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Front Cover: An adult male Eastern Collared Lizard (*Crotaphytus collaris*) from Harper County, Kansas.
Photograph by MacKenzie K. Wiley

Journal of Kansas Herpetology

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KHS BUSINESS

KHS Fall Field Trip to Pottawatomie County

Plans are underway to hold the KHS Fall Field Trip in Pottawatomie County on the weekend of 7-8 October 2006. Derek and Mark have thoroughly scouted the area and are now acquiring landowner permission for some extensive areas of excellent herping.

Schedule this trip on your calendar now, and plan to spend some time in the northern Flint Hills next Fall. The public is invited, as all field trips are not limited to our members only. More detailed information will be provided in the September *Journal*. Hope to see you there, it should be a lot of fun.

Nominations for KHS Awards

Individuals are reminded that the deadline is 15 September 2006 for submission of applications for the Howard K. Gloyd-Edward H. Taylor Scholarship and the Alan H. Kamb Grant for Research on Kansas Snakes. Self-nominations for the Gloyd-Taylor Scholarship are encouraged. Submissions for both the scholarship and grant should be sent to Dan Fogell, the Chairperson of the KHS Awards Committee (see inside front cover).

KHS Donors

Al Kamb Grant

Steve Adams
Calvin C. Cink
E. Fred Elledge
Olga S. Guarisco
Richard L. Lardie
R. Gayan Stanley
Suzanne L. & Joseph T. Collins,
in memory of Stephen Michael Rochford

Gloyd-Taylor Scholarship

Steve Adams
E. Fred Elledge
Richard L. Lardie
R. Gayan Stanley
Suzanne L. & Joseph T. Collins,
in memory of Stephen Michael Rochford

Upcoming Events of Interest

Missouri Herpetological Association
19th Annual Meeting
30 September - 1 October 2006;
Reis Biological Station

SSAR/HL/ASIH/AES
2006 Joint Meeting
12-17 July 2006; New Orleans, Louisiana

Kansas Ornithological Society
Fall Meeting
6-8 October 2006; Fort Hays State University, Hays

Central Plains Society of Mammalogists
14 October 2006; Edmund, Oklahoma

New Members Wanted

If you know of someone interested in herpetology, urge that they join the KHS by sending their calendar 2005 membership dues (\$15.00 regular, \$20.00 contributing) to:

Mary Kate Baldwin
KHS Secretary
5438 SW 12th Terrace Apt. 4
Topeka, Kansas 66604

Membership in the KHS has many benefits, and supports the KHS and its many fine programs. Also, members are eligible for KHS grants and scholarships. If you have received this issue, you have already paid your dues for 2005; please encourage a friend or colleague to join. The KHS is the strongest state herpetological society in the nation; keep us that way by promoting membership growth.

Results of the KHS Spring Field Trip to Kiowa County

The World's Largest Hand Dug Well and the World's Largest Meteorite... all that at their feet and the Kansas Herpetological Society's main focus for the weekend was to unearth, uncover and chase down every reptile, amphibian and turtle they could find in Kiowa County. Members of the society began to trickle in and assemble on Friday evening 21 April at Kiowa County Lake; and so began the sharing of stories about individual species encountered during the abnormally warm spring of 2006.

Kiowa County covers an area of 723 square miles and has a population of over 3,200 people. The biggest worry in setting up this trip was Kiowa County's lack of public ground. The total county public land was estimated to be around fifty acres; but thanks to help from Ken Brunson with the Kansas Department of Wildlife and Parks, and Greensburg resident, Bob Mosier, KHS was able to secure private land access. Not just land access but access to rocky bluffs overlooking the tributaries of the Medicine Lodge River and lots of old homesteads for tin and debris flipping. These were areas that surely had never actively been hiked before by a large group of herpetologists.

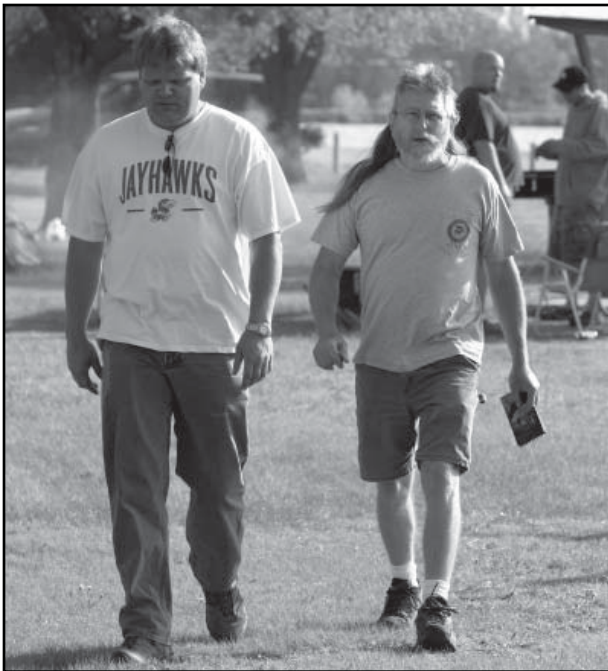
The conditions in Kiowa County were arid to say the least. Mother Nature had forgotten to drop much rain on the South-Central Kansas County. April is normally a busy time for the amphibians of Kiowa County, but because early spring rains were nearly absent, and streams and ponds were dry or reduced to mere puddles, not a single frog was heard chorusing during our stay.

Did that mean that society members came up empty handed? No. Four hundred and five specimens were encountered. KHS captured five species of frogs and toads, and seven species of lizards despite the drought conditions. Also encountered were four species of turtles and nineteen different species of snakes. That, my friends, is the advantage of having 110 sets of eyes scanning the terrain. This outing presented a once in a lifetime opportunity for the members to observe several species that are very rare within Kansas' borders. The group discovered four species in Kiowa County that had never been found there before: the Milk Snake, the Brown Snake, and the Northern Painted Turtle.

2006 KHS Spring Field Trip Photographs



Some of the many herpers that participated in the KHS 2006 Spring Field Trip to Kiowa County, Kansas. Individuals came from all over Kansas, and as far away as Iowa to take part. Photograph by Larry L. Miller.



KHS Field Trip Co-chairpersons Derek Schmidt (left) and Mark Ellis discuss the logistics of coordinating 100+ eager herpers. Photograph by Larry L. Miller.



Cherrie Riffey, Charlie Stieben, and Nate Davis probe the Medicine Lodge River for the elusive Checkered Garter Snake. Unfortunately, none were found during the field trip. Photograph by Travis W. Taggart.



Eric Kessler leads a group of students on a Kiowa County hillside. Eric always brings along an entourage of students to each field trip. Photograph by Larry L. Miller.



Dan and Shelbi Carpenter make camp in preparation for a day of herping. Photograph by Larry L. Miller.

2006 KHS Spring Field Trip Photographs



Rachel holds one of many Bullsnares discovered during the KHS Spring Field Trip. Photograph by Larry L. Miller.



The bulk of the field trip participants descended upon Buster's in Sun City for dinner and entertainment. The KHS Executive Council used this opportunity to conduct a business meeting. Photograph by Travis W. Taggart.



A group of students show off their recently caught Eastern Racer. Eastern Racers proved plentiful, as several were discovered during the field trip. Photograph by Larry L. Miller.



An impromptu meeting of field trip participants discuss their finds and ask questions of mentor Joe Collins (second from right). Photograph by Suzanne L. Collins.



A line of herpers make their way across the landscape as they find and turn plate sized rocks, distributed liberally throughout the grass. Photograph by Travis W. Taggart.



There were reports of a large man-like beast terrorizing the campsite Friday night. One brave KHS member (who wishes to remain anonymous) happened to get this picture.

2006 KHS Spring Field Trip Photographs



These basking Sliders were at home near the campsite at Kiowa State Fishing Lake. Photograph by Suzanne Miller.



Ron Pine, a renowned mammalogist by training, made his way from Lawrence to participate in the field trip. Photograph by Travis W. Taggart.



KHS Field Trip Co-chair Derek Schmidt and President Curtis J. Schmidt (right) welcome the participants Saturday morning prior to the first series of excursions. Photograph by Travis W. Taggart.



Mark Ellis (KHS Field Trip Co-chair) and Dan Johnson (right) prepare to relax for some storytelling around the campfire Saturday night. Photograph by Travis W. Taggart.



Mike Rochford, Ginny Weatherman, and Ian McCloud discuss the days events around the campfire. Photograph by Travis W. Taggart



A slow sleepy early Sunday morning at the campsite. Photograph by Travis W. Taggart.

33rd Annual Meeting Announcement

The 2006 KHS Annual Meeting will be held in Hays, Kansas on 4-5 November at the Sternberg Museum of Natural History and Fort Hays State University (FHSU). KHS members are encouraged to patronize the Holiday Inn, Hampton Inn, or Motel 6 (phone numbers below), all of which offer special reduced rates for those attending the meeting; be sure to mention that you are attending the KHS meeting at FHSU. Lodging arrangements will not be made by the KHS. More detailed information will be available in the September *Journal*, and is currently available on the KHS website (www.ku.edu/~khs)



Social: In what is becoming a tradition, an informal social gathering will take place at the Stadium Club (inside the Holiday Inn) on Friday evening (3 November). Members are urged to bring their stories and pictures (digital or otherwise) to share with the others.

Keynote Speakers: We are pleased to have two distinguished FHSU alumni agree to return as our Keynote Speakers. James L. Knight (South Carolina State Museum, Columbia) will start things off Saturday morning during the first paper session, and Jerry D. Johnson (University of Texas, El Paso) will speak Saturday evening.

Paper Sessions: Scientific papers and illustrated talks will be presented during four sessions on Saturday and two sessions on Sunday.

Banquet: A KHS banquet will be held on Saturday night (4 November) at the Sternberg Museum of Natural History. The KHS auction will follow the banquet, so stay in your seats.

Auction: Joseph T. Collins will conduct the annual KHS auction on Saturday night (4 November) at the Sternberg Museum of Natural History. All proceeds from the auction go to the KHS. Beer, soft drinks and snacks will be free.

Live Exhibit: A live exhibit of native Kansas herpetofauna will be assembled and available in Room 244 of Albertson Hall for viewing and photography.

Art Exhibit: A retrospective exhibit of herpetological artwork by well-known artist and former KHS president Marty Capron, will be on display in Room 248 of Albertson Hall (next to the live exhibit). Come and view the artistic achievements of one of our own.

Book Sales: The book seller, Eric Thiss, will display his tremendous diversity of herpetological titles in Room 248 of Albertson Hall (next to the live exhibit). Buy your favorite books, new and old. Eric is a generous contributor to the KHS auction.

Hotels: Holiday Inn: 800-315-2621; Hampton Inn: 1-800-426-7866; Motel 6: 800-466-8356

Annual Meeting Call for Papers

Participants wishing to present a talk at the Annual Meeting should mail or e-mail (see inside front cover) the following to KHS President Curtis Schmidt by 1 October 2006:

- Title of presentation
- Author(s) of presentation
- Affiliation and/or address of each author

Presentations will be limited to twelve minutes.

