erythrocytes lysed, at temperatures of 25°C. Three groups of frogs were tested, with group A being held at room temperature, group B being cold adapted at 5°C for two months, and group C being cold adapted at 5°C for two months and then re-warmed to room temperature over six hours. Our results showed that there were significant differences between the re-warmed group when tested at both 25°C when compared to the room temperature group tested at 25°C ( $p = 0.011$ ) with re-warmed frogs having higher erythrocyte osmotic fragility, thus being less resistant to lysing. There were no significant differences within any group when tested at 25°C. Plasma osmolarity values were determined using plasma samples from each frog in the three groups. There were no significant differences in plasma osmolarity between any of the groups ( $p = 0.57$ ). The difference in osmotic fragility cannot be explained by differences in plasma osmolarity between the groups. Thus we believe that erythrocyte membrane structural components could be involved.

The Reproductive Ecology, Habitat Requirements, and Distribution of the Spring Peeper (*Pseudacris crucifer*) in Bourbon County, Kansas\*\*

Joshua Lynn Jagels, Pittsburg State University

The Spring Peeper (*Pseudacris crucifer*) was first discovered in Bourbon County in 1996 and little was known about its reproductive status and ecology in that county. Two sites were evaluated in Bourbon County to determine the reproductive ecology and habitat requirements of the Spring Peeper. Sampling took place during the spring of 2002 and 2003. The number of calling males, females, amplexing pairs, egg clutches laid, and behavioral observations were observed, as well as tadpoles and metamorphosed Spring Peepers. Environmental parameters, an aquatic predator evaluation, water quality analysis, and vegetative analysis of both the pond edge vegetation and the wooded area were also performed. Males began calling in late February and activity of the males increased as temperatures increased. Twelve females and twelve amplexing pairs were found during the study. Tadpoles and 180 newly metamorphosed Spring Peepers were found at site two; none were found at site one. One of the two sites was designated as an optimal breeding site for the Spring Peeper. The presence of dense pond edge vegetation and close proximity of a wooded area appeared to greatly affect Spring Peeper abundance and breeding success. In addition, the distribution of the Spring Peeper in Bourbon County was evaluated and five new breeding sites were discovered.

Herpetological Observations for 2003\*\*

Chad Whitney, Johnson County Community College, Olathe

A summary of observations made during the year of 2003 will be presented, including slides of reptiles and amphibians counted in Kansas, Nebraska, Oklahoma, and Missouri.

The Environmental Enrichment of Reptiles and Amphibians in Captivity

Jason T. Moore, Topeka Zoological Park

Species are adapted to a specific environment. The captive environment is an incomplete substitute. The critical role environmental enrichment plays in high quality husbandry and exhibitry of amphibians and reptiles and, indeed, all animals, cannot be underestimated. Environmental enrichment is a fairly new formalized practice, used widely only in the last

few decades. Herpetoculturists have long tried to simulate natural environments to decrease mortality and increase reproductive success, and have therefore long offered at least haphazard enrichment. For maximum benefit, however, enrichment should be tailored to the needs of the individual animal. Considerations for a successful program include individual and natural histories of the specimen, health risks to the specimen, practical constraints and resource limitations, containment, and keeper and public safety. General examples and several anecdotal cases of successful (though not always intentional) enrichment provide illustration of enrichment and its benefits.

\*\* indicates the paper is a candidate for *The Collins Award* in 2004.

KHS Executive Council  
Minutes

9 November 2003 (noon to 1:00 pm)  
Emporia State University

Officers attending: Mary Kate Baldwin, Eva Horne, Eric Kessler, Suzanne L. Collins, Joseph T. Collins (for Travis W. Taggart), Greg Seivert presided.

In keeping with the goal of endowing the Gloyd-Taylor Scholarship, the Executive Council agreed to transfer \$1,000 from the Society general balance to the Gloyd-Taylor Scholarship Fund. The new balance in the Gloyd-Taylor CD will be \$2,096.36.

Greg Seivert suggested that the Council consider having a family rate for registration. After discussion, the Executive Council instead decided to change the student rate to include high school students (grades 9–12) only, and exempt from registration elementary students in grades K–8.

KHS 2004 SPRING FIELD TRIP

The KHS 2004 spring field trip will be west to Logan County. For information as it is posted, be sure to check the KHS web site regularly at:

<http://www.ku.edu/~khs/FieldTripSpringInfo.html>

For immediate information, contact:

Jay D. Kirk  
KHS Field Trip Chairperson  
(see inside front cover of this issue)

## RESULTS OF THE KHS 2003 FALL FIELD TRIP

In early October 2003, KHS members traveled to Leavenworth County, Kansas, to search for amphibians, reptiles, and turtles found in the northeastern part of the state as part of the annual KHS Fall Field Trip. Many gathered at Leavenworth County State Lake on Friday night, and at 9:00 am on Saturday morning a stunning 101 individuals were present for the herpetofaunal count.

