TRAVIS W. TAGGART

REPTILES AND AMPHIBIANS OF THE CIMARRON NATIONAL GRASSLANDS MORTON COUNTY, KANSAS

JOSEPH T. COLLINS
SUZANNE L. COLLINS

U. S. Forest Service
KPL Gas Service
Kansas Department of Wildlife & Parks
Kansas Herpetological Society
Single copies of this publication are available for $7.00 US including postage. Orders may be sent to: Cimarron National Grasslands, U.S. Forest Service, 242 Highway 56-E, P. O. Box J, Elkhart, Kansas 67950 USA.

Cover drawing is of a Woodhouse's Toad (*Bufo woodhousii woodhousii*) by Martin B. Capron, Oxford, Kansas.
Reptiles and Amphibians of the Cimarron National Grasslands, Morton County, Kansas

By

JOSEPH T. COLLINS
Museum of Natural History
The University of Kansas

and

SUZANNE L. COLLINS
School of Education
The University of Kansas
Lawrence

With

Photographs by the Authors
FORWARD

As a responsible business entity, KPL Gas Service is vitally involved in safeguarding the precious environment of America’s heartland.

Corporate environmental responsibility is more than raising the environmental consciousness of customers and employees or organizing recycling campaigns. At KPL Gas Service it has been, and will continue to be, “the way we do business every day.” Our Company has been an industry leader in innovative methods to reduce pollution associated with electric generation. Utilizing low-sulpher coal, limestone scrubber systems, and equipment to reduce nitrogen oxide emissions, we are committed to preventing acid rain and protecting our nation’s air and water. We also supply many of the homes and businesses in Kansas, Missouri, and Oklahoma with clean-burning, environmentally safe natural gas.

Investing in environmental protection technologies is not all that KPL Gas Service does. We have developed energy load management programs for our industrial, commercial, and residential customers that retard the rate of growth in demand for electricity; thereby forestalling the need for additional generating capacity development.

We have a vegetation management program which severely limits herbicide and pesticide use. We have developed a prototype environmental classroom at an urban Kansas City grade school. We have provided land adjacent to one of our power plants for the Dillon Natural Area in Hutchinson; and, in cooperation with the Kansas Department of Wildlife and Parks, we are developing the Jeffrey Energy Center property for multiple recreation and wildlife habitat preservation uses.

Energy development and delivery can occur in harmony with the environment. We are continually exploring ways to improve our environmental consciousness, and we take pride in supporting programs which improve the quality of life for all living things. As the scientific understanding of our environment increases, KPL Gas Service will continue to incorporate innovative technologies and management principles into our business. Our goal is to protect our environment and the creatures which inhabit it. This booklet on the Cimarron National Grasslands emphasizes one of the wild and natural areas of Kansas, demonstrates the diversity of wildlife found in that part of the state, and KPL Gas Service is pleased to co-sponsor it.

John E. Hayes, Jr.
Chairman of the Board, President
and Chief Executive Officer
KPL Gas Service
Topeka
Since the appearance of the two editions of *Amphibians and Reptiles in Kansas* (Collins 1974, 1982), much new information has accumulated on the distribution and habits of amphibians and reptiles native to our state, including those known to inhabit the Cimarron National Grasslands. Through the efforts of various field-oriented individuals, and a search of major herpetological collections, we have a more precise knowledge of the distribution of these animals in the southwestern part of the state. A number of articles have been published that refer to amphibians and reptiles in the Cimarron River Valley, and the data contained in them has permitted us to refine and clarify the information contained herein for most of the accounts of Grassland species. Any articles with direct reference to amphibians and reptiles in the Grasslands or in Morton County, Kansas, have been listed in the bibliography at the end of this book.

This book is about the 31 species of amphibians and reptiles known to occur, either now or in the past, in the Cimarron National Grasslands of Morton County, Kansas. We have written this book to provide knowledge about the amphibians and reptiles found in the Grasslands, so that residents of the southwestern part of the state and visitors to it will have a readily available source of current information about these animals. The bibliography, list of current scientific and common names, and endangered or threatened species designations, may be useful to biologists and historians, but the bulk of this book is written for the people who will visit the Grasslands, in the hope that they will be stimulated to learn more about the amphibians and reptiles of this rugged and scenic area, and will appreciate the natural place of these creatures in such an environment.