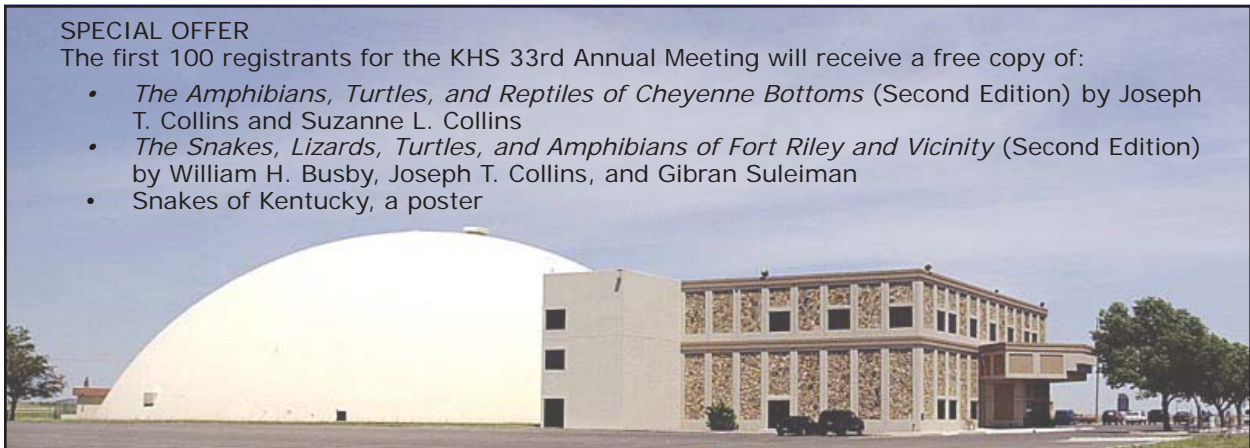
We will attempt to adhere to a strict schedule during the paper sessions. Presenters are asked to have their talks loaded prior to the start of the session in which their presentation is scheduled. Space is limited, and slots are provided on a first come - first served basis.

The meeting room will be equipped to facilitate MS PowerPoint, 35mm slides, and overhead transparencies; if additional aids are required for your talk or you have any other questions concerning your presentation please address them to Curtis Schmidt (see inside front cover).

SPECIAL OFFER

The first 100 registrants for the KHS 33rd Annual Meeting will receive a free copy of:

- *The Amphibians, Turtles, and Reptiles of Cheyenne Bottoms* (Second Edition) by Joseph T. Collins and Suzanne L. Collins
- *The Snakes, Lizards, Turtles, and Amphibians of Fort Riley and Vicinity* (Second Edition) by William H. Busby, Joseph T. Collins, and Gibran Suleiman
- Snakes of Kentucky, a poster



HERPETOLOGICAL HAPPENINGS

Recent Significant Name Changes for the Amphibians of the United States

In their recent publication, Frost, Grant, Faivovich, Bain, Haas, Haddad, De Sá, Channing, Wilkinson, Donnellan, Raxworthy, Campbell, Blotto, Moler, Drewes, Nussbaum, Lynch, Green & Wheeler (2006. The Amphibian Tree of Life. Bulletin of the American Museum of Natural History 297: 1-370) brought amphibian taxonomy in line with its evolutionary history. The majority of the changes were the reallocation of a species into another genus, as a result several specific names required correctional emendations to maintain their Latin gender. Those changes associated with United States (US) taxa are listed below. Those species found in Kansas are delimited with an asterisk (*).

- 1) The Family Dicamptodontidae (Tihen, 1958) is synonymized with the Family Ambystomatidae (Gray, 1850).
 - A. woodhousii** (Girard, 1854)
 - A. w. australis* (Shannon and Lowe, 1955)
 - A. w. velatus* (Bragg and Sanders, 1951)
 - A. w. woodhousii** (Girard, 1854)
- 2) The genus *Haideotriton* Carr, 1939, is synonymized with the genus *Eurycea* Rafinesque, 1822, resulting in the new combination *Eurycea wallacei* (Carr, 1939).
 - Chaunus* Wagler, 1828
 - C. marinus* (Linnaeus, 1758)
 - Cranopsis* Cope, 1875
 - C. alvaria* (Girard in Baird, 1849)
 - C. nebulifer* (Girard, 1854)
- 3) The Family Ascaphidae (Fejérváry, 1923) is synonymized with the Family Leiopelmatidae (Mivart, 1869).
- 4) As part of the partitioning of the genus *Eleutherodactylus*, the genus *Syrrhophus* (Cope, 1878) is resurrected and, along with the genus *Craugastor* (Cope, 1862), is placed in the Family Brachycephalidae (Günther, 1858), as follows:
 - Craugastor augusti* (Düges, 1879)
 - C. a. cactorum* (Taylor, 1938)
 - C. a. latrans* (Cope, 1880)
 - Syrrhophus cystignathoides* (Cope, 1877)
 - S. c. campi* (Stejneger, 1914)
 - Syrrhophus guttillatus* (Cope, 1879)
 - Syrrhophus marnockii* (Cope, 1878)
- 5) Partitioning of the genus *Bufo* worldwide results in the recognition of three genera of these anurans in the US, as follows:
 - Anaxyrus** Tschudi, 1845
 - A. americanus** (Holbrook, 1836)
 - A. a. americanus** (Holbrook, 1836)
 - A. a. charlesmithi** (Bragg, 1954)
 - A. baxteri* (Porter, 1968)
 - A. boreas* (Baird and Girard, 1852)
 - A. b. boreas* (Baird and Girard, 1852)
 - A. b. halophilus* (Baird and Girard, 1853)
 - A. californicus* (Camp, 1915)
 - A. canorus* (Camp, 1916)
 - A. cognatus** (Say in James, 1823)
 - A. debilis** (Girard, 1854)
 - A. d. debilis* (Girard, 1854)
 - A. d. insidior** (Girard, 1854)
 - A. exsul* (Myers, 1942)
 - A. fowleri** (Hinckley, 1882)
 - A. hemiophrys* (Cope, 1886)
 - A. houstonensis* (Sanders, 1953)
 - A. microscaphus* (Cope, 1866)
 - A. nelsoni* (Stejneger, 1893)
 - A. punctatus** (Baird and Girard, 1852)
 - A. quercicus* (Holbrook, 1840)
 - A. retiformis* (Sanders and Smith, 1951)
 - A. speciosus* (Girard, 1854)
 - A. terrestris* (Bonnaterre, 1789)
 - Lithobates* Fitzinger, 1843
 - L. areolatus** (Baird and Girard, 1852)
 - L. a. areolatus* (Baird and Girard, 1852)
 - L. a. circulosus** (Rice and Davies, 1878)
 - L. berlandieri* (Baird, 1859)
 - L. blairi** (Mecham, Littlejohn, Oldham, Brown and Brown, 1973)
 - L. capito* (LeConte, 1855)
 - L. catesbeianus** (Shaw, 1802)
 - L. chiricahuensis* (Platz and Mecham, 1979)
 - L. clamitans** (Latreille, 1801)
 - L. c. clamitans* (Latreille, 1801)
 - L. c. melanotus** (Rafinesque, 1820)
 - L. gryllo* (Stejneger, 1901)
 - L. heckscheri* (Wright, 1924)
 - L. okaloosae* (Moler, 1985)
 - L. onca* (Cope, 1875)
 - L. palustris** (LeConte, 1825)
 - L. pipiens* (Schreber, 1782)
 - L. septentrionalis* (Baird, 1854)
 - L. sevosus* (Goin and Netting, 1940)
 - L. sphenoccephalus* (Cope, 1886)
 - L. s. sphenoccephalus** (Cope, 1886)
 - L. s. utricularius** (Harlan, 1825)
 - L. subaquavocalis* (Platz, 1993)
 - L. sylvaticus* (LeConte, 1825)
 - L. tarahumarae* (Boulenger, 1917)
 - L. virgatipes* (Cope, 1891)
 - L. yavapaiensis* (Platz and Frost, 1984)
 - Rana* Linnaeus, 1758
 - R. aurora* Baird and Girard, 1852
 - R. boylei* Baird, 1854
 - R. cascadae* Slater, 1939
 - R. draytonii* Baird and Girard, 1852
 - R. luteiventris* Thompson, 1913
 - R. muscosa* Camp, 1917
 - R. pretiosa* Baird and Girard, 1853

- Joseph T. Collins and Travis W. Taggart, The Center for North American Herpetology, 1502 Medinah Circle, Lawrence, Kansas 66045. www.cnah.org.

Cheyenne Bottoms Book Revised and Available Gratis

The U.S. Fish and Wildlife Service and Sternberg Museum of Natural History, Fort Hays State University, are pleased to announce publication of:

Amphibians, Turtles, and Reptiles of Cheyenne Bottoms,
Second (Revised) Edition

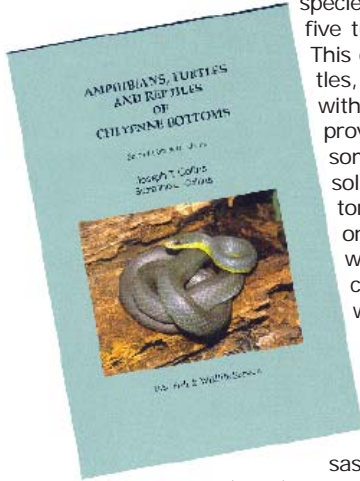
Cheyenne Bottoms, a nearly 27,500-acre wetlands situated in a relatively dry 41,000-acre lowland in central Kansas, sports a small but fascinating herpetofauna composed of 28 species—one salamander, eight frogs & toads, five turtles, two lizards, and twelve snakes.

This delightful guide to the amphibians, turtles, and reptiles of the Bottoms is spiced with humorous anecdotes and asides that provide a sometimes whimsical, sometimes somber, view of these creatures, as well as solid information about their natural history along with the most up-to-date taxonomy. The book is profusely illustrated with 36 images (33 of them in color) by co-author Suzanne L. Collins, a noted wildlife photographer.

Sponsors of this elegant and informative little book include the U. S. Fish and Wildlife Service (Manhattan, Kansas), Sternberg Museum of Natural History, Fort Hays State University (Hays, Kansas), Kansas Department of Wildlife and

Parks (Pratt), Westar Energy (Topeka), Kansas Herpetological Society (Topeka), Touchstone Energy (Washington, D. C.), and The Center for North American Herpetology (Lawrence, Kansas).

Single copies of the 84-page book are available gratis by writing to the Sternberg Museum of Natural History, Fort Hays State University, 3000 Sternberg Drive, Hays, Kansas 67601-2006. Please include a self-addressed 7x10-inch envelope with \$2.07 U.S. postage attached.



Legislation Prohibits the Keeping of Non-native Venomous Snakes

Summary of Senate Bill 578: This bill regulates the ownership of lions, tiger, leopards, jaguars, cheetahs, and mountain lions, and related hybrids; as well as, bears and related hybrids. Senate Ways and Means amended the bill to also include non-native venomous snakes. The bill would require owners of such animals to meet USDA regulations and would require them to register with their local animal control authority. Among the provisions of the bill are those requiring owners to keep regulated animals in a cage, keep them from direct contact with another person, and carry at least \$250,000 in liability insurance or bonding. The KDWP supported this bill. Accredited zoos, museums, and wildlife parks are exempt from the law. Circuses and researchers with the proper licensing are not affected. The law also prohibits ownership of exotic animals by anyone who has been convicted of a felony within the past 10 years.