Led by KHS Field Trip Chairperson Jay Kirk, part of the group visited the Fort Leavenworth Military Reservation in the eastern part of the county, while the remainder of the participants worked around the state lake. They had a great weekend, collecting and observing numerous herpetological species throughout the county. The complete count for 11–12 October 2003 is listed on page 15. Participants were: Cathy Acuff, Laura Acuff, Rob Acuff, JoAnn Akers, Lucia Baldwin, Mary Kate Baldwin, Neil Bass, Mary Bolfing, Keith Coleman, Joe Collins, Suzanne Collins, Cindy Cummings, Nate Davis, Natalie Demonchaux, Theodore Demonchaux, Kathy Ellis, Mark Ellis, Dan Fogell, Anne Gallet, Cameron Gallet, Christophe Gallet, Nathan Gallet, Donald Gebers, Nicholas Gomez, Alan Gravenstein, Donna Gravenstein, Tanner Gravenstein, Hank Guarisco, James Gubanyi, Ed Hampton, Trevor Hampton, Myriah Hott, Nicole Howley, Patrick Howley, Chris Hutson, Collin Isham, Dan Johnson, Dustin Johnson, Grace Ann Johnson, Matt Jones, Eric Kessler, Maura Kessler, Rebecca Kessler, Jay Kirk, Jost Kramer, Margaret Kramer, Tad Kramer, Hannah Law, Ted Leonard, Katherine Linquist, Alexandra Lopez, Michael McDonald, Ross McNearney, Aaron Meggison, Chris Messier, Evan Mielke, Jim Mielke, Larry Miller, Matt Miller, Suzanne Miller, Dan Murrow, Adrian Mutlow, Hisako Mutlow, David Oldham, Jackson Oldham, Robin Oldham, Tag Oldham, Eric Overstreet, Eric Palmer, Tracy Patten, Erica Peterson, Ben Rebein, Mike Rochford, Liz Rogers, Kelsey Rot, Maureen Rot, Pam Rutter, Andy Schiefelbein, Julie Snyder, Mary Snyder, Gayan Stanley, Nick Steele, George Stevenson, John Stoklosa, James Strieby, Marshall Stula, Trudy Stula, Travis Taggart, Briana Teetzen, Brace Turbot, Derek Turner, Arrin Vrtiska, Pat Wakeman, Janeen Walters, Barbara Watkins, Ginny Weatherman, Eric Wenzl, Roy Wenzl, Chad Whitney, Kelsee Wright, and Amy Zavala.



*Upper Left:* The assembled group posed at the shelter house for the 2004 KHS Fall Field Trip. *Lower Left:* Hannah Law of Northern Hills Junior High School examines the only chelonian, a Painted Turtle, caught during the KHS Fall Field Trip. *Right (above):* Jay Kirk, KHS Field Trip Chairperson, tries to bring order to the herd. Photographs by Larry L. Miller & Suzanne L. Collins.



*Leavenworth County State Lake  
11 October 2003  
9:00 am to 1:00 pm*

Species	Number Observed
American Toad .....	6
Northern Cricket Frog .....	203
Cope's Gray Treefrog .....	1
Western Chorus Frog .....	1
Plains Leopard Frog .....	40
Bullfrog .....	2
Great Plains Narrowmouth Toad .....	1
Five-lined Skink .....	3
Great Plains Skink .....	2
Ringneck Snake .....	39
Eastern Racer .....	3
Milk Snake .....	2
Northern Water Snake .....	4
Brown Snake .....	1
Western Ribbon Snake .....	1
Common Garter Snake .....	1
Copperhead .....	1
17 species .....	311 specimens

*Fort Leavenworth Military Reservation  
11 October 2003  
10:45 am to noon*

Northern Cricket Frog .....	6
Plains Leopard Frog .....	2
Five-lined Skink .....	5
Ringneck Snake .....	7
Eastern Racer .....	4
Western Rat Snake .....	1
Milk Snake .....	2
Brown Snake .....	1
Common Garter Snake .....	1
Copperhead .....	2
10 species .....	31 specimens



*Leavenworth County State Lake  
12 October 2003  
9:00 am to noon*

Northern Cricket Frog .....	12
Plains Leopard Frog .....	2
Painted Turtle .....	1
Five-lined Skink .....	2
Western Slender Glass Lizard .....	1
Ringneck Snake .....	17
Eastern Racer .....	2
Brown Snake .....	1
Common Garter Snake .....	1
Copperhead .....	1
10 species .....	40 specimens
GRAND TOTAL	
20 species .....	382 specimens



*Upper: Dan Murrow turns rocks at the 2004 KHS Fall Field Trip. Lower Left: Joe Collins, in his Irish tenor, sings happy birthday to Tanner Gravenstein, one of the younger field trip participants. Photographs by Larry L. Miller & Suzanne L. Collins.*

## OF INTEREST

### MAJOR KANSAS HERPETOFAUNAL GRANT

Fort Hays State University's *Sternberg Museum of Natural History* has been awarded a \$281,224 grant from the Kansas Department of Wildlife and Parks to conduct a statewide inventory of amphibians, reptiles and turtles.

Matching funds from the *Sternberg Museum of Natural History*, Hays, Kansas, and *The Center for North American Herpetology*, Lawrence, Kansas, bring the total value of the project to \$391,290.

"Amphibians, turtles, and reptiles are an important part of the ecosystem, and their distributions and habitat needs are poorly understood," said Travis Taggart, newly-appointed associate curator of herpetology at the Sternberg Museum and principal investigator on the project.

"Our goal is to investigate the distribution and conservation needs of these animals so that we can better protect them and their habitat in the future," Taggart said.

The herpetofauna can be sensitive indicators of environmental health. By learning about the ecological needs of the herpetofauna, future environmental damage can be monitored, minimized, and, it is hoped, eliminated.

In addition to Taggart, several other museum staff members co-authored the proposal, including Joseph T. Collins, adjunct curator of herpetology, Curtis Schmidt, also a newly-appointed curator of herpetology, Jerry Choate, museum director, and Greg Liggett, assistant director. The grant will fund paid positions for both Taggart and Schmidt.

"This grant is significant to the Sternberg Museum, and to the study of modern wildlife in general," said Choate. "Basic research into the state's biodiversity is extraordinarily important. Basic questions, like how many species we have and what are their distributions, must be answered before more in-depth studies can be undertaken. And often money for those types of basic studies is not available."

The project is funded in part by a State Wildlife Grant from the *Fish and Wildlife Service* of the U.S. Department of the Interior and the *Kansas Department of Wildlife and Parks*.

"The Sternberg Museum is excited to enter into this partnership with *Kansas Wildlife and Parks* and the *Fish and Wildlife Service*. Those organizations recognize the importance of learning all we can about the biodiversity of Kansas," Choate said.

"Curtis and I are ready to get out in the field and see what is out there," said Taggart. "It is amazing to think that even right here in Kansas there are many things that are unknown about the state's amphibians, reptiles, and turtles. I think we can go a long way toward filling the gaps in that knowledge," he said.