During the last two decades we have visited the Grasslands on a number of occasions, exploring its canyons and prairies, and observing amphibians and reptiles at every opportunity. All of the photographs for this book were taken by us, and most were of Kansas examples of amphibians and reptiles. We are indebted to a number of people for their companionship and field assistance. They are Ray E. Ashton, Frank B. Cross, Errol Hooper, Jr., Kelly J. Irwin, C. E. Judd, Al Kamb, Steve Kamb, Larry Miller, Randall E. Moss, Stanley D. Roth, and Terry D. Schwaner. We are most grateful to these individuals, for without their help and encouragement the writing of this book would have been much more difficult.

Many of our colleagues, both past and present at the University of Kansas, have assisted us in a variety of ways. Space does not permit us to thank them all, but we particularly wish to remember the late Edward H. Taylor, whose field work in Morton County in the 1920s provided the basis for this book.

Many individuals associated with museum and university herpetological
collections generously supplied us with lists of their holdings of specimens of amphibians and reptiles from the Cimarron National Grasslands, or loaned us material for examination. We are indebted to David Wake and Harry Greene (Museum of Vertebrate Zoology, University of California, Berkeley), Jerry Choate, E. D. Fleharty, and Michael Rush (Museum of the High Plains, Fort Hays State University, Kansas), Ronald Crombie, W. Ronald Heyer, Roy W. McDiarmid and George Zug (National Museum of Natural History, Smithsonian Institution, Washington, D. C.), Linda Maxson and Dorothy Smith (University of Illinois, Urbana), Jerry D. Johnson and Robert G. Webb (University of Texas, El Paso), Arnold Kluge (University of Michigan), Alan E. Leviton (California Academy of Sciences, San Francisco), C. J. McCoy (Carnegie Museum, Pittsburgh), Wilmer Tanner (Brigham Young University, Provo, Utah), Hymen Marx (Field Museum of Natural History, Chicago), Kelly J. Irwin (University of Georgia, Athens), and William E. Duellman and John E. Simmons (Museum of Natural History, The University of Kansas, Lawrence).

Personnel of the State Biological Survey of Kansas (Lawrence) and the Kansas Department of Wildlife and Parks (Pratt) were most helpful during the gathering of information for this book, and we thank them.

During our 1987 trip to the Grasslands, Joe Hartman, USDA Forest Service District Ranger, and his excellent staff, Dick Bennin, Nancy Brewer, and Dorothy Simmons, extended to us a variety of courtesies, services, and information, and to them we are most thankful. In particular, Joe Hartman encouraged us to write this book, and provided us with a wealth of information about the Grasslands.

Frank B. Cross, curator of fishes, and Philip S. Humphrey, director, Museum of Natural History, University of Kansas, gave us steady support in the preparation of this book. To these two colleagues we are deeply grateful. We are indebted to John E. Simmons (Museum of Natural History, The University of Kansas), who reviewed the manuscript in its entirety, and made numerous helpful suggestions. Finally, we express our fullest appreciation to the U. S. Forest Service, the KPL Gas Service, the Kansas Department of Wildlife & Parks, and the Kansas Herpetological Society, for the financial support necessary to publish this booklet.

Joseph T. Collins
Suzanne L. Collins
14 July 1990
INTRODUCTION

Worldwide, there are over 9,000 species of amphibians and reptiles, of which approximately 500 kinds are known to occur within the continental United States. The living amphibians and reptiles found in Kansas consist of 91 species of salamanders, frogs and toads, lizards, turtles, and snakes. Of these, 31 species have been verified as occurring on the Cimarron National Grasslands in Morton County, in the extreme southwestern corner of Kansas.

Amphibians and reptiles are vertebrates which means they have a backbone consisting of numerous vertebrae that provide their body with flexible support. They share this characteristic with fishes, birds, and mammals. Amphibians and reptiles are generally terrestrial, primarily living near or entering water only to catch food, escape predators, or to regulate their body temperature and water balance. They differ from birds and mammals in lacking feathers or hair, being covered instead with either moist skin (amphibians) or scales or shells (reptiles). Amphibians and reptiles are similar to fishes in that all three groups are ectothermic, which means their body temperature is primarily regulated either by the surrounding air temperature or by the temperature of the soil, rocks, or water where they sit or swim. This is not true of birds and mammals which are endothermic and can maintain a stable body temperature independent of the temperature of their surroundings. Since salamanders, frogs and toads, turtles, lizards, and snakes cannot regulate significantly their own body temperature, they are inactive during cold winter months. During this time they retreat beneath the ground or water to avoid freezing temperatures. Those individual animals which do not retire deep enough will die.