The Senate Ways and Means Committee passed this bill on Thursday, March 16, and the same day the full Senate unanimously passed the bill. On March 17 the bill was received and introduced in the House. The House Wildlife Parks and Tourism Committee passed the bill on March 22 and it was approved by the full House on March 30 by a vote of 101-24. This bill was signed by the Governor on April 17.

Blanchard's Cricket Frog Sunk

Malcolm L. McCallum and Stanley E. Trauth. (2006. An evaluation of the subspecies *Acris crepitans blanchardi* (Anura, Hylidae). Zootaxa 1104: 1-21) found no support for the designation of *Acris crepitans blanchardi* throughout its range and recommended that the form be regarded as *Acris crepitans* with no subspecies recognized. Reprints are available from the authors, or can be downloaded in a PDF format from the CNAH website (www.cnah.org).

FIELD NOTES

Graduate Research on the Massasauga in Kansas

Western Massasaugas (*Sistrurus catenatus tergeminus*) occur from southwest Iowa and northwest Missouri through central Texas to Mexico (Conant, 1998). The Western Massasauga is common in central and eastern Kansas; where it occurs in grassland prairie to open wetlands (Collins, 1993).

This small rattlesnake is active from late April to early October, and can frequently be found while driving roads at night and in the mornings. The maximum length in Kansas is 39 1/2 inches (Collins, 1993). They feed on a variety of small terrestrial vertebrates (Greene, 1965), however little life history on the Western Massasauga in Kansas is available, but see Fitch, 1985, and Rush and Ferguson, 1986. Young are born in July and August and litter sizes can range from three to thirteen (Collins, 1993). Current research is focused on the evolution of snake venom which will include samples for Barber, Barton, and Russell counties.

Growing up in Ellsworth County has kept my interest in all reptiles and amphibians, and held my interest on this particular organism. Western Massasaugas are very

common in that area and it is possible to capture six individuals on average while road cruising the areas around the town of Ellsworth. Capturing snakes in this fashion can offer some insight into the snake's behavior, including reproductive behavior. Recently, while helping Eric Bartholomew with his research at the Quivira National Wildlife Refuge, I had the opportunity to observe more snakes in their native environments, while assessing the effects of burning on the native snake communities. Currently, as a graduate student at Fort Hays State University I plan to start my investigation involving the Western Massasauga.

In the spring and fall seasons of 2006 and 2007, a study will be conducted to analyze the diet of the Western Massasauga in upland grassland areas of Ellsworth county and lowland marshes of Barton and Stafford Counties. I hypothesize that there is a difference in prey items being selected between grassland and wetland areas. The primary objective is to capture individuals that contain prey items in their stomachs, extract and analyze those items. I will be identifying the contents in the lab during two seasons to assess if there are differences in the types of organisms in these distinct macrohabitats. To accomplish the objective, road cruising, passive trapping, and active

searching will be used to capture individuals.

As part of the project, an evaluation of the efficiency and accuracy of techniques used to recover the contents of the stomachs will be conducted. The first technique will be palpation, which has been used in other investigations (Gregory, 2004). A cooling method has been used with small vipers and might work well for massasaugas (Kjaergaard, 1981). The flushing technique will be evaluated as well (Legler, 1979). These nonlethal techniques will be compared to dissection of stomachs, which will be the standard for the project. In addition, I might be able to observe differences in capture efficiency and behavior among populations that occur in the distinct macrohabitats. The snakes may be actively foraging in distinct areas with regards to their most common prey item, and therefore may be targeting those organisms as prey.

Anyone interested in working with these animals in a field research setting should contact David Bender to get a complete understanding of the potential field experience involved.

Literature Cited

- Collins, J.T. 1993. Amphibians and reptiles in Kansas. The University of Kansas, Lawrence, Kansas.
- Conant, R. and Collins, J. T. 1998. A field guide to reptiles and amphibians eastern and central north America. Houghton Mifflin Company, Boston Massachusetts.
- Greene, H. W., and Oliver, G. V. Jr. 1965. Notes on the natural history of the Western Massasauga. *Herpetologica* 21:225-228.
- Gregory, P.T. and L. A. Isaac. 2004. Food habits of the grass snake in southeastern England: Is *Natrix natrix* a generalist predator? *Journal of Herpetology* 38:88-95.
- Kjaergaard, J. 1981. A method for examination of stomach content in live snakes and some information on feeding habits in common viper (*Vipera berus*) in Denmark. *Natura Jutlandica* 19:45-48.
- Legler, J. M. and L. J. Sullivan. 1979. The application of stomach-flushing to lizards and anurans. *Herpetologica* 35:107-110.
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30th Annual Herpetological Survey of Southern Sumner County, Kansas

"A Brief Summary of the History of the Research"

The herpetological surveys of the amphibians, reptiles, and turtles found in the southern part of Sumner County, Kansas have quite a history. The first formally organized event of this type was planned by the late Gene Trott of Hunnewell, Martin B. Capron of Oxford, and Larry L. Miller of Caldwell and held during late March of 1977. It was officially named the Chikaskia River Wildlife Study and continued as an annual event for the next ten years with Miller, Trott, and Capron continuing as the main organizers. Much of the research during the Chikaskia River Wildlife Studies took place on the Freeman Dillard property located north of Drury along the banks of the Chikaskia. However, each year since 1977 some type of research has been conducted on one or more tracts of land south of Caldwell in Sumner County. It has often been conducted on land now owned by Nina and Carson Ward of Caldwell.

The first somewhat documented records of serious herpetological research in the area appear to date to the 1950's when a young Caldwell biology teacher, George Toland, conducted a number of field trips to the area

south of Caldwell. Toland and his students collected a number of specimens. Apparently some of these specimens made their way to Toland's next teaching job in Salina where he taught biology for more than 30 years. At some point in time during the 1970's at least a few of the specimens collected by Toland and his students found their way to Emporia State University where they were cataloged by James L. Knight, a former student of Toland's at Salina High School. Other specimens may still be in the possession of the Toland family.

Students at Caldwell Elementary School became involved with the documentation of new herpetological records about a year after the first edition of AMPHIBIANS AND REPTILES IN KANSAS by Joseph T. Collins was published in 1974. The first of dozens of new records was brought to Larry L. Miller, Caldwell Elementary School 5th and 6th grade science teacher, during the fall of 1975. It was an adult Speckled Kingsnake (Common Kingsnake) that had been killed at the west edge of Caldwell by one of the Caldwell 5th grade student's domestic cats. The student, Debra Walta, is pictured holding the preserved specimen on page #23 of the 1976 edition of the Caldwell (USD# 360) School Yearbook.

Historic information as well as a number of images from past herpetological field trips and surveys of the southern Sumner County area and information in regard to a number of other scientific and historic happenings in and around Caldwell can be found on the Internet. Access <http://www.KsHeritage.com> and follow links related to herpetology, Caldwell, the Chikaskia River, and the Ornate Box Turtle. Links to information about some of the more recent field trips to the Caldwell area can be found at <http://www.nhjhbiology.com>.

Images and information in regard to the 30th annual survey has been posted at the <http://www.nhjhbiology.com> website. Information includes a list of animals collected along with the number of individuals of each. Links to information in regard to past surveys are also provided. Just go to the site and click on the 2006 Sumner County survey icon toward the bottom of the page.

The students and science staff members from Northern Hills Junior High School (USD# 345) located north of Topeka in Shawnee County, Kansas wish to thank everyone from the Caldwell area that has been involved with past surveys and everyone that participated in the 2006 survey. They also wish to thank the landowners that have granted access to their property and the City of Caldwell for its continued hospitality.

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Submit Your Herp Counts

Those of you that have conducted Herpetofaunal Counts this spring need to submit them to Associate Editor, Joseph T. Collins (see inside front cover). They will be published in the September issue of JKH.

Also, you are encouraged to continue to make herp counts throughout the year. Historically, only spring counts were compiled, however the program has been expanded so that more species and localities can be covered. Your efforts in this regard, have been, and will continue to be, an invaluable resource for Kansas' herpetologists.

Forms can be found in the March issue of JKH, or downloaded from the KHS website (www.ku.edu/~khs).

ARTICLES

A Survey of the Amphibians, Turtles, and Reptiles of the Eastern Portion of the Kiowa National Grassland of New Mexico and the Rita Blanca National Grassland of Adjacent Oklahoma and Texas

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Introduction

This survey of the herpetofauna of the Kiowa–Rita Blanca National Grasslands (KRB) in New Mexico, Oklahoma, and Texas, was undertaken (in part) to obtain information about three sensitive species of reptiles that might occur there. The Kiowa–Rita Blanca National Grassland, hereinafter abbreviated KRB, is a significant area of federal land located at the junction of the state borders of New Mexico, Oklahoma, and Texas (Figure 1). This herpetofaunal survey was conducted for the U.S. Forest Service in all three states during the course of five field trips between 25 April 1999 to 10 September 1999.

Although we surveyed the KRB for all amphibians, turtles, and reptiles, three sensitive species targeted for special consideration were the Texas Horned Lizard (*Phrynosoma cornutum*), Longnose Snake (*Rhinocheilus lecontei*), and Western Ribbon Snake (*Thamnophis proximus*). Of these three species, only the Texas Horned Lizard has been previously recorded on KRB in Union County, New Mexico (Degenhardt et al. 1996). None of the three sensitive taxa had previously been verified from the KRB in Cimarron County, Oklahoma, or Dallam County, Texas.

Study Area

The KRB survey area consisted of the eastern portion of the Kiowa National Grassland in eastern Union County, New Mexico, and the Rita Blanca National Grassland in adjacent Cimarron County, Oklahoma, and Dallam County, Texas. Degenhardt et al. (1996) provided an overview of the herpetological habitats of northeastern New Mexico, and Webb (1970) for the reptilian habitats in the panhandle of Oklahoma. No such herpetofaunal compilations are available as yet for northwestern Texas, but the Rita Blanca National Grassland in Dallam County, Texas, probably aligns most closely with its counterpart in Cimarron County, Oklahoma, to the north.

An attempt was made to survey (at least once) every USFS unit within the entire KRB in all three states. All common herpetological searching techniques were used,

including road-cruising (both day and night), searching beneath ground cover (rocks, sheet metal, boards, logs, brush piles, debris, etc.), and hiking the margins of aquatic situations. In addition, funnel traps were set throughout the survey area in all three states in varied habitats, but no captures were made in them. Further, where possible, pieces of sheet metal and other flat debris were spread out in various habitats to enhance opportunities for observations, and some success was realized from this strategy. Voucher specimens were collected for many species from New Mexico and a few from Texas (we had scientific collecting permits for those states), but none were collected from Oklahoma. In addition, color slides

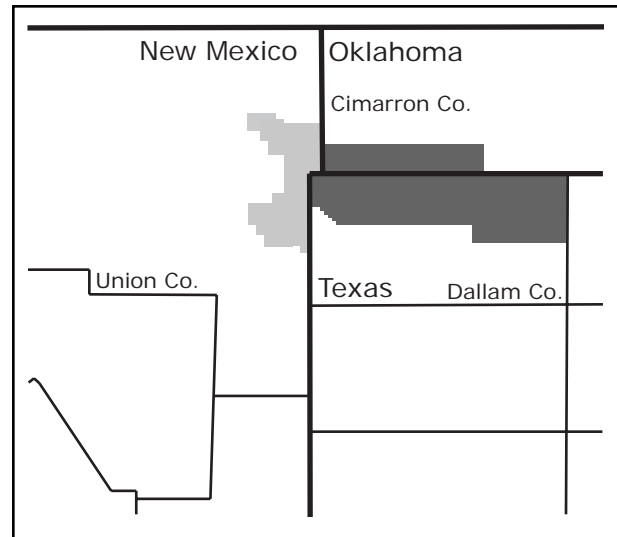


Figure 1. The Kiowa-Rita Blanca Grasslands, located at the junction of the borders of New Mexico, Oklahoma, and Texas. Light-shaded area is the Kiowa Grasslands; dark-shaded area is the Rita Blanca Grasslands.

were taken of all species for which living specimens were obtained. Throughout this report, the designation AOR means the specimen was found alive on the road; DOR means dead on the road

Methods

Road-cruising: Throughout the KRB survey, road-cruising both day and night was a constant and extremely productive technique for recording both AOR and DOR specimen observations (see Accounts of Species Observed). Indeed, without this technique, the survey would have been impossible to accomplish, given the immense size of the KRB. A majority of observations of amphibians, turtles, and reptiles on the KRB were made using this technique.