Collins, who is also adjunct herpetologist at the Kansas Biological Survey, University of Kansas, Lawrence, pointed out that "this is the largest grant ever made to study amphibians, turtles, and reptiles in Kansas, and represents a significant effort by the Sternberg Museum and Fort Hays State University to focus on the biodiversity of these creatures in our state." He went on to say that "the research collection at the Sternberg Museum will become a very important component of future studies on these creatures, not only in Kansas, but throughout the Great Plains. The DNA material alone will provide researchers across the nation with much needed information for their studies, and will enhance our understanding of these animals not only in Kansas, but across their entire range."

For more information, contact:

Travis W. Taggart (785) 628-5504 (ttaggart@fhsu.edu)  
Curtis Schmidt (785) 628-5504 (cjschmidt@fhsu.edu)  
Joseph T. Collins (785) 749-3467 (jcollins@ku.edu)

### NORTH AMERICAN SPADEFOOTS FAMILY SCAPHIOPODIDAE

Mario García-París, Daniel R. Buchholz, and Gabriela Parra-Olea [2003, *Phylogenetic relationships of Pelobatoidea re-examined using mtDNA. Molecular Phylogenetics and Evolution* 28(1): 12–23] used partial sequences of two mitochondrial genes (cytochrome b and 16S RNA) from all Pelobatoidea subclades, including all species of Pelobatidae and Pelodytidae and four outgroup taxa (*Xenopus*, *Ascaphus*, *Discoglossus*, and *Rana*), to propose a phylogenetic hypothesis for relationships within Pelobatoidea. They showed that the family Pelobatidae, as previously defined is not monophyletic, and should be split into Eurasian Spadefoots, *Pelobates*, which retain the family name Pelobatidae and North American Spadefoots, *Scaphiopus* and *Spea*, which comprise the revived family Scaphiopodidae. Their analysis also uncovered the existence of morphologically cryptic taxa within previously recognized species of the genus *Spea*.

## NEW 2003 CAAR ACCOUNTS

The Catalogue of American Amphibians and Reptiles, sponsored by the *Society for the Study of Amphibians and Reptiles*, recently issued twenty new accounts for 2003, three of which pertain to Kansas. They are:

*Carphophis* Worm Snakes by Ernst, Orr & Creque  
CAAR 773

*Carphophis vermis* Western Worm Snake by Ernst,  
Orr & Creque CAAR 775

*Thamnophis radix* Plains Garter Snake by Walley,  
Wusterbarth & Stanford CAAR 779

Copies can be ordered from Breck Bartholomew,  
SSAR Publications Secretary, P.O. Box 58517, Salt  
Lake City, Utah 84158.

## SIXTH ANNUAL RUNNING OF THE LIZARDS

The 6th Annual Running of the Lizards was held on 14 September 2003 at the intersection of 21st Street and Gage Boulevard in South Topeka, Shawnee County, Kansas. Organized by Suzanne & Joe Collins, the run has been held annually since 1998 to coincide with the herpetology course that Joe teaches each fall semester at Washburn University in Topeka. This year, nearly a dozen of Joe's students joined him for the lizard run. In addition, Larry L. Miller arrived with about a dozen of his students from Northern Hills Junior High School, and the assembled crowd of 25-30 participants chased hundreds of the introduced (apparently in the 1960s), non-native Italian Wall Lizards around the neighborhoods of 21st & Gage. During the three-hour hunt (from 11 am to 2 pm), they caught approximately 55 of the reptiles. Many were photographed and all were released.



Participants for the 2003 *Sixth Annual Running of the Lizards* in Topeka, Kansas, on 14 September.  
Photograph by Suzanne L. Collins.

## A GAP ANALYSIS OF KANSAS

Kansas State University, in cooperation with the Kansas Department of Wildlife & Parks, Wildlife Management Institute, and the US Geological Survey, is pleased to announce the CD release of *KS-GAP: Final Report and Data*. Available on two CDs, the August 2002 report contains data on 359 species of Kansas vertebrates, including most of the amphibians, turtles, and reptiles found in the state. *KS-GAP* is the first attempt to model all resident and breeding populations of vertebrates in Kansas. Herpetological distribution maps on these CDs are derived directly from Collins (1993 *Amphibians and Reptiles in Kansas. Third Edition*. University Press of Kansas, Lawrence. xx + 397 pp.).

Individuals wishing to obtain a set of *KS-GAP* CDs should contact Jack Cully at (785) 532-6070 or email him at

[kscfwru@ksu.edu](mailto:kscfwru@ksu.edu)

The CDs are easily readable using Adobe Acrobat Reader on either Macintosh or a PC.

## LIZARD FAMILIES CONDENSED

Schulte, James A. II, John Pablo Valladares and Allan Larson (2003. *Phylogenetic Relationships within Iguanidae Inferred using Molecular and Morphological Data and a Phylogenetic Taxonomy of Iguanian Lizards*. *Herpetologica* 59(3): 399–419) proposed returning the currently recognized North American lizard families *Crotaphytidae*, *Iguanidae*, *Phrynosomatidae*, and *Polychrotidae* back into a single family, *Iguanidae*.

## DANGEROUS DIAMONDBACKS IN KANSAS

Five species of venomous snakes are native to Kansas. These are the Copperhead, Cottonmouth, Massasauga (a rattlesnake), Prairie Rattlesnake, and Timber Rattlesnake. Each species occupies its own unique range within the state. However, there are many regions of the state where these distributions overlap. In many places in eastern Kansas, up to three of the species listed may be found within close proximity to one another.

Fortunately, the assemblage of native venomous snakes in Kansas is a relatively benign group. Fewer than fifty bites to humans are reported each year in Kansas, and of those individuals bitten, few retain any debilitating effects from the bite, and death resulting from snakebite in Kansas is almost unheard of (only one death in the last half century). This is not to say that venomous snakes should be taken lightly. Live venomous snakes should be left alone and any bite should be examined by qualified medical help as soon as possible.

But Kansas now has a problem. Recently, a truly giant venomous alien serpent has become a more frequent discovery right in the middle of Kansas at Kanopolis State Park in Ellsworth County. Since 1991, no less than eight Western Diamondback Rattlesnakes (*Crotalus atrox*) have been collected and removed from the park. The latest snake was discovered earlier this summer by some hikers in the Horsethief Canyon area of the park.