Amphibians and reptiles are generally shy and retiring. Most are completely harmless. Only one of the 31 species found on the Cimarron National Grasslands can be considered dangerous to humans, and it is the venomous Prairie Rattlesnake.

Accumulating information on all of the species of amphibians and reptiles known to occur on the Grasslands was accomplished by field work in the area, observing living animals, examining preserved museum specimens, gathering locality data, and searching for pertinent information in technical and popular articles written about these creatures.

A HISTORY OF GRASSLANDS HERPETOLOGY

Kansas became a state in 1861, but half a century passed before the first verified specimen of an amphibian or reptile was reported from Morton County — an anonymous donor presented the Museum of Natural History at The University of Kansas with a Great Plains Toad collected in the county in
August 1911. Although this was a herpetologically auspicious way to begin
the second decade of the 1900s, it would be 15 years before another amphibian
or reptile was collected in Morton County, and a quarter of a century before
this political unit in the extreme southwestern corner of the state would
become home to the Cimarron National Grasslands.

No concentrated field work on amphibians and reptiles was apparently
done in Morton County until Edward H. Taylor, a professor and herpetologist
at The University of Kansas, led a field party into the region during August of
1926. Additional trips were also made by him or his colleagues in June of
1927, June of 1928, and August of 1928. The herpetological results of these
trips were reported in a single paper by Taylor in 1929 in the _University of
Kansas Science Bulletin_, and is the first published information about the
amphibians and reptiles of Morton County. Taylor recorded 25 species from
the county, two of which, the Western Green Toad and the Checkered Garter
Snake, were new to the state. Apparently he overlooked a third addition to the
Kansas amphibian fauna, collected also in Morton County by his colleagues
in 1927. This was a single example of the Red-spotted Toad, discovered
amongst the collections, but whose presence in Kansas was not reported until
later by J. Eric Hill in a 1931 issue of _Science_.

Then came the drought of the 1930s, a time when the wildlife in the
Cimarron River Valley of Morton County suffered severe damage. A decade
of dust storms and hot winds sucked much moisture from the earth and its
sandy tributaries, and some animals, such as the Western Green Toad, the Red-
spotted Toad, and the Eastern Hognose Snake, apparently disappeared from
the area forever. Too much sod had been broken to plant too much wheat, and
the wheat eventually sold for too little. Action by the Federal Government was
needed, and the 75th Congress responded. In 1936 the government began
buying the worst of the “dustbowl” land, and by 1939 had acquired tens of
thousands of acres. This land, administered by the Soil Conservation Service
until early 1954, eventually came under the control of the U.S. Forest Service,
and in 1960 it was formally designated the Cimarron National Grasslands.
The Grasslands, composed of 108,175 acres primarily in Morton County and
spilling over slightly into neighboring Stevens County, has undergone a
tremendous rebirth, and virtually all of the native wildlife in the region
depends on it for seclusion and cover.

Even as the drought wreaked havoc on the Cimarron River Valley ecosystem,
at least one interested naturalist visited the parched region to explore for
amphibians and reptiles. The first Texas Longnose Snake was discovered
there on 27 May 1934 by Charles E. Burt of Topeka, and increased to 27 the
number of species known from the county. But, after 1940, as the river valley
continued its recovery, little field work was done on amphibians and reptiles.
Taylor’s (1929) list of 25 species remained the only basic information
available about these creatures on the Grasslands for three decades. Begin-
ning in the 1970s, individual species of amphibians and reptiles were added sporadically to the faunal list. The Bullfrog and Western Painted Turtle were first reported from the Grasslands in 1974, based on examples found by Stanley D. Roth and Ray E. Ashton (both of Lawrence) during July. In April of 1978 the first Blanchard’s Cricket Frogs were discovered by R. B. Wilhelm on the Grasslands at two different localities. And finally, our recent field trip yielded the latest addition to the fauna of this rugged wilderness, when Kelly J. Irwin and Errol D. Hooper, Jr., both excellent field biologists, discovered the first New Mexico Blind Snakes from the Grasslands (and Morton County) on 31 May 1987.