Rock-turning: Where possible at selected sites, all flat rocks were turned in the search for specimens. This was particularly effective in canyon areas where rocks were exposed and readily accessible.

Daytime visual searching: Special attention was given to aquatic situations (streams, marshes, stock ponds, and stock tanks) and to cultural situations such as abandoned homesteads. Both situations attract amphibians, turtles, and reptiles because such structures often have much flat detritus that provided cover for these creatures (and their prey). Binoculars were occasionally used to confirm lizard identifications.

Ground cover: Whenever ground cover such as sheet metal, boards, and other flat debris was encountered, survey participants always looked beneath such items and made every effort to enhance the position of such cover for future searching. This proved particularly effective for the Great Plains Skink (*Plestiodon obsoletus*) and Prairie Rattlesnake (*Crotalus viridis*).

Funnel traps: Seven funnel traps were set and monitored throughout the survey. Nothing was captured in them, and they are not recommended as a survey technique for any future work on KRB.

Accounts of Species Observed Class Amphibia Amphibians

Barred Tiger Salamander (*Ambystoma mavortium*)

The Barred Tiger Salamander was the only salamander known to occur on the KRB, and was abundant and ubiquitous throughout the survey. Forty-seven adult or subadult



Figure 2. A larval Barred Tiger Salamander (*Ambystoma mavortium*) from Union County, New Mexico. Photograph by Suzanne L. Collins.

specimens were observed from 29 April to 8 September in all three states, as follows: New Mexico 17, Oklahoma 4, Texas 26. Of these forty-seven salamanders, forty-six were observed on roads; thirty-two were AOR and fourteen (30.4%) were DOR. Most observations were made during or after rainfall.

A single subadult was found on moist earth beneath a board near an abandoned farmstead on Unit 58 (New Mexico) on 9 August.

An estimated 1,000 larval Barred Tiger Salamanders (Figure 2) were observed in a stream in Unit 42 (New Mexico) on 25 May, but were not present (and had presumably metamorphosed) by 9 July. On 11 July, 14 July and 16 July, an estimated 500 larvae were observed in a marsh on Units 14 and 15 (Texas), but were not present (and had presumably metamorphosed) by 7 August. On 7 August and 13 August, an estimated 100 larvae (some quite large) were observed in a stock pond (containing many cattails) on Unit 32 (New Mexico). It is possible that some of these salamanders were neotenic adults. Observations on 8 September revealed only two larvae at this site. A single dead larva was found in a stream pool on Unit 19 (Texas) on 12 August. On 3 September, an estimated 50 larvae were observed in a stock pond (containing many cattails) on Unit 31 (New Mexico). No larvae were found or observed in Cimarron County, Oklahoma.

Adult Barred Tiger Salamanders were observed abundantly crossing all roads in KRB during and after rainstorms (both day and night) from 29 April to 9 July. A single deformed adult (missing right eye) was found on 30 April near Unit 113 (Oklahoma). Three subadults were observed AOR on 8 August only (1 New Mexico, 2 Texas). This amphibian is apparently well adapted to impoundments and other aquatic situations created by human activity.

Plains Spadefoot (*Spea bombifrons*)

The Plains Spadefoot was the more observably abundant of the two members of its genus that were verified as present on KRB during this survey. Fifty-eight adult and subadult specimens were observed from 29 April to 11 August in all three states, as follows: New Mexico 35, Oklahoma 2, Texas 21. All fifty-eight frogs were observed on roads; forty-five were AOR and thirteen (22.4%) were DOR. All observations were made during or after rainfall.

An estimated 25 adult Plains Spadefoots were chorusing by day (2:50 pm) in a temporary rain-filled roadside ditch along Units 14 and 15 (Texas) on 30 April. Two additional choruses of these anurans were heard nearby in temporary rain-filled roadside ditches in Texas on the same day, the first estimated at 100 individuals at 3:05 pm and the second estimated at 15 frogs at 3:15 pm. Neither of these choruses were found along or near KRB Units. On 1 May, the chorus in the roadside ditch along Units 14 and 15 (referred to above on 30 April) had swelled to an estimated 100 individuals when heard at 1:05 pm. Another small chorus of these amphibians was heard at 3:55 pm on 1 May in New Mexico, but was not near a KRB Unit. On 12 August, an estimated 500 tadpoles of this frog were observed in a small intermittent stock pond at 6:45 pm near Unit 49 (New Mexico).

Adult Plains Spadefoots were observed abundantly crossing roads in KRB at night during and after rainstorms from 29 April to 11 August. Five subadults (recently metamorphosed) were observed on 6 August (New Mexico) and three more were discovered on 7 August (New Mexico). This amphibian is apparently well adapted to roadside ditches and other aquatic situations created by human activity.



Figure 3. An adult New Mexico Spadefoot (*Spea multiplicata*) from Union County, New Mexico. Photograph by Suzanne L. Collins.

New Mexico Spadefoot (*Spea multiplicata*)

The New Mexico Spadefoot was the least observably abundant of the two members of its genus that were verified as present on KRB during this survey. Eighteen adult specimens were observed from 15 July to 4 September in two states, as follows: New Mexico 17, Texas 1. All eighteen frogs were observed on roads; sixteen were AOR and two (11.1%) were DOR. All observations were made during or after rainfall.

No choruses of the New Mexico Spadefoot were heard on the KRB during this survey, nor were any tadpoles observed.

Adult New Mexico Spadefoots (Figure 3) were observed crossing roads in KRB (New Mexico and Texas only) at night during and after rainstorms. No subadults were observed. This amphibian is apparently well-established in the higher elevations of the Kiowa (New Mexico) portion of the Grasslands, but was scarce in the Rita Blanca portion of the KRB in Texas and was not observed in Oklahoma.

Great Plains Toad (*Anaxyrus cognatus*)

The Great Plains Toad was one of three members of the genus verified as present on KRB during this survey. Fifty-five adult and subadult specimens were observed from 11 July to 8 September in two states, as follows: Oklahoma 5, Texas 50. Of these fifty-five toads, forty-four were found on roads; thirty-six were AOR and eight (18.1%) were DOR.

One adult was found dead at the edge of a marsh on Units 14 and 15 (Texas) on 14 July, apparently crushed by livestock. One subadult was found active at 12:15 pm on 4 September in a quarry on Unit 19 (Texas). Nine specimens (mostly subadults) were found trapped in a stock tank at 1:00 pm on 8 September on Unit 11 (Texas); one was dead, but the other eight were rescued and released.

An estimated 1,000 recently metamorphosed Great Plains Toads were observed active by day around the edge of a grassy marsh on Units 14 and 15 (Texas) on 11 July, 14 July and 16 July, but none were present on 6 August; presumably all had dispersed. Three recently metamorphosed young were discovered beneath a piece of sheet metal on Unit 11 (Texas) at 11:25 am on 11 July.

Adult Great Plains Toads were observed abundantly crossing roads in KRB (Oklahoma and Texas) at night during and after rainstorms from 11 July to 5 September. Nine subadults were observed crossing roads in KRB

(Oklahoma and Texas) at night during and after rainstorms from 8 August to 4 September. This amphibian is apparently well-established at the lower elevations of the Rita Blanca portion of the Grasslands in Oklahoma and Texas, but was not found in the Kiowa portion of the KRB in New Mexico.

Red-spotted Toad (*Anaxyrus punctatus*)

The Red-spotted Toad was the least observably abundant of three members of its genus verified as present on KRB during this survey. Three adult specimens were observed from 6 August to 9 September in the New Mexico portion of KRB.

One adult male Red-spotted Toad was heard calling at night (10:40 pm) from a rocky canyon pool just west of Unit 49 on 6 August. A second specimen was discovered trapped in a cavitation hole in Perico Creek bedrock on Unit 34 at 4:00 pm on 8 September; it was rescued and released. The third example of this toad was found under a rock in the Perico Creek streambed on Unit 33 at 9:30 am on 9 September.

No Red-spotted Toads were found in the Oklahoma or Texas portions of the KRB, possibly because those lower-elevation areas lacked much of the rocky canyon habitat so often frequented by this species.

Woodhouse's Toad (*Anaxyrus woodhousii*)

The Woodhouse's Toad was the most observably abundant of three members of its genus verified as present on KRB during this survey, and was ubiquitous. One hundred and fifty-nine adult and subadult specimens were observed from 29 April to 9 September in all three states, as follows: New Mexico 94, Oklahoma 6, Texas 59. Of these 159 toads, 113 were observed on roads; ninety-one were AOR and twenty-two (19.4%) were DOR.

One large adult was found active at 10:00 am on 11 July around the edge of a grassy marsh on Units 14 and 15 (Texas). Two adults were found trapped alive in a water-filled stock tank near a windmill on Unit 6 (New Mexico) at 10:05 am on 12 July; both were rescued and released. Two subadults were discovered under small rocks on a west-facing outcrop on Unit 65 (New Mexico) at 10:45 am on 9 August. On 10 August, a single subadult was found beneath a board on Unit 71 (Texas) at 10:30 am. Subadult toads were discovered active both day and night on 10 August (2 specimens) and 13 August (1 specimen) at the edge of a semi-permanent cattail-filled stock pond on Unit 32 (New Mexico). On Unit 128 (Oklahoma), an adult Woodhouse's Toad was observed in a temporary stream pool at 8:05 pm on 10 August. On 3 September, a single subadult specimen was discovered at 8:40 pm on Unit 31 (New Mexico) around the edge of a cattail-filled stock pond. Twelve adults and subadult Woodhouse's Toads were found trapped in a stock tank on Unit 11 (Texas) at 1:00 pm on 8 September; all were rescued and released. Also on 8 September, 12 adults and subadult toads were discovered trapped in a cavitation hole in the bedrock of Perico Creek on Unit 34 (New Mexico) at 4:00 pm; again, all were rescued and released. On the morning of 9 September, a single subadult toad was found active in the streambed of Perico Creek on Unit 33 (New Mexico). Also, on the afternoon of 9 September, two subadults (one alive, one dead) were discovered in the streambed of Corrupa Creek near Unit 137 (New Mexico).

An estimated five adult Woodhouse's Toads were chorusing at night (11:00 pm) at Clayton Lake State Park (New Mexico) on 24 May. A single adult was heard calling on Unit 66 (New Mexico) at 9:50 pm on 7 August. Four

adults were found chorusing on Unit 50 (New Mexico) at 10:40 pm on 7 August.