The discovery of liberated alien venomous snakes into Kansas is not without precedent. Single specimens of released or escaped Western Diamondback Rattlesnakes have occasionally turned up in Cherokee, Cowley, Crawford, Ellis, Lyon, and Sumner counties. A population of Cottonmouths was established for a short time during the mid 1970s in the Verdigris River between Independence and Coffeyville. And a Mojave Rattlesnake was collected from a quarry in Leavenworth County in 1980. The release of non-native wildlife such as the Western Diamondback Rattlesnake into Kansas poses needless threats to both the ecology of the state and to outdoor enthusiasts alike. It is also illegal.

The Western Diamondback Rattlesnake is large. Average specimens are between three and four feet in length with exceptional specimens reaching lengths of seven feet. They are native to the North American southwest and have a wide range that encompasses an area from northern Mexico into west central Arkansas and west into southeast California. Isolated populations also occur in southern Mexico. The specimens discovered at Kanopolis State Park are approxi-

mately 150 miles north of their natural range.

Western Diamondback Rattlesnakes are often quick to crawl away when approached, but will immediately coil and aggressively stand their ground should they be threatened. Their relatively large size means they also have proportionately longer fangs, a considerable quantity of venom to inject, and an increased striking distance. These factors contribute to the Western Diamondback Rattlesnake being responsible for more serious snakebites and fatalities than any other North American reptile. In Texas alone, this species is responsible for the majority of the more than 1,400 cases of snakebite reported each year and for most fatalities.

The origin and status of the Western Diamondback Rattlesnakes at Kanopolis State Park is unknown. Joseph Collins, Adjunct Curator of Herpetology at the Sternberg Museum of Natural History and Executive Director of The Center for North American Herpetology (CNAH), believes that this species is being released at Kanopolis State Park. According to him, the most telling evidence of this illegal release is that these snakes have been discovered consistently, yet only recently (1991 to date), despite intensive searching in the Kanopolis area by biologists since the early 1900s. It is not known how many or how often they are being released or who is releasing them. Fortunately, despite the fact that Western Diamondback Rattlesnakes have been turning up regularly at Kanopolis State Park since 1991, there is no evidence that a breeding population has become established. Future monitoring of the area could help address these questions. Tissues taken from the recently discovered snake hold promise for ultimately determining its source locality. DNA extracted from such tissue can be compared to DNA obtained from Western Diamondback Rattlesnakes throughout their range, and can be tested for genetic relatedness or similarity.

Western Diamondback Rattlesnakes have been collected in Oklahoma, reportedly within 15–50 miles of the Kansas border. While, it is possible that natural populations of this species may eventually be discovered along the Kansas/Oklahoma border in Comanche and Barber counties, the lack of such a discovery over the last century would indicate that *Crotalus atrox* is not native to Kansas.

TRAVIS W. TAGGART, *Sternberg Museum of Natural History, Fort Hays State University, Hays, Kansas 67601.*

*Editor's Note: Since this was published in the Hays (Kansas) Daily News, another large specimen of the Western Diamondback Rattlesnake was discovered at the entrance to Kanopolis State Park in early October 2003.*

## GEOGRAPHIC DISTRIBUTION

**AMBYSTOMA MAVORTIUM** (Barred Tiger Salamander) Kansas: SALINE Co: 1 mi S and 4 mi W Falun, Smoky Hill Air National Guard Weapons Range (Sec. 14, T16S, R5W). 5 June 2003. Curtis J. Schmidt and Richard S. Hayes. MHP 7798–7837. New county record. Verified by Travis W. Taggart.

Submitted by **CURTIS J. SCHMIDT**, Sternberg Museum of Natural History, Fort Hays State University, 3000 Sternberg Drive, Hays, Kansas 67601.

**NOTOPHTHALMUS VIRIDESCENS** (Eastern Newt). KANSAS: BOURBON Co: SW 1/4, Sec. 7, T26S, R24E, 2.2 mi S and 0.4 mi W Marmaton (N37.79769, W094.83221). 26 October 2003. Josh Jagels, Travis W. Taggart, Curtis J. Schmidt, Suzanne L. Collins, and Joseph T. Collins. MHP 7958–59, MHP 7568–69. New county record (Collins and Collins 1993, Amphibians and Reptiles in Kansas, Univ. Press Kansas, Lawrence. xx + 397 pp.).

Submitted by **JOSHUA L. JAGELS**, Pittsburg State University, Department of Biology, 1701 South Broadway, Pittsburg, Kansas 66762.

**EUMECES SEPTENTRIONALIS** (Northern Prairie Skink) Kansas: SALINE Co: 7.4 mi S and 1 mile E Brookville, Smoky Hill Air National Guard Weapons Range (Sec. 14, T16S, R5W). 6 June 2003. Curtis J. Schmidt and Richard S. Hayes. MHP 7759. New county record. Verified by Travis W. Taggart.

Submitted by **CURTIS J. SCHMIDT**, Sternberg Museum of Natural History, Fort Hays State University, 3000 Sternberg Drive, Hays, Kansas 67601.

**LAMPROPELTIS TRIANGULUM** (Milk Snake). Kansas: SALINE Co: 3 mi N and 2.2 mi W Falun, Smoky Hill Air National Guard Weapons Range (Sec. 30, T15S, R4W). 6 June 2003. Travis W. Taggart, Curtis J. Schmidt and Richard S. Hayes. MHP 7767. New county record. Verified by Justin D. Hoffman.

Submitted by **TRAVIS W. TAGGART**, Sternberg Museum of Natural History, Fort Hays State University, 3000 Sternberg Drive, Hays, Kansas 67601.