Our field trip, from 31 May to 5 June 1987, resulted in the collection of 20 of the 30 kinds of amphibians and reptiles previously recorded from the Grasslands, and added the New Mexico Blind Snake to that list. But the list is not complete. More field work may reveal yet other kinds of these creatures inhabiting the Cimarron River Valley. And as the search for them goes on, maybe more people will become interested in the amphibians and reptiles of this region — not only for the opportunity to visit and observe them in their native haunts, but for as long as knowledge of these creatures, as well as their cousins, the birds and mammals, will enable us to better understand and appreciate the great grassland prairies and sand rivers of southwestern Kansas. With that understanding and appreciation, the dustbowl will remain an historical anomaly — without it, the dark, dry windstorms will surely once again wreak destruction on this beautiful valley.

HOW THE SPECIES ACCOUNTS ARE ORGANIZED AND A CHECKLIST

The accounts in this book are presented in the same sequence as that used in Amphibians and Reptiles in Kansas (Collins 1982) within each main group (salamanders, frogs and toads, turtles, lizards, and snakes). Within each genus the species are in alphabetic order. Each account is a compact unit of information about an animal. These accounts will supply the basic information needed to help identify an amphibian or reptile and provide a view of its natural history or lifestyle. Each account of an animal gives its standard common name and information on its natural history, and is supplemented by a color photograph at the rear of the book.

Common and scientific names: Each account begins with the common name. All common names are those now standardized nationwide for U.S. species and subspecies by Collins (1990). Effort should be made by all schools and libraries to use only the standardized common name when referring to a particular amphibian or reptile. This prevents much confusion and allows for easy recognition of an amphibian or reptile in conversation and reading.
The scientific name is the formal name of each species and subspecies, and is included in this book only in the right column of the Cimarron National Grassland checklist of amphibians and reptiles that follows.

### AMPHIBIANS

#### Salamanders
Barred Tiger Salamander .................................. *Ambystoma tigrinum mavortium*

#### Frogs and Toads
- Plains Spadefoot .................................................. *Spea bombifrons*
- Great Plains Toad ............................................... *Bufo cognatus*
- Western Green Toad ............................................. *Bufo debilis insidior*
- Red-spotted Toad .................................................. *Bufo punctatus*
- Woodhouse’s Toad .................................................. *Bufo woodhousii woodhousii*
- Blanchard’s Cricket Frog ....................................... *Acris crepitans blanchardi*
- Plains Leopard Frog ............................................. *Rana blairi*
- Bullfrog .................................................................. *Rana catesbeiana*

### REPTILES

#### Turtles
- Common Snapping Turtle ........................................ *Chelydra serpentina serpentina*
- Yellow Mud Turtle ................................................. *Kinosternon flavescens flavescens*
- Ornate Box Turtle .................................................. *Terrapene ornata ornata*
- Western Painted Turtle .......................................... *Chrysemys picta bellii*

#### Lizards
- Northern Earless Lizard ........................................ *Holbrookia maculata maculata*
- Northern Prairie Lizard .......................................... *Sceloporus undulatus garmani*
- Texas Horned Lizard ............................................... *Phrynosoma cornutum*
- Great Plains Skink ................................................ *Eumeces obsoletus*
- Prairie Racerunner ............................................... *Cnemidophorus sexlineatus viridis*

#### Snakes
- New Mexico Blind Snake ........................................ *Leptotyphlops dulcis dissectus*
- Plains Hognose Snake .......................................... *Heterodon nasica nasica*
- Eastern Hognose Snake .......................................... *Heterodon platirhinus*
- Plains Blackhead Snake ......................................... *Tantilla nigricaps*
- Eastern Yellowbelly Racer .................................... *Coluber constrictor flaviventris*
- Western Coachwhip ................................................ *Masticophis flagelium testaceus*
- Kansas Glossy Snake ............................................. *Arizona elegans elegans*
Bullsnake ........................................... *Pituophis catenifer sayi*
Central Plains Milk Snake ................... *Lampropeltis triangulum gentilis*
Texas Longnose Snake ....................... *Rhinocheilus lecontei tessellatus*
Checkered Garter Snake ..................... *Thamnophis marcianus marcianus*
Western Plains Garter Snake ............... *Thamnophis radix haydenii*
Prairie Rattlesnake ........................... *Crotalus viridis viridis*

**ENDANGERED AND THREATENED SPECIES**

Under the authority of the Kansas Nongame, Threatened and Endangered Species Act, passed in 1975 by the Kansas Legislature, the Kansas Department of Wildlife and Parks has developed a list of Kansas amphibians and reptiles that may be in danger of disappearing from our state, or are in need of conservation. Although no kind of amphibian or reptile known to occur in Kansas is now considered endangered or threatened on the national level, the interest and concern inherent in creating a state list, particularly one that includes reptiles and amphibians, indicates a growing environmental sensitivity and awareness of the fact that these creatures deserve equal protection under the laws of nature and people.