On 11 July, 14 July and 16 July, an estimated 500 recently metamorphosed young of this toad were observed active by day around the edge of a grassy marsh on Units 14 and 15 (Texas), but none were present on 6 August; presumably all had dispersed.

Adult Woodhouse's Toads were observed abundantly crossing all roads in KRB at night during and after rainstorms from 29 April to 7 September. Subadults were observed crossing roads from 7 August to 7 September. This amphibian is apparently well adapted to stock tanks and other aquatic situations created by human activity.

Plains Leopard Frog (*Lithobates blairi*)

The Plains Leopard Frog was the only member of its genus verified as present on KRB during the survey. An estimated two hundred and fifty adult and subadult specimens were observed from 8 August to 9 September in two states, as follows: New Mexico 85, Texas 165. Of these 250 frogs, only one was found AOR (on 11 August); none DOR.

On 8 August, two adult specimens were observed in a permanent cattail-filled pond near a windmill-fed stock tank at 2:30 pm on Unit 32 (Texas). Two subadults were observed on 10 August at 2:50 pm in a semi-permanent stock pond on Unit 32 (New Mexico). An estimated fifteen adult frogs were found around a grassland pond near an old homestead on 11 August at 8:20 pm on Units 66 and 67 (New Mexico). Three adults and two subadults were discovered in water-holding Government Well on Unit 19 (Texas) at 1:45 pm on 11 August. Also on the same date at Unit 19 (Texas), an estimated fifty adult and subadult Plains Leopard Frogs were found at 1:55 pm in a cattail-filled overflow pond fed from a stock tank. In addition, on 12 August at the same site, an estimated 100 adult and subadult frogs were observed active at 10:25 am around two stream pools with large rock overhangs. On 3 September, a single adult frog was observed around a cattail-filled pond at 8:40 pm on Unit 31 (New Mexico). Three adults and one subadult were observed along Corrupa Creek on Unit 65 (New Mexico) on the morning of 7 September. On that same date along Corrupa Creek just north of Unit 63 (New Mexico), the distress call of a subadult Plains Leopard Frog was heard at 12:30 pm, and was discovered being eaten by a Western Terrestrial Garter Snake (*Thamnophis elegans*); the snake was captured and the frog released. Six adult frogs of this species were found in a cattail-filled stock pond on 8 September at 3:40 pm on Unit 32 (New Mexico). On 9 September, an estimated 55 adults and subadults of this amphibian were discovered active at 2:30 pm near Unit 137 (New Mexico) among cattails along Corrupa Creek.

On 11 August, an estimated 500 tadpoles of the Plains Leopard Frog were observed in a grassland pond near an old homestead at 8:20 pm on Units 66 and 67 (New Mexico). An estimated 100 tadpoles of this species were counted in water-holding Government Well on Unit 19 (Texas) at 1:50 pm on 4 September.

Adult Plains Leopard Frogs were observed in KRB from 8 August to 9 September. Subadults were observed from 10 August to 9 September. This amphibian is restricted to permanent natural streams and springs as well as aquatic situations created by human activity on the New Mexico and Texas portions of KRB. None of these anurans was heard or observed in Oklahoma.

Great Plains Narrowmouth Toad (*Gastrophryne olivacea*)

The Great Plains Narrowmouth Toad was the only



Figure 4. An adult male Great Plains Narrowmouth Toad (*Gastrophryne olivacea*) from Union County, New Mexico. Photograph by Suzanne L. Collins.

member of its genus verified as present on KRB during the survey. A single adult male (Figure 4) was first heard calling at 8:45 pm on 6 August in a small ephemeral pool just west of Unit 49 in New Mexico. Later that same evening at 10:40 pm, the specimen was again heard calling from the same pool and was captured for us by Emily Moriarty.

This record was the third for all of New Mexico, and the first for this species from the northern half of the state (Moriarty et al. 2000).

Class Chelonia Turtles

Yellow Mud Turtle (*Kinosternon flavescens*)

The Yellow Mud Turtle was the least observably abundant of the two species of turtles verified from the KRB during this survey, and was the only aquatic turtle found on the Grasslands. Five adult specimens were observed from 11 July to 4 September in all three states, as follows: New Mexico 1, Oklahoma 1, Texas 3. Of these five turtles, none were found AOR, and one was observed DOR on 12 July along Unit 33 (New Mexico).

On 11 July, an adult Yellow Mud Turtle was observed in a grassy marsh on Units 14 and 15 (Texas) at 10:00 am. A second adult turtle was discovered in a temporary stream pool on 10 August at 8:05 pm on Unit 128 (Oklahoma). Two more adults were found on 4 September at 10:00 am on Units 14 and 15 (Texas); one was floating in a grassy marsh pool, while the other was sunning on a mud flat in a dry portion of the marsh.

Yellow Mud Turtles are one of the few aquatic species of turtles adapted for life on the Grasslands. They can survive long periods of drought by burrowing deep into moist mud.

Ornate Box Turtle (*Terrapene ornata*)

The Ornate Turtle was the only terrestrial turtle found on the Grasslands, was the most observably abundant of the two species of turtles verified from the KRB during this survey, and was ubiquitous. Fifty-eight specimens and tracks were observed from 26 April to 9 September in all three states, as follows: New Mexico 34, Oklahoma 3, Texas 21. Of these fifty-eight turtles, forty-one were observed on roads; sixteen were AOR and twenty-five (60.9%) were DOR. In addition, shells of another seven turtles were discovered in grassland habitat on various Units, six in New Mexico and one in Texas.

On 26 April, an adult Ornate Box Turtle was found dead on Unit 65 (New Mexico) at 3:00 pm, apparently trapped in a dry cement water trough from which it could not escape. On 28 April at 3:00 pm on Unit 71 (New Mexico), a single adult specimen was found dead and another was observed covered with mud as it emerged from a winter burrow. An adult female was observed walking along a cattle path through grasslands at 11:00 am on 12 July on Unit 9 (New Mexico). On 12 July, an adult turtle was found dead on Unit 17 (New Mexico) at 1:15 pm, apparently trapped in a dry stock tank from which it could not escape. During the afternoon of 8 September, tracks of this species were observed in sand on Unit 6 and Unit 11 (Texas), and in the sand streambed of Perico Creek on Unit 34 (New Mexico). A single adult was found dead on the streambed of Perico Creek at 9:30 am on 9 September in Unit 33 (New Mexico).

Live adult Ornate Box Turtles were observed throughout KRB from 28 April to 8 September. Subadults were observed from 12 July to 9 August, and two newborns were observed on 10 July and 16 July. Ornate Box Turtles are well-adapted for life on the Grasslands, are abundant on KRB, and appear to be thriving, despite high mortality from highway deaths.

Class Reptilia Reptiles

Eastern Collared Lizard (*Crotaphytus collaris*)

The Eastern Collared Lizard was the only member of its genus found on the KRB Grasslands during this survey. Thirty-two adult and juvenile specimens were observed from 26 April to 9 September in two states, as follows: New Mexico 31, Texas 1. Of these thirty-two lizards, none were AOR or DOR.

On 26 April, seven adult Eastern Collared Lizards were found under rocks on a SW facing outcrop on Unit 61 (New Mexico) at 3:30 pm. A single gravid female was discovered beneath a rock on a north-facing outcrop at 11:50 am on 25 May in Unit 49 (New Mexico). Four adult lizards were captured under rocks on a west-facing outcrop at 10:45 am on 9 August in Unit 65 (New Mexico). On 10 August in Unit 71 (Texas), a single adult was observed active at 10:30 am on the west-facing cliff of an arroyo. During the morning of 7 September, one adult and three newborns were discovered active along west-facing outcrops above Corrupa Creek on Unit 65 (New Mexico). During the evening of 7 September on Unit 66 (New Mexico), one adult lizard was found dead in a burrow beneath a rock on a west-facing outcrop, and two live newborns were discovered in the same microhabitat. At 4:00 pm on 8 September in Unit 34 (New Mexico), seven newborn Eastern Collared Lizards were discovered under rocks on a north-facing outcrop along Perico Creek. On Unit 33 (New Mexico), five newborn lizards of this species were found, three active and two beneath rocks, on the morning of 9 September.

Live adult Eastern Collared Lizards were observed commonly in the New Mexico portion of KRB, and one specimen was found in the Texas portion. None were observed in the Oklahoma portion of KRB. Adults were recorded from 26 April to 7 September. Newborns were observed from 7 September to 9 September. Eastern Collared Lizards are well-adapted for life on the rocky, boulder-strewn New Mexico portion of KRB, but have little available habitat to the east in Texas; no such habitat was observed on the Oklahoma portion of KRB.

Lesser Earless Lizard (*Holbrookia maculata*)

The Lesser Earless Lizard was the only member of its genus found on the KRB Grasslands during this survey. Seventeen adult and juvenile specimens were observed from 27 April to 5 September in all three states, as follows: New Mexico 3, Oklahoma 6, Texas 8. Of these seventeen lizards, ten were AOR and none DOR.

On 27 April, three adult Lesser Earless Lizards were observed taking refuge beneath yucca plants, one at 10:00 am on Unit 16 (Texas) and two at 4:00 pm on Unit 137 (Oklahoma). On 12 August, an adult and a newborn were found active in grassland during the morning on Unit 19 (Texas). On 4 September, an adult was discovered active in a stone quarry at 12:15 pm on Unit 19 (Texas), and a newborn was observed active in grassland at 1:50 pm in the same Unit on the same date.

The Lesser Earless Lizard is an open, grassland species that prefers loose sand and soil, and avoids areas with rugged terrain and rocks. This habitat was typical in the lower elevations of the Rita Blanca Grasslands in Oklahoma and Texas, but grew more scarce in the higher elevations of the Kiowa Grasslands to the west in New Mexico. Adults were recorded from 27 April to 4 September. Newborns were observed from 12 August to 5 September.

Texas Horned Lizard (*Phrynosoma cornutum*)

The Texas Horned Lizard was the only member of its genus found on the KRB Grasslands during this survey (see Figure 1). Twenty adult, subadult and newborn specimens were observed from 29 April to 9 September in two states, as follows: New Mexico 12, Texas 8. Of these twenty lizards, sixteen were found on roads in KRB; ten were AOR and six (37.5%) were DOR.

On 12 August, two adult Texas Horned Lizards were observed active in road ruts at 10:20 am on Unit 19 (Texas). On 4 September, two subadults were discovered active in grassland at 1:50 pm on Unit 19 (Texas).

The Texas Horned Lizard is an inhabitant of open grassland, and prefers loose sand and soil in which to burrow. Adults were recorded from 29 April to 6 September. Newborns were observed from 4 September to 9 September. This species spends much time basking on roadways, both paved and unpaved, in the heat of the day. Instead of using quick reflexes and speed (like the Six-lined Racerunner), it apparently remains motionless and relies on cryptic coloration when threatened by approaching vehicles. This undoubtedly accounts for the high percentage of DOR specimens. Nonetheless, the species appears to be common throughout the New Mexico and Texas portions of the KRB, but was not found in the Oklahoma portion of the Grasslands.

Prairie Lizard (*Sceloporus consobrinus*)

The Prairie Lizard found during this survey on the KRB Grasslands is currently recognized as a single species, but two separate populations of this lizard were easily identified. Further taxonomic study of these lizards is needed, and may demonstrate that two distinct parapatric species occur on the Grasslands.