**AGKISTRODON CONTORTRIX** (Copperhead). OHIO: HAMILTON Co: Cincinnati, North College Hill, 2021 North Bend Road. 12 August 2003. Mike Hoefker. Sternberg Museum of Natural History, Fort Hays State University, Hays, Kansas (MHP 7928). Verified by Travis W. Taggart. Second known specimen from the county and the first in over a century; previous

record (Cincinnati Mus. Nat. Hist. 235) was collected in 1898, but lacks specific locality data. According to curator John W. Ferner (pers. comm. 21 August 2003), CMNH 235 cannot now be located, but a note in the main collection catalogue states it was “seen by Conant, April 1, 1931.” Conant (1938, Reptiles of Ohio. American Midland Naturalist 20(1): 1–200; see page 109) cites and maps the CMNH specimen. In addition, one of us (JTC) was acting curator of the CMNH in the early 1960s (while it was housed at the University of Cincinnati), and examined the specimen at that time.

Cincinnati is a heavily populated metropolitan area, and the discovery of this specimen (an adult male) is problematic. Supporting its presence in North College Hill is the secretive nature of the taxon and the proximity (ca. 1 mile) of this new locality to Mt. Airy Forest and Spring Grove Cemetery, two large areas that may contain suitable habitat for Copperheads. Further, the species is known to occur naturally to the east in Clermont County, Ohio, and just south across the Ohio River in Ryland Heights, Kentucky. Casting doubt about the natural occurrence of this snake in North College Hill is the suburban nature of the locality (did the specimen escape from captivity?), the proximity of 8–10 large trucks used by a construction firm to haul earth and rock (and which may account for the accidental introduction of the specimen to the area), and the presumed barrier of 4–5 well-traveled roads located between the locality reported herein and Mt. Airy Forest and Spring Grove Cemetery.

Additional field work is needed to determine whether a population of this serpent exists in central Hamilton County, Ohio.

Submitted by **JERRY D. COLLINS**, 2203 Cathedral Avenue, Cincinnati, Ohio 45212, and **JOSEPH T. COLLINS**, The Center for North American Herpetology, 1502 Medinah Circle, Lawrence, Kansas 66047.



An adult male Eastern Newt from Bourbon County, Kansas. Photograph by Suzanne L. Collins.

## NOTES

### SNAKES OF THE UNIVERSITY OF KANSAS BIOTIC SUCCESSION AREA

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The University of Kansas Biotic Succession Area was set up in 1984 in the southeastern corner of Jefferson County in an upland field that was fairly level. Through the 1960s and 1970s, it was privately owned and grew cultivated crops. In 1969, it was purchased by the University of Kansas as part of the Nelson Environmental Study Area. It was divided from west to east into five blocks, each having from two to four sets of rectangular islands where natural vegetation was allowed to grow in replicate patterns, while the areas between islands were mowed several times in each growing season. The islands were of three sizes: 4 x 8m, 12 x 24m and 50 x 100m. The smallest rectangular islands were replicated in three rows of five, regularly spaced in an area corresponding to a large island (50 x 100m). The smallest rectangular islands were replicated in three rows of five, regularly spaced in an area corresponding to a large island (50 x 100m), and the medium sized islands (12 x 24m) were in two rows of three, also corresponding with a large island (Fitch, 1999). Only the two eastern blocks (4 and 5) were used in this study; there were three sets of small islands, one set of medium-sized islands, and three large islands. During each check, all available shelters were turned. Snakes were studied by individual marking and recapture. In the years 1986–1998, field work was done by Fitch. From 1999–2002, he was assisted by Scott and Kylee Sharp. In 1993, Karl Anderson and Mike Zerwekh carried on field work, bringing snakes to Fitch for individual marking and recording. We thank them for their contribution. Blocks 4 and 5 plus the peripheral strip were approximately 10 hectares.

#### *Results*

At the start of this study, there were 49 pairs of shelters (half of them plywood and half corrugated metal) on the islands, but after the first year 26 more pairs were added as a peripheral strip, and in 1994 fifty-two more pairs were added on the peripheral

strip, half of them with no preparation of substrate and half with substrate prepared by hoeing and raking (Parmalee and Fitch, 1995). Eleven species of snakes were obtained by turning the shelters. During the 18-year study, the islands of vegetation changed strikingly, from low grass to perennial weeds such as goldenrod and aster, and finally to woody vegetation including elm, dogwood, sumac, blackberry and many other seral kinds. The intervening mowed areas underwent relatively little change and were dominated by short-grass. The shelters attracted a great variety of small animals, some of which lived beneath them permanently. Rodents, especially the Prairie Vole (*Microtus ochrogaster*), became abundant.

The Ringneck Snake (*Diadophis punctatus*), Common Garter Snake (*Thamnophis sirtalis*), Eastern Racer (*Coluber constrictor*), Western Rat Snake (*Elaphe obsoleta*), Copperhead (*Agkistrodon contortrix*), Milk Snake (*Lampropeltis triangulum*), Prairie Kingsnake (*L. calligaster*) and Brown Snake (*Storeria dekayi*) were considered to be permanent residents on the BSA study area, but the Timber Rattlesnake (*Crotalus horridus*), Northern Water Snake (*Nerodia sipedon*) and Bullsnake (*Pituophis catenifer*) were found only occasionally and were thought to be wanderers.

Because the Ringneck Snake had been studied already in some detail (Fitch, 1975), it was not included in the records taken on BSA in some years. In 2003, there were 39 Ringneck Snakes taken along with 47 Eastern Racers, 31 Common Garter Snakes, 8 Milk Snakes, 7 Western Rat Snakes, 4 Prairie Kingsnakes and 4 Copperheads. Hence, the Ringneck Snake was the second most numerous species, with over one-third (38.6%) of the total, and doubtless similar ratios prevailed throughout the years of study, since Ringneck Snakes prefer an edge habitat such as that on the islands' periphery. The larger kinds of snakes, especially the Copperhead, were favored by the abundance of the Prairie Vole, as this vole is the favorite prey species of the Copperhead. As the voles

increased, the Copperhead thrived. It not only increased in numbers, but grew larger (adult females  $644.8 \pm 8.3$ ) than it did on adjoining areas where the voles were scarce or absent ( $606.5 \pm 5.8$ ). Litter size was larger ( $7.3 \pm 1.15$ ) in this thriving population than in adjacent populations on the Reservation ( $5.37 \pm 0.17$ ). The Western Rat Snake, a forest species, was favored by the invasion of woody vegetation. In this dry upland habitat, the Common Garter Snake seemed to thrive. Those caught were mostly adult females, and it was found that they preyed mostly on Prairie Voles, which were too large to be eaten by adult males or first-year young. As a generalist, the Eastern Racer thrived, occupying diverse habitats and taking many kinds of prey. The Milk Snake was typically an edge inhabitant and maintained its numbers, but the Prairie Kingsnake was adversely affected by the replacement of grass with woody vegetation. It was scarce at first and underwent progressive decline.