The most recent version of the Endangered and Threatened Species List for Kansas includes the following six species that are known to occur on the Cimarron National Grasslands:

**Endangered: None**

**Threatened:**
- Western Green Toad
- Checkered Garter Snake
- Eastern Hognose Snake
- Kansas Glossy Snake
- New Mexico Blind Snake
- Texas Longnose Snake

Endangered status indicates a higher priority than designation as Threatened. The six species listed above are protected by state regulations, and a permit issued by the Kansas Department of Wildlife and Parks is required to collect them for scientific purposes. Indeed, of the six, the Western Green Toad and Eastern Hognose Snake may already be gone from the Grasslands, victims of the drought of the 1930s. In addition to these six, two species, the Red-spotted Toad and the Plains Hognose Snake, are considered by the state to be "in need of conservation," but this attention may have come too late for the Red-spotted Toad. It, too, may no longer occur on the Grasslands, yet another victim of the "dustbowl" days.
HOW TO FIND AND OBSERVE AMPHIBIANS AND REPTILES

There are numerous techniques for observing amphibians and reptiles. Each person, as experience is gained, becomes more competent at locating these interesting creatures. The following paragraphs, modified from Hobart M. Smith's fine 1956 book on Kansas amphibians and reptiles, describes the more common methods used to find and observe these animals.

At certain times of the year, especially in spring, much success can be realized by slowly driving along highways at night, carefully scrutinizing the area of the road lighted by the headlights. With experience, even the tiniest snakes can be seen by this means, and of course all manner of larger snakes and amphibians may be found. Success varies with the speed of driving, alertness of the observers, intensity of the lights, nature of the road, darkness of the night, air temperature, ground temperature, and humidity. Attention to these factors will result in more animals discovered, and will increase the enjoyment of an evening drive.

Many amphibians are easily discovered at night when they are breeding or prowling for food. Use of a flashlight is highly recommended as an aid in observing them. In the spring, choruses of frogs and toads will lead to their discovery; at such times it is profitable to drive about until voices of interest are heard. At other times any pond, marsh, or other body of water may be expected to contain individuals. Barred Tiger Salamanders may be found at the mouths of mammal burrows where they spend the day, but from which they may wander a short distance at night.

Flashlights are also valuable when observing nocturnal snakes on flat plains or grasslands and along streams. In these open areas one should watch both far ahead for fleeting glimpses of wary snakes, and near at hand for the motionless bodies of sluggish or temporarily blinded species. Snakes along the Cimarron River may remain motionless when approached at night, but at other times will glide quickly away.

Another productive field technique is the seining of marshes, ponds, and rivers. The tadpoles of frogs and toads, and sometimes Barred Tiger Salamanders and their larvae, may be found by this means. Any closely packed debris or vegetation present near the borders of the bodies of water should be hauled onto the shore and carefully inspected. This procedure is often extremely successful.

The most effective field technique is to keep a sharp eye on the entire surroundings and turn every conceivable type of cover. Stones, logs, cardboard, junk, tin, and any other movable surface cover may conceal some seldom seen reptile or amphibian. An alert observer never leaves cover unturned. In early spring, and to a lesser extent in the fall, one may expect good results from this effort. In the summer the ground under such cover is often
too dry and hot, and little will be seen. At such times of the year it is by far the best practice to be about early in the morning, before the heat of the sun has penetrated through cover to the ground. Often much more will be present under such cover early in the morning than at any other time.

In certain areas removal of debris from the ground reveals many specimens. Accumulations of vegetation, twigs, and even flood deposits often conceal reptiles or amphibians. Bales of hay drying in fields may conceal snakes and make it profitable for the observer to be present when the hay is being removed.

Inspecting the edges of streams or pools may reveal small holes in the mud or sand where the heads of turtles have been protruding. Feeling with the hands or feet about such spots often turns up turtles that would otherwise be difficult to find.