Thirty adult, subadult and newborn specimens were observed from 26 April to 9 September in two states, as follows: New Mexico 22, Texas 8. Of these thirty lizards, only one was AOR; none were DOR.

On 26 April, two Prairie Lizards, one adult and one subadult, were found under sheet metal at 2:30 pm on Unit 58 (New Mexico). On 27 April, a single adult was observed beneath a yucca plant at 10:00 am on Unit 16 (Texas). Two adults took refuge in yucca plants

on a north-facing hillside at 11:30 am on 28 April in Unit 49 (New Mexico). On 12 July, an adult male was observed basking on the stone foundation of an abandoned homestead at 11:00 am on Unit 9 (New Mexico). On 9 August, an adult was captured under a large rock on a west-facing outcrop at 10:45 am on Unit 65 (New Mexico). An adult female was observed basking on the west-facing cliff-bank of an arroyo on the morning of 10 August in Unit 71 (Texas). On 11 August, an adult and subadult were seen basking on west-facing boulders at 1:45 pm on Unit 19 (Texas). On the morning of 12 August at the same Unit, four newborns were discovered active on west-facing boulders. An estimated ten adults and newborns were found basking on south-facing boulders at Clayton Lake State Park on the morning of 13 August. On 3 September, an adult and a newborn were discovered at 10:00 am in Unit 68 (New Mexico) under boards near an abandoned homestead. An adult female was observed active on a north-facing ridge of rocks in Unit 49 (New Mexico) on the morning of 3 September. On 9 September, two adults were seen active during the morning on grassland above the Perico Creek streambed on Unit 33 (New Mexico).

In the Texas portion of KRB, the Prairie Lizard inhabits low-elevation grassland where it prefers open areas with short vegetation in which to hide. In the more rugged high-elevation areas in the New Mexico portion of KRB, this lizard prefers rock outcrops and boulders. Both low-elevation and high-elevation populations of these lizards probably opportunistically use cultural artifacts such as abandoned homesteads as basking spots and as cover from predators. Adults and subadults were recorded from 26 April to 9 September. Newborns were observed from 11 August to 3 September. The Prairie Lizard appears to be common throughout the New Mexico and Texas portions of the KRB, but was not found in the Oklahoma portion of the Grasslands.

Great Plains Skink (*Plestiodon obsoletus*)

The Great Plains Skink was the only member of its genus found on the KRB Grasslands during this survey. Eight adult, subadult and newborn specimens were observed from 24 May to 2 September in all three states, as follows: New Mexico 4, Oklahoma 2, Texas 2. Of these eight lizards, one was found DOR.

On 11 July, an adult Great Plains Skink was found beneath a piece of sheet metal at 11:25 am on Unit 11 (Texas). On 8 August, a subadult lizard was discovered beneath a piece of sheet metal near an abandoned homestead at 10:40 am on Unit 58 (New Mexico). Two newborn lizards were found impaled (apparently by a Shrike) on barbwire at 12:15 pm on 11 August in Unit 137 (Oklahoma). In addition, on the evening of 11 August an adult lizard was discovered beneath a rock near an abandoned homestead on Units 66 and 67 (New Mexico). On 12 August, a single newborn was found beneath a piece of sheet metal at 10:05 am on Unit 11 (Texas). On 2 September, an adult Great Plains Skink was found active near a gate post to Unit 42 (New Mexico) at 8:20 pm.

The Great Plains Skink is a semi-fossorial inhabitant of grasslands and canyons, and prefers to spend most of its time beneath rocks and other ground debris. Cultural artifacts such as sheet metal and boards provide excellent retreats for these lizards. Adults and subadults were recorded from 24 May to 2 September. Newborns were observed on 11 August and 12 August. Because of its secretive habits, this lizard is probably more common than our survey observations indicate.

Six-lined Racerunner (*Aspidoscelis sexlineata*)

The Six-lined Racerunner was the only member of its genus found on the KRB Grasslands during this survey. Seventeen adult and subadult specimens were observed from 1 May to 10 August in all three states, as follows: New Mexico 9, Oklahoma 2, Texas 6. Of these seventeen lizards, sixteen were found on roads in KRB; fifteen were AOR and one (6.2%) was DOR.

On 15 July, an adult Six-lined Racerunner was observed active in short grass near an abandoned stone building at 12:05 pm on Unit 54 (New Mexico).

The Six-lined Racerunner is an inhabitant of open areas, and prefers loose sand and soil in which to burrow. Adults were recorded from 1 May to 10 August. Subadults were observed on 7 August only. Of all the lizards on KRB, this extremely quick and agile species spends the most time on roadways, both paved and unpaved, in the heat of the day, chasing insects as it darts in and out of shade provided by low roadside vegetation. Despite this behavior, only one DOR specimen was found, a testament to the reflexes and speed of this lizard. Six-lined Racerunners appear to be common throughout the New Mexico and Texas portions of the KRB, but were not as numerous in the Oklahoma portion of the Grasslands.

Eastern Glossy Snake (*Arizona elegans*)

The Eastern Glossy Snake was the only member of its genus verified as present on KRB during this survey. A single juvenile specimen was found DOR at 8:50 pm on 11 August at Unit 6 in New Mexico.

This serpent is very nocturnal, and much effort was made to road-cruise late at night on a number of dates, particularly when relatively high overnight temperatures were predicted in July and August. The absence of additional observations is inexplicable.

Eastern Racer (*Coluber constrictor*)

The Eastern Racer was the only member of its genus found on the KRB Grasslands during this survey. Twenty adult, subadult and newborn specimens were observed from 10 July to 6 September in all three states, as follows: New Mexico 4, Oklahoma 8, Texas 8. Of these twenty snakes, fifteen were found on roads in KRB; six were AOR and nine (60%) were DOR.

On the morning of 14 July, an adult Eastern Racer was observed actively foraging at the edge of a marsh on Units 14 and 15 (Texas). On 10 August, an adult was discovered at 10:30 am on the grassy slope of an arroyo in Unit 71 (Texas). A shed skin was found on grassland in Unit 19 (Texas) on 4 September. On the morning of 6 September in Unit 113 (Oklahoma), a subadult of this snake was observed active around clumps of yucca and a newborn was discovered beneath a board in an arroyo.

The Eastern Racer is a common diurnal snake on KRB. Adults were recorded from 10 July to 10 August. Subadults were observed from 10 July to 6 September and newborns were found on 5 September and 6 September. This extremely quick and agile serpent appears to spend time on KRB actively foraging around aquatic situations and along arroyos. Eastern Racers appear to be more common throughout the lower elevations of the Oklahoma and Texas portions of the KRB; they were observably not as numerous in the higher elevations of the New Mexico portion of the Grasslands. Despite its quickness, this serpent suffered high mortality from vehicles as it crossed roads, paved and unpaved, throughout the KRB.



Figure 5. A subadult Great Plains Rat Snake (*Pantherophis emoryi*) from Union County, New Mexico. Photograph by Suzanne L. Collins.

Great Plains Rat Snake (*Pantherophis emoryi*)

The Great Plains Rat Snake was the only member of its genus verified as present on KRB during this survey. A single subadult specimen (Figure 5) was found under a rock beneath an undercut cliff along Perico Creek streambed on the morning of 9 September at Unit 33 in New Mexico.

The Great Plains Rat Snake is secretive and nocturnal, and much effort was made to road-cruise late at night on a number of dates, particularly when relatively high overnight temperatures were predicted in July and August. The absence of additional observations is inexplicable.

Western Hognose Snake (*Heterodon nasicus*)

The Western Hognose Snake was the only member of its genus found on the KRB Grasslands during this survey. Fifteen adult, subadult and newborn specimens were observed from 12 July to 9 September in all three states, as follows: New Mexico 12, Oklahoma 2, Texas 1. All fifteen of these serpents were found on roads in KRB; two were AOR and thirteen (86.6%) were DOR.

The Western Hognose Snake is a relatively common snake on KRB. Adults were recorded from 13 July to 9 September. Subadults were observed from 12 July to 9 September and newborns were found from 15 July to 7 August. Western Hognose Snakes appear to be more common throughout the higher elevations of the New Mexico portion of the KRB; they were observably not as numerous in the lower elevations of the Oklahoma and Texas portions of the Grasslands. Because of its slow-moving behavior, the Western Hognose Snake suffered increased mortality from vehicles as it crossed roads, paved and unpaved, throughout the KRB.

Coachwhip (*Masticophis flagellum*)

The Coachwhip was the only member of its genus found on the KRB Grasslands during this survey. Thirty-two adult, subadult and newborn specimens were observed from 27 April to 9 September in all three states, as follows: New Mexico 25, Oklahoma 1, Texas 6. Of these thirty-two snakes, twenty-seven were found on roads in KRB; three were AOR and twenty-four (88.8%) were DOR.

On the evening of 27 April, an adult Coachwhip was found beneath a piece of sheet metal at 5:30 pm on Unit 42 (New Mexico). On 12 July, an adult of this species was discovered under boards near an abandoned homestead at 5:30 pm on Unit 58 (New Mexico). On 8 August in Unit 49 (New Mexico) on the north-facing slope of a ridge, two large adults were observed between 11:00 am and

1:15 pm; one was beneath a large boulder and the other was resting in grass among boulders. The shed skin of an adult was discovered on the grassy slope of an arroyo on the morning of 10 August in Unit 71 (Texas).

The Coachwhip is an active, abundant diurnal snake on KRB. Adults were recorded from 27 April to 8 September. Subadults were observed from 9 July to 5 September and newborns were found from 3 September to 9 September. This swift-moving reptile appears to spend time on KRB around rock outcrops and abandoned homesteads, where it takes advantage of structural cover, both natural and cultural (i.e., sheet metal, boards). Coachwhips appear to be more common throughout the higher elevations of the New Mexico portion of the KRB; they were observably not as numerous in the lower elevations of the Oklahoma and Texas portions of the Grasslands. Despite its quick reflexes and speed, the Coachwhip suffered high mortality from vehicles as it crossed roads, paved and unpaved, throughout the KRB.

Gopher Snake (*Pituophis catenifer*)

The Gopher Snake (aka Bullsake) was the only member of its genus found on the KRB Grasslands during this survey. Thirty-nine adult, subadult and newborn specimens were observed from 30 April to 8 September in all three states, as follows: New Mexico 20, Oklahoma 11, Texas 8. Of these thirty-nine snakes, thirty-one were found on roads in KRB; nine were AOR and twenty-two (70.9%) were DOR.

At 6:20 pm on 12 July, an adult Gopher Snake was observed crawling in grassland near an abandoned homestead on Unit 58 (New Mexico). A shed skin of this serpent was picked up along the roadside in Texas (not on or near a USFS Unit) on 8 August. At Unit 65 (New Mexico) on 9 August, an adult Gopher Snake was discovered in a rock crevice on a west-facing outcrop at 11:00 am. On the morning of 13 August, a single adult was found active near the restroom facility at Clayton Lake State Park. On 6 September (between 10:30 am and 1:30 pm), three Gopher Snakes were found on Unit 113 (Oklahoma); one newborn was active around yucca plants, one adult was discovered under a board pile in an arroyo, and the shed skin of an adult was recovered. On 7 September, the shed skin of an adult was found along Corrupa Creek just north of Unit 63 (New Mexico) at 12:30 pm.