The basic plan for BSA, with a mosaic of habitats—short-grass (mowed), tall-grass, and many islands of woody vegetation—was favorable for snakes in general and they became extraordinarily abundant and diverse, but with some unexpected trends as succession progressed. Of the eleven resident species and

three that were occasional visitors, none was eliminated by the major habitat changes that occurred over 18 years (Table 1).

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- Robinson, G. R., R. D. Holt, M. S. Gaines, S. P. Hamburg, M. L. Johnson, H. S. Fitch and E. A. Martinko 1992. Diverse and contrasting effects of habitat fragmentation. *Science* 257: 524–526.

Table 1. Snake captures on the University of Kansas Biotic Succession Area, 1990 through 2002 (figures without parentheses) and in the 2003 season (figures enclosed in parentheses).

Species	No. of Captures	No. of Snakes	Percentage of Total	Recapture Percentage	Biomass (kg)	Percentage of Biomass
<i>Thamnophis sirtalis</i>	223 (31)	155 (23)	37.20 (30.70)	30.5	20.48 (3.14)	24.5 (24.4)
<i>Coluber constrictor</i>	154 (47)	121 (41)	25.70 (46.50)	21.5	25.00 (5.90)	29.9 (45.9)
<i>Elaphe obsoleta</i>	68 (7)	43 (4)	11.40 (6.93)	37.0	10.90 (1.75)	13.0 (13.6)
<i>Agkistrodon contortrix</i>	76 (4)	41 (2)	12.70 (3.96)	46.0	14.70 (0.98)	17.6 (7.6)
<i>Lampropeltis triangulum</i>	47 (8)	18 (5)	7.85 (7.90)	36.0	1.51 (0.38)	1.8 (3.0)
<i>Lampropeltis calligaster</i>	14 (4)	9 (4)	2.34 (3.96)	35.6	1.90 (0.48)	2.3 (3.7)
<i>Crotalus horridus</i>	12 (0)	12 (0)	2.00 (0)	0	8.14 (0)	9.7 (0)
<i>Nerodia sipedon</i>	3 (0)	2 (0)	0.50 (0)	0	1.20 (0)	1.4 (0)
<i>Pituophis catenifer</i>	2 (0)	2 (0)	0.33 (0)	0	1.00 (0)	1.4 (0)
<i>Diadophis punctuatis</i>	*(39)	*(39)	*(38.6)	*	*(0.23)	*(1.8)
Totals	599(101)	403(79)			83.73(12.86)	

\*not consistently recorded in the years 1990–2002

ADDITIONAL NOTES ON REPRODUCTION IN THE  
ITALIAN WALL LIZARD (*PODARCIS SICULA*)

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Collins (1993) indicated that little was known about reproduction in the established populations of the non-native Italian Wall Lizard (*Podarcis sicula*) in Kansas. According to Burton and Burton (1975), in their native range females of these lizards dig a hole in the ground into which they lay between 3 and 9 eggs, which hatch after an incubation period of about two months. Wynne (1981) reported that hatching *P. sicula* are 2–3 inches long. Gubanyi (2001) presented data for Kansas specimens of this species regarding clutch size, egg dimensions, and incubation. The following notes are presented as a supplement to the observations of Gubanyi (2001).

On the morning of 26 May 2003, ten eggs laid by a single female *P. sicula* were discovered in the unit in which the lizard was being maintained. The female was not especially large, but did have a total length of 145 mm and a S-V length of 77mm. The eggs were carefully removed and placed into a moist incubation medium in the same position they were laid. The eggs were incubated at temperatures around 80 F. Three or four weeks later, one of the eggs, which was actually stuck to another egg, had collapsed and shriveled, but the other eggs appeared healthy. Subsequently, on 26 July 2003, nine juvenile Italian Wall Lizards were discovered in the incubator. Five of these lizards were measured and were found to have an average total length of 65 mm and an average S-V length of 25 mm. The juveniles began to eat immediately when offered tiny mealworms and crickets; all were later released back into the Topeka population from which the adult female originated.

The author would like to acknowledge the assistance of Keith Coleman and Joseph T. Collins.

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- Wynn, Richard H. 1981. *Lizards in Captivity*. TFH Publications, Neptune, New Jersey. 189 pp.



An Italian Wall Lizard (*Podarcis sicula*) from the introduced colony in Topeka, Kansas. Photograph by Larry L. Miller.

**LACERTA BILINEATA** (Western Green Lacerta). KANSAS: SHAWNEE CO: within Topeka city limits, 21st Street & Mission. 22 April 2002. James E. Gubanyi & Carl Michaels. Sternberg Museum of Natural History, Fort Hays State University (MHP 7927). Verified by Joseph T. Collins. New maximum size for introduced Kansas population. Total length 12 5/8 inches (320 mm), snout-vent length 105 mm. Specimen was maintained in captivity for nearly 16 months by the author.

Submitted by **JAMES E. GUBANYI**, 2501 Burnett Avenue, Topeka, Kansas 66614.



An adult female Western Green Lacerta (*Lacerta bilineata*) from the introduced colony in Topeka, Kansas. Photograph by Suzanne L. Collins.



## ARTICLES

### REPRODUCTION IN RATTLESNAKES OF THE SHARON SPRINGS, KANSAS, ROUNDUP

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Snakes tend to have indeterminate growth that is extremely variable in individuals and, although older snakes tend to be larger, the age of an adult cannot be estimated with any degree of confidence. Rattlesnakes are unique in carrying with them a record of previous sloughs from which approximate body size at the time of shedding can be estimated, thus facilitating studies of their population ecology. In this paper, I attempt to achieve a better understanding of the population ecology and reproduction of *Crotalus viridis* in Kansas on the basis of records taken at the Sharon Springs rattlesnake roundups, held in Wallace County, in 1994 and 1995.

Earlier (Fitch, 1985), I studied series of *C. viridis* from Morton County, in extreme southwestern Kansas, that had intact rattle strings, and calculated a mean diameter for each successive segment from the first (button) to the twelfth. Measurements for the sexes were separated. Male snakes were found to have consistently larger segments than their female counterparts. Rattle segments are larger in proportion to body size in males than females. Expressed as a percentage of SVL, the basal rattle segments of 20 adult males selected at random from the Sharon Springs roundup was  $1.46 \pm 0.016\%$ , whereas in 20 females it was  $1.33 \pm 0.023\%$ , with little overlapping.

The natal rattle or button is at the posterior end of the string in an intact rattle; it consists of anterior and posterior lobes. The posterior lobe is ovate with smooth and rounded contours, quite different in appearance from the posterior lobe in a broken string, with its sharp angles and edges. Most adult snakes have incomplete strings, with the button and other segments acquired early in growth missing. However, there is usually some taper. From its size (diameter) the terminal rattle segment can generally be matched with one of the means for segments in an intact string, and the number of segments missing can be estimated. For instance, a female snake having five rattle segments, ending in one that is 10 mm in diameter could be estimated to have lost four segments (since her terminal 10 mm segment approximates in size 10.99 mm that is the mean for the fifth) (Table 1). Hence this female could be estimated to have produced a total of nine rattle segments in her lifetime.

In the combined collections from the 1994 and 1995 roundups, there were 14 adult males and three females whose rattle string lacked taper and consisted of large segments of approximately the same size, and these were the largest snakes (maximum 1210 mm SVL). The rattle strings of others had some taper, hence the number of segments missing could be estimated for each snake. There were 19 males and 7 females that had produced six segments; 31 males and 17 females with seven; 41 males and 32 females with eight; 36 males and 18 females with nine; 32 males and 23 females with ten; 31 males and 9 females with eleven; 14 males and 6 females with twelve; 5 males and 2 females with thirteen; three, four and one males had fourteen, fifteen, and sixteen segments, respectively. Age cannot be determined with precision from the number of rattle segments. In central California, following a marked population of *Crotalus oreganus* over periods of years (Fitch, 1949) I found a mean gain annually of 1.5 segments of adult males and 1.1 for adult females, and probably the Kansas snakes are similar, since the two groups were alike during early growth in the rates at which they added rattle segments. Probably most of the snakes taken at the roundups were less than ten years old.

Besides these adults, the roundup samples included 1 male and 3 female first-year young (each having only the natal button). These were brought in contrary to the roundup rules, since all were less than 15 inches in total length. Also, there were 20 second-year males and 11 females, mostly with five rattle segments. In the roundups, there were 87 adults (49 males and 38 females) that had intact strings. From these samples, the means of each rattle segment from the first to the eighth were obtained. Means seemed to show that the Morton County snakes were a little bigger at birth and maintained that superiority as adults, but for each category the correspondence was close.

In most kinds of reptiles, primiparae have small clutches or litters, and numbers in the brood increase progressively from year to year as a female grows larger and older. Surprisingly, the Sharon Springs *Crotalus viridis* females do not fit this pattern, but show no correlation with age, (estimated from the

number of rattle segments). The largest litters were those of females that had produced nine rattle segments and the smallest were those of females that had produced ten segments. Table 2 shows sizes (SVL in mm) of female Prairie Rattlesnakes correlated with the number of rattle segments they had produced, from the sixth to the thirteenth. It shows rapid growth from the sixth to the seventh segment, reduced to half that rate from the seventh to eighth, and much slower growth subsequently. Adult females slough less frequently than males, hence there is wider range of body size for each segment. The incidence of fecundity increased with the number of rattle segments; it was only 12.5% in those with six segments, 65.2% in those with seven, 72.5% in those with eight, and around 80% in those having more than eight segments.

Female Prairie Rattlesnakes from the roundup population are intermediate between the females of northern *Crotalus viridis*, which are biennial in their reproduction (i.e., they produce litters every other year; Rahn, 1942) and those in the southern part of the range of the species, in which most females produce litters annually.

#### Literature Cited

- Fitch, H. S. 1949. Study of snake populations in central California. *American Midland Naturalist*, 41: 513–579.  
 Fitch, H. S. 1998. The Sharon Springs roundup and Prairie Rattlesnake demography. *Transactions of the Kansas Academy of Science*, 1013 (3-4): 101–113.  
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Table 1. Size (diameters in mm) of rattle segments of *Crotalus viridis* in complete strings, Sharon Springs, Kansas, 1994 and 1995.

Segment Number	Sex	N	Mean Diameter (mm)
1	Male	49	5.03 ± 0.068
1	Female	38	5.10 ± 0.067
2	Male	49	6.26 ± 0.090
2	Female	38	6.07 ± 0.100
3	Male	48	7.52 ± 0.080
3	Female	38	7.67 ± 0.110
4	Male	48	9.01 ± 0.100
4	Female	38	8.83 ± 0.110
5	Male	45	10.25 ± 0.110
5	Female	37	10.09 ± 0.160
6	Male	36	13.50 ± 0.150
6	Female	35	10.89 ± 0.160
7	Male	30	12.17 ± 0.140
7	Female	28	11.34 ± 0.140
8	Male	12	12.81 ± 0.140
8	Female	12	11.98 ± 0.180

Table 2. Reproductive traits of female Prairie Rattlesnakes (*Crotalus viridis*) of the Sharon Springs, Kansas, roundup, according to body size and number of rattle segments.