The Gopher Snake is an abundant snake on KRB. Adults were recorded from 30 April to 8 September. Subadults were observed from 9 July to 5 September and newborns were found on 4 September and 6 September. This robust, slow-moving reptile is ubiquitous on KRB, utilizing all habitats and cover thereon. Because of its large size and slow-moving behavior, the Gopher Snake suffered high mortality from vehicles as it crossed roads, paved and unpaved, throughout the KRB.

Ground Snake (*Sonora semiannulata*)

During this survey, two specimens of the Ground Snake were observed on the KRB Grasslands (one each on 28 April and 25 May) in New Mexico. Both snakes were found off-road in KRB.

A single adult specimen of the Ground Snake was found in a rock crevice at a roadcut at noon on 28 April at Unit 49. On 25 May, a subadult Ground Snake was discovered under a rock on the north-facing slope of an outcrop at 11:50 am on Unit 49.

The Ground Snake is secretive and fossorial. Much effort was made to discover more of these serpents by

lifting rocks throughout KRB during the entire survey. Because both specimens were discovered during the wetter spring months of April and May, it is possible that these snakes retreated deeper beneath the ground for the remainder of the survey (during the drier months of July, August and September) and thus became inaccessible to us.

Plains Blackhead Snake (*Tantilla nigriceps*)

The Plains Blackhead Snake was the only member of its genus verified as present on KRB during this survey. Four specimens of this small serpent were observed from 11 August to 6 September in two states, as follows: New Mexico 2, Oklahoma 2. Of these four snakes, two were found on roads in KRB; both were DOR adults.

On 6 September, two newborn Plains Blackhead Snakes were discovered under rocks on the north-facing slope of an outcrop above Agua Fria Creek at 10:30 am on Unit 113 (Oklahoma).

The Plains Blackhead Snake is secretive and fossorial, probably emerging above ground only after rains and at night. Adults were recorded from 11 August to 6 September. Newborns were found on 6 September. Much effort was made to discover more of these serpents by road-cruising and lifting countless rocks throughout KRB during the entire survey, to no avail.

Western Terrestrial Garter Snake (*Thamnophis elegans*)

The Western Terrestrial Garter Snake was observably the least abundant member of the two species of its genus verified as present on KRB during this survey. Two specimens of this snake were observed during September in New Mexico. Both reptiles were found off-road near KRB Units.

On 7 September, an adult Western Terrestrial Garter Snake (Figure 6) was discovered at an old bridge along Corrupma Creek at 12:30 pm near Unit 63. The snake had captured and was swallowing a Plains Leopard Frog. During the afternoon of 9 September, a newborn example of this species was observed active among cattails along Corrupma Creek near Unit 137.

The Western Terrestrial Garter Snake, like most of its genus, prefers habitats both in and along the edges of aquatic situations. An adult was recorded on 7 September; a newborn snake was found on 9 September. The Corrupma Creek drainage was by far the best habitat for this snake in KRB; the species may not be present at the lower elevations in the Oklahoma and Texas portions of the Grasslands.



Figure 6. An adult Western Terrestrial Garter Snake (*Thamnophis elegans*) from Union County, New Mexico. Photograph by Suzanne L. Collins.

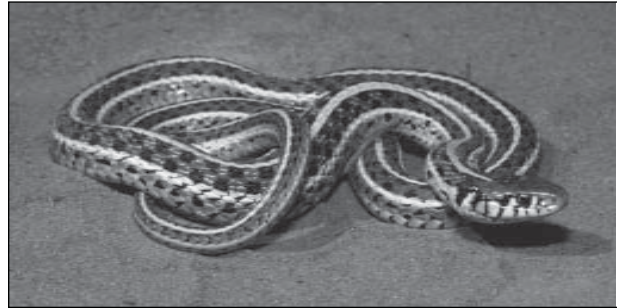


Figure 7. An adult Plains Garter Snake (*Thamnophis radix*) from Union County, New Mexico. Photograph by Suzanne L. Collins.

Plains Garter Snake (*Thamnophis radix*)

The Plains Garter Snake (Figure 7) was observably the most abundant member of the two species of its genus verified as present on KRB during this survey. Nineteen adult, subadult, and newborn specimens were observed from 25 May to 9 September in all three states, as follows: New Mexico 16, Oklahoma 1, Texas 2. Of these nineteen snakes, nine were found on roads in KRB; four were AOR and five (55.5%) were DOR.

At 12:45 pm on 25 May, an adult male and female of this species were observed mating in direct sunlight at the edge of a low bush in a dry streambed on Unit 48 (New Mexico). On 12 July, an adult Plains Garter Snake was found under a piece of sheet metal near an abandoned homestead at 5:30 pm on Unit 58 (New Mexico). On 11 August, a newborn specimen was captured on the edge of a grassland pond near an abandoned homestead at 8:20 pm on Units 66 and 67 (New Mexico). On 12 August, a subadult was found active around the edge of a small stock pond at 6:45 pm near Unit 49 (New Mexico). The shed skin of an adult snake was discovered near an abandoned homestead at 10:00 am on 3 September in Unit 68 (New Mexico). A subadult snake was caught while active around the edge of a marsh on Unit 14 (Texas) at 10:00 am on 4 September. Also on 4 September, an adult Plains Garter snake was observed in a cattail-filled stock pond at 2:10 pm on Unit 19 (Texas). On 9 September, two adult serpents were seen active among cattails along Corrupma Creek near Unit 137 (New Mexico) from 2:30 pm to 4:45 pm.

The Plains Garter Snake is a relatively common snake on KRB. Adults were recorded from 25 May to 9 September. Subadults were observed from 15 July to 4 September and a newborn snake was found on 11 August. On KRB, this reptile appears to spend its time around aquatic situations. Plains Garter Snakes appear to be more common throughout the higher elevations of the New Mexico portion of the KRB; they were observably not as numerous in the lower elevations of the Oklahoma and Texas portions of the Grasslands. Although a relatively fast-moving serpent, the Plains Garter Snake suffered high mortality from vehicles as it crossed roads, paved and unpaved, throughout the KRB.

Lined Snake (*Tropidoclonion lineatum*)

During this survey, eight adult and subadult specimens of the Lined Snake were observed on the KRB Grasslands from 26 April to 9 September in two states, as follows: New Mexico 7, Oklahoma 1. Of these eight snakes, five were found on roads in KRB; two were AOR and three (60%) were DOR.

At 2:30 pm on 26 April, an adult Lined Snake was found under a board on Unit 58 (New Mexico). On the afternoon of 9 September, two adults were discovered beneath a rock on a north-facing outcrop above Corrupa Creek near Unit 137 (New Mexico).

The Lined Snake is probably a relatively common snake on KRB. Adults were recorded from 26 April to 9 September. One subadult was observed on 15 July, and no newborns were discovered during the survey. On KRB, this secretive, small, slow-moving serpent appears to spend daytime beneath cover. Roadkill records show that it is active in the open at night. Lined Snakes appear to be more common throughout the higher elevations of the New Mexico portion of the KRB; they were observably not as numerous in the lower elevations of the Oklahoma and Texas portions of the Grasslands. Because of its slow, unhurried behavior, the Lined Snake suffered high mortality from vehicles as it crossed roads, paved and unpaved, throughout the KRB.

Prairie Rattlesnake (*Crotalus viridis*)

The Prairie Rattlesnake was the only member of its genus found on the KRB Grasslands during this survey. Seventy-four adult, subadult, and newborn specimens were observed from 26 April to 8 September in all three states, as follows: New Mexico 37, Oklahoma 13, Texas 24. Of these seventy-four snakes, fifty-nine were found on roads in KRB; twenty-two were AOR and thirty-seven (62.7%) were DOR.

At 11:30 am on 26 April, two adult Prairie Rattlesnakes were discovered beneath boards near a storm cellar on Unit 42 (New Mexico). On that same date at 12:30 pm, a single adult snake was observed sunning at the base of a fence post on Unit 53 (New Mexico). Returning to Unit 42 (New Mexico) at 5:30 pm on 27 April, we found another Prairie Rattlesnake beneath boards near a storm cellar (probably one of the two discovered there on 26 April). On 25 May, a single adult was uncovered beneath a piece of sheet metal along a fence line at 5:15 pm on Unit 11 (Texas). On 14 July, an adult of this species was encountered crawling through grass just east of the marsh on Units 14 and 15 (Texas) at 10:45 am. On 9 August, one adult rattlesnake was discovered in a rock crevice on a west-facing outcrop at 11:00 am on Unit 65 (New Mexico). On Unit 71 (Texas), three adults (at least one of which was a female) were observed basking among grass and loose rocks on the west-facing cliff of an arroyo from 10:45 am to 12:40 pm on 10 August (this locality may be a brooding site for the species). On 11 August at 7:10 pm, an adult serpent of this species was found beneath a board near a trench filled with old farm gear on Unit 137 (Oklahoma). On the morning of 7 September, two adults and a shed skin were encountered along west-facing rock outcrops above Corrupa Creek on Unit 65 (New Mexico). The largest Prairie Rattlesnake found during this survey was discovered dead on 8 September in Thompson Picnic Grove at 1:00 pm in Unit 11 (Texas). This snake had been killed by people, and its head and rattle were removed. The body of the snake measured slightly over forty inches in length, and the intact specimen probably exceeded 45 inches in total length.

The Prairie Rattlesnake is the most observably abundant snake on KRB. Adults were recorded from 26 April to 8 September. Subadults were observed from 28 April to 8 September and newborns were found from 28 April to 8 September. This robust serpent occurs everywhere on KRB. Because of its very slow-moving

behavior, the Prairie Rattlesnake suffered increased mortality from vehicles as it crossed roads, paved and unpaved, throughout the KRB.

Summary

A herpetofaunal survey of the Kiowa-Rita Blanca National Grasslands (KRB) of Union County, New Mexico, Cimarron County, Oklahoma, and Dallam County, Texas, was conducted from 25 April 1999 to 10 September 1999. Previously, fifty-one species of amphibians, turtles, and reptiles had been recorded from Union County, New Mexico, Cimarron County, Oklahoma, and Dallam County, Texas. Twenty-eight species of amphibians, turtles, and reptiles were confirmed from the KRB portion of those counties during this survey, and consisted of eight amphibians, two turtles, and eighteen snakes (Table 1). A total of 995 individual salamanders, frogs and toads, turtles, lizards, and snakes were observed and recorded during this KRB herpetofaunal survey. This does not count larval salamanders, choruses of frogs or toads and their tadpoles, and metamorphosing frogs and toads (numbers of which could only be estimated; estimates are included in each appropriate species account). Global Positioning System coordinates were taken for all observations made. A breakdown of the 995 observations by groups is shown in Table 2. Only a few of these 995 individual observations could be considered repetitious. That is, most do not represent a re-counting of the same individuals at sites visited on more than one occasion.

Three sensitive species were targeted for special attention, and our most intensive field work was conducted in an attempt to locate them. They were the Texas Horned Lizard (*Phrynosoma cornutum*), Longnose Snake (*Rhinocheilus lecontei*), and Western Ribbon Snake (*Thamnophis proximus*). Of these three reptiles, only one, the Texas Horned Lizard, was discovered on KRB during the survey. Although habitat for the other two reptilian taxa is present on KRB, they were not encountered during this survey. In particular, the Corrupa Creek and Perico Creek drainages of New Mexico contained excellent rock outcrops at their channel margins, and the Longnose Snake may eventually be discovered in both of those areas. In addition, both of those drainages and a marsh on Rita Blanca Units 14 and 15 in Texas contained good habitat for Western Ribbon Snakes. Future field work might confirm the presence of this taxon on KRB.