Number of rattle segments	Number of snakes	Mean SVL (range)	Mean Number of Ova Palped
6	7	697.9±07.0 (510–720)	None
7	34	794.1±10.2 (574–935)	8.5±0.52 (6,7,7,7,8,8,8,9,9,9,9,11,11,11,14)
8	42	843.0±07.2 (690–940)	10.5±0.6 (3,3,7,7,8,8,8,9,9,10,10,10,11,11,11,11,12,12,12,12,13,13,14,14)
9	37	864.1±09.5 (760–950)	12.1±1.0 (5,5,7,10,10,11,11,11,11,11,12,12,13,13,13,14,18,20,21)
10	29	891.0±11.4 (750–985)	9.5±0.7 (6,6,7,7,7,7,9,9,10,12,12,13,14)
11	17	905.1±14.2 (795–987)	12.3±1.0 (6,8,10,11,11,11,11,13,14,16,17,19)
12	16	872.6±22.4 (824–964)	10.6±0.5 (9,9,10,10,11,12,13)
13	1	880	11

# The Kansas Herpetological Society

The *Kansas Herpetological Society* is a non-profit organization established in 1974 and designed to encourage education and dissemination of scientific information through the facilities of the Society; to encourage conservation of wildlife in general and of amphibians, turtles and reptiles in Kansas in particular; and to achieve closer cooperation and understanding between herpetologists, so that they may work together in common cause.

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## Editorial Policy

The *Journal of Kansas Herpetology*, issued quarterly, publishes peer-reviewed manuscripts and notes dealing with the biology of amphibians, turtles and reptiles. Manuscripts should be submitted to the Editor no later than the 10th of the month prior to the month of issuance. All manuscripts become the sole possession of the Society, and will not be returned unless arrangements are made with the Editor. Pen and ink illustrations and photographs are also welcomed. Illustrations and photographs will be returned to the author only upon request. The *Journal of Kansas Herpetology* uses the common names standardized nationwide by Collins & Taggart (2002).

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The Gloyd-Taylor Scholarship is presented annually by the Kansas Herpetological Society to an outstanding herpetology student. Nominations for this award are open to any KHS member enrolled in an accredited educational institution in Kansas or any KHS member enrolled in any accredited educational institution outside of Kansas. The scholarship is \$100.00 and is awarded on the basis of potential for contributing to the science of herpetology. Students from grade school through university are eligible.

Nominations should include typewritten details of the nominee's qualifications, plus name and address of the nominee and nominator. Self-nomination is encouraged. If self-nominated, a letter of reference from an academician is required.

Nominations should include, but are not limited to, academic record, herpetological activities, and future plans in herpetology. Academic record should address schools attended and an indication of academic performance in each (e.g., grade point average, teacher evaluations, courses completed). Herpetological activities should include a brief narrative that details experiences and activities that demonstrate a long-term interest in herpetology, and documents accomplishments in herpetological study. Future plans in herpetology should include a statement, not to exceed one-page, written by the student about his/her future interests and plans.

Applicants may include an optional appendix with photographs, awards, newspaper articles, reports written by the student, or other documents relevant to herpetological activities.

Nominations should be sent to the KHS Awards Committee Chair, and must be postmarked by 15 September. The scholarship winner will be announced at the annual meeting in November. New applications will be accepted after 1 January of the following year.

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KHS members only are eligible to apply for The Alan H. Kamb Grant for Research on Kansas Snakes. The recipient of the grant (minimally \$100.00) will be selected by the KHS Awards Committee. If no qualified proposals are submitted, no award will be made for that year.

The KHS Awards Committee will entertain proposals for research on Kansas snakes. The proposal must be limited to ten typed pages, and should include, but not be limited to the following: title, name of researcher, contact information, abstract, introduction and justification, objectives or hypotheses, materials and methods, significance of research and possible results, literature cited, timetable, and proposed budget. The research must be conducted on one or more native Kansas snake species. Additionally, a majority of the field work or observations must be proposed to occur in Kansas, or the data must be proposed to be collected, at least in part, on Kansas specimens.

Proposals should be sent to the KHS Awards Committee Chair, and must be postmarked by 15 September. The grant recipient will be announced at the annual meeting in November. New applications will be accepted after 1 January of the following year.

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Conditions and Stipulations: The Award shall be known, presented, and portrayed as the *Suzanne L. & Joseph T. Collins Award for Excellence in Kansas Herpetology* and may not be changed for any reason, nor added to or merged with any other award, prize, or gift. The Award is established in recognition of the scientific and photographic achievements of Suzanne L. Collins and Joseph T. Collins, whose life-long study and conservation of the native amphibians, turtles, and reptiles of Kansas is amply demonstrated in their extensive and excellent writings and photography, both academic and popular, about these animals.

*The Collins Award* shall be presented no more than once each year. The Award may not be divided, but must be presented in full to a single individual. The Award consists of a trust-in-perpetuity, owned and invested by the *The Center for North American Herpetology*, and part of the interest from the trust is annually forwarded to the *Kansas Herpetological Society*, should they choose to make an award in that year.

Recipients of *The Collins Award* are chosen by the *Kansas Herpetological Society Awards Committee*.

*In even-numbered years*, the Award is bestowed upon an individual who, in the *preceding* two calendar years, had published a paper of academic excellence on the systematics, ecology, or conservation of a native species of Kansas amphibian, turtle, and/or reptile in the *Journal of Kansas Herpetology*, *Transactions of the Kansas Academy of Science*, *Herpetological Review*, or the *Journal of Herpetology*, and/or presented a lecture of excellence on the systematics, ecology, or conservation of a native species of Kansas amphibian, turtle, and/or reptile at the KHS Annual Meeting. To qualify for the Award, a portion of the field work or observations must have occurred in Kansas, or the systematic data must have been based in part on Kansas specimens. *In odd-numbered years*, the Award is bestowed upon an individual who was chosen the best in a juried competition featuring the art of photography in portraying amphibians, turtles, and/or reptiles, said competition to take place under the auspices and on the occasion of the annual meeting of the *Kansas Herpetological Society*. To qualify for the Award, the art work must portray a species native to Kansas.

*The Collins Award* is minimally \$1000.00, and is neither a grant nor a scholarship. No nominations or applications can be made for it.

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