In addition to the three sensitive species targeted for special attention, eight species of amphibians, turtles, and reptiles were identified as marker species typical of KRB. Marker species are those taxa that are highly adapted to the KRB grassland environment, currently occur there in observable abundance far greater than others within their group, and are excellent subjects to assess on a regular basis in order to monitor the health of the herpetofaunal assemblage on KRB. These eight marker species are: Barred Tiger Salamander (*Ambystoma mavortium*), Woodhouse's Toad (*Anaxyrus woodhousii*), Plains Leopard Frog (*Lithobates blairi*), Ornate Box Turtle (*Terrapene ornata*), Lesser Earless Lizard (*Holbrookia maculata*), Coachwhip (*Masticophis flagellum*), Gopher Snake (*Pituophis catenifer*), and Prairie Rattlesnake (*Crotalus viridis*). These eight species appear to be widely distributed throughout KRB and their continued abundance would indicate an environmental health that would be beneficial to the rest of the herpetofauna (as defined by this survey).

Table 1. Twenty-eight species of amphibians, turtles, and reptiles verified from the KRB in Union County, New Mexico, Cimarron County, Oklahoma, and Dallam County, Texas. x = verified from within KRB administrative area in the respective county. Common names are those standardized and in current used nationwide, as compiled by Collins and Taggart (2002).

Verified Species	KRB Union County New Mexico	KRB Cimarron County Oklahoma	KRB Dallam County Texas
Barred Tiger Salamander	x	x	x
Plains Spadefoot	x	x	x
New Mexico Spadefoot	x		x
Great Plains Toad		x	x
Red-spotted Toad	x		
Woodhouse's Toad	x	x	x
Great Plains Narrowmouth Toad	x		
Plains Leopard Frog	x		x
Yellow Mud Turtle	x	x	x
Ornate Box Turtle	x	x	x
Eastern Collared Lizard	x		x
Lesser Earless Lizard	x	x	x
Texas Horned Lizard	x		x
Prairie Lizard	x	x	x
Great Plains Skink	x	x	x
Six-lined Racerunner	x	x	x
Eastern Glossy Snake	x		
Eastern Racer	x	x	x
Great Plains Rat Snake	x		
Western Hognose Snake	x	x	x
Coachwhip	x	x	x
Gopher Snake	x	x	x
Ground Snake	x		
Plains Blackhead Snake	x	x	
Western Terrestrial Garter Snake	x		
Plains Garter Snake	x	x	x
Lined Snake	x	x	
Prairie Rattlesnake	x	x	x
Total Species	27	18	20

Recommendations

A natural abundance of amphibians, turtles, and reptiles on KRB is a reflection of the health of its grassland ecosystem. Most of these creatures are mid-level items in the food chain of the KRB environment, preying on each other and/or selected species smaller than themselves (plants, insects, other invertebrates, and other small vertebrates) and in turn being eaten by larger and/or stronger predators (raptorial and wading birds, carnivorous mammals). Thus, they also provide an integral part of the balance within the grassland ecosystem, a balance that should be maintained in a natural state if the KRB Grasslands are to continue to display a normal diversity of wildlife.

People negatively (and usually unknowingly) impact the herpetofauna of the KRB in a manner that is clearly documented by this survey. Throughout KRB, roads have been built, many in grids that crisscross virtually all of the habitats used by amphibians, turtles, and reptiles. Although the human population in and around KRB is not numerically great (when compared to more urban areas), and the number of vehicles that use the roads might appear comparatively minimal, the impact of people and their vehicles on amphibians, turtles, and reptiles is significant. Of the 995 individual amphibian, turtle, and reptile observations amassed during this survey, 530 were of specimens crossing roads. Of those 530 individual specimens found on roads, 209 (39.4%) were killed by cars (Table 3). Although it is impossible to compare this mortality of wildlife to known numbers of

each species living on KRB, it definitely is an impact that these creatures did not experience prior to the invention of the automobile. Thus, positive recommendations for enhancement of habitat to counter this negative impact are appropriate, and are as follows:

1. *Increase the number of stock ponds maintained by windmills.* Although KRB has some marshes and streams, these are few and the streams are probably ephemeral. Since any aquatic situation on KRB is a potential breeding site for salamanders, frogs, and toads, every effort should be made to enhance such habitat in order to increase breeding and counter the loss of individuals killed trying to cross KRB roads. Consideration should be given to increased use of windmills on KRB to create stock ponds from overflow of stock tanks, and the resultant stock ponds should be fenced with sufficient perimeter to prevent nutrient overload by nearby cattle droppings.
2. *Stock tank enhancement.* All active stock tanks on KRB should have at least a single large log or board placed diagonally from their edge down into the water to allow trapped amphibians, turtles, and reptiles an opportunity to crawl up the log or board and escape. On a number of occasions during this herpetofaunal survey, trapped turtles and amphibians were encountered in stock tanks (both water-filled and dry) on KRB and had to be rescued; some were found dead.
3. *Increase cultural structure.* Many units on KRB contain abandoned homesteads in varying condition, but

Table 2. Group distribution of the 995 observations of amphibians, turtles, and reptiles made on the KRB during this herpetofaunal survey.

Group	Number of Observations
Amphibians	591
Salamanders	47
Frogs & Toads	544
Turtles	63
Reptiles	341
Lizards	124
Snakes	217

often with flat pieces of sheet metal or wood strewn about on the ground. This should be encouraged and, where possible, enhanced by additional sheet metal and wood, preferably some distance from nearby roads so that it does not detract from the aesthetic appearance of the KRB, and so that species using such cover are more removed from those roads. Such a positive policy would create more protective and isolated cover for amphibians, turtles, and reptiles, and thereby probably increase their number in an effort to offset those individuals killed trying to cross KRB roads.

4. *Vigilance against commercial collectors.* Ornate Box Turtles are being collected illegally throughout their

Table 3. Number of observations by species of adult, subadult, and juvenile amphibians, turtles, and reptiles observed on the KRB in Union County, New Mexico, Cimarron County, Oklahoma, and Dallam County, Texas. Does not include amphibian larvae, tadpoles, or choruses. AOR = alive on road; DOR = dead on road.

Species	Number observed Total/AOR/DOR
Barred Tiger Salamander	47/32/14
Plains Spadefoot	58/45/13
New Mexico Spadefoot	18/16/2
Great Plains Toad	55/36/8
Red-spotted Toad	3/0/0
Woodhouse's Toad	159/91/22
Great Plains Narrowmouth Toad	1/0/0
Plains Leopard Frog	250/1/0
Yellow Mud Turtle	5/0/1
Ornate Box Turtle	58/16/25
Eastern Collared Lizard	32/0/0
Lesser Earless Lizard	17/10/0
Texas Horned Lizard	20/10/6
Prairie Lizard	30/1/0
Great Plains Skink	8/0/1
Six-lined Racerunner	17/15/1
Eastern Glossy Snake	1/0/1
Eastern Racer	20/6/9
Great Plains Rat Snake	1/0/0
Western Hognose Snake	15/2/13
Coachwhip	32/3/24
Gopher Snake	39/9/22
Ground Snake	2/0/0
Plains Blackhead Snake	4/0/2
Western Terrestrial Garter Snake	2/0/0
Plains Garter Snake	19/4/5
Lined Snake	8/2/3
Prairie Rattlesnake	74/22/37
Total specimens observed	995/321/209

range for commercial sale abroad. Although we observed no such activity on KRB, U.S. Forest Service personnel should be aware that these turtles, as well as selected reptiles, may be targeted and negatively impacted by such unlawful activity. USFS personnel should be especially vigilant for individuals with snake hooks, steel picks, cloth bags, wooden crates in their possession, and any other equipment that might be used to capture and temporarily store amphibians, turtles, and reptiles. Such vigilance might prevent decimation of Ornate Box Turtle populations, and also help to keep population numbers higher in order to counter the number of individuals killed trying to cross KRB roads.

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Literature Cited

Collins, Joseph T. and Travis W. Taggart. 2002. Standard Common and Current Scientific Names for North American Amphibians and Reptiles. Fifth Edition. Publication of The Center for North American Herpetology, Lawrence, Kansas. iv + 44 pp.

Conant, Roger and Joseph T. Collins. 1991. Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America. Third Edition. Houghton Mifflin Company, Boston, Massachusetts. xx + 450 pp.

Conant, Roger and Joseph T. Collins. 1998. Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America. Third Edition Expanded. Houghton Mifflin Company, Boston, Massachusetts. xviii + 616 pp.

Degenhardt, William G., Charles W. Painter and Andrew H. Price. 1996. Amphibians and Reptiles of New Mexico. University of New Mexico Press, Albuquerque, New Mexico. xix + 431 pp.

Moriarty, Emily C., Suzanne L. Collins & Joseph T. Collins. 2000. Geographic Distribution: *Gastrophryne olivacea*. Herpetological Review 31(1): 50.

Webb, Robert G. 1970. Reptiles of Oklahoma. University of Oklahoma Press, Norman, Oklahoma. xi + 370 pp.

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.

Membership

All interested persons are invited to become members in the Society. Membership dues per calendar year are \$15.00 (U.S., Regular), \$20.00 (outside North America, Regular), and \$20.00 (Contributing) payable to the KHS. Send all dues to: KHS Treasurer (see inside front cover). All members are entitled to participate in Society functions, have voting privileges, and are eligible for Society, either gratis or at a discount.

Field Trips

The KHS hosts two or more field trips each year, one in the spring and one in the fall. Field trips are an enjoyable educational experience for everyone, and also serve to broaden our collective understanding of the distribution and abundance the amphibians, reptiles, and turtles in Kansas. All interested persons are invited to attend.

Editorial Policy

The Journal of Kansas Herpetology, issued quarterly (March, June, September, and December), publishes all society business.

Submission of Manuscripts

As space allows, *JKH* publishes all manner of news, notes, and articles. Priority of publishing is given to submissions of Kansas herpetological subjects and by KHS members, however all submissions are welcome. The ultimate decision concerning the publication of a manuscript is at the discretion of the Editor. Manuscripts should be submitted to the Editor in an electronic format whenever possible. Those manuscripts submitted in hard copy may be delayed in date of publication. 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. In the interest of consistency and clarity the common names used in *JKH* will follow the latest edition of standardized common names as organized by CNAH (www.cnah.org), which are also used in the prior, current and subsequent editions of *Amphibians and Reptiles in Kansas* (currently Collins and Collins, 1993).

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Pen and ink illustrations and photographs are also welcomed. Illustrations and photographs will be returned to the author only upon request.

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Individuals selected as Distinguished Life Members are chosen by the KHS Executive Council based on their distinguished research publications on Kansas herpetology.

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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 will be selected by the KHS Awards Committee. The award of \$100 is given annually. If no qualified proposals are submitted, no award will be made for that year.

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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, reptiles, and turtles 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. 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 native species of Kansas amphibian, reptile, and/or turtle and 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, reptiles, and/or turtles. The Collins Award is minimally \$1,000.00, and is neither a grant nor a scholarship. No nominations or applications can be made for it.

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