All amphibians occurring on the Grasslands may be captured and handled with safety. However, care should be taken to avoid any possible contact of the skin secretions with a person’s eyes, nose, or mouth, because the skin secretions of toads (genus *Bufo*) are poisonous if ingested and irritate mucous membranes.

No lizard in the state is venomous, but all can bite. On the Grasslands, only the Great Plains Skink has jaws powerful enough to deliver painful bites. All other lizards have jaws so small that no precaution is necessary.

Harmless snakes can be temporarily captured for closer examination by picking them up quickly by any part of the body — but don’t pick them up by the tail because this may hurt them. Be aware that any snake more than sixteen inches long may be capable of giving a painful bite, and some precaution may be desired. Gloves can be worn to protect against such bites.

Snakes, however, include the dangerous Prairie Rattlesnake, easily identified because it is the only snake on the Grasslands with a rattle. Wanton destruction of snakes (venomous or non-venomous) is deplorable, for all are of considerable value in the balance of nature and to people in controlling their really important enemies and pests among the insects and small mammals. It is unfortunate that people rarely appreciate the beneficial role of all snakes.
AMPHIBIANS

SALAMANDERS

BARRED TIGER SALAMANDER

The Barred Tiger Salamander is the only salamander found on the Grasslands. It is a chubby amphibian, easily identified by the yellow or orange-yellow bars or blotches which contrast with its robust black body. The bars or blotches on the sides of the body usually extend onto the belly, creating a yellow and black mottled pattern (Fig. 9, p. 45). During the breeding season females can be distinguished from males by their heavier bodies, and males have swollen cloacal lips. Females have slightly longer bodies than males, but males have proportionately longer tails than females.

Adult Barred Tiger Salamanders are 6–8 inches in total length. The largest terrestrial adult from Kansas was an 11½ inch female taken by Theodore White and Edward H. Taylor on 20 August 1926 from the 81 Ranch near Elkhart in Morton County.

The Barred Tiger Salamander occurs everywhere in Kansas from the Flint Hills westward, and is the only salamander found in the western half of the state. It was first discovered on the Grasslands in August 1926, and was observed as recently as 1979. Adult Barred Tiger Salamanders generally spend much of the summer and winter months beneath the ground, often in the burrows of other animals such as prairie dogs, where they avoid temperature and moisture extremes. These amphibians frequently emerge from their burrows at night or during rains, even when temperatures approach freezing.

Barred Tiger Salamanders do not appear to have a regular annual activity period, having been found in Kansas during most months of the year when temperatures are optimal. Grassland observations of this salamander have been made during April, May, July, and August, but this may reflect only the times observers have been present. Little is known of the size of this salamander’s home range.

After sufficient rains this amphibian seeks a breeding site, generally permanent shallow ponds, ditches, or back water pools along rivers in open prairie. Breeding probably occurs throughout the year, weather permitting. Courtship by the Barred Tiger Salamander takes place in water and consists of males and females rubbing bodies with occasional “nips” at each other. Much lashing about of bodies and tails may occur, and this “foreplay” eventually stimulates the male to swim in front of the female who follows with her snout near his cloaca. The male deposits a spermatophore which the female swims over and picks up with her cloacal lips. Eggs are deposited singly or in small clumps of two or three, and are attached to sticks and weed.
masses along water's edge. A female can lay up to 1000 eggs. The eggs hatch in a few weeks, and the gilled larvae may metamorphose into adults the same summer, over-winter until their second summer, or achieve sexual maturity as larvae and remain in that stage their entire lives. This latter condition, called neoteny, usually occurs when terrestrial conditions are harsh and habitat for salamanders is minimal.

The Barred Tiger Salamander is opportunistic in its feeding, preying upon any animal small enough for it to swallow, including insects, earthworms, fish, tadpoles, frogs, toads, other salamanders, and mice. Conversely, this amphibian keeps alert for snakes, large birds, and small mammals, all of which like to eat salamanders.

FROGS AND TOADS

PLAINS SPADEFOOT

The Plains Spadefoot differs from other Grassland frogs and toads in two ways—its eyes (which are vertically slit when exposed to strong light) and by the presence of a distinct black spur at the base of each hind foot. Overall, this amphibian is light to medium gray with irregular darker markings and two poorly defined light lines down the back, and a white belly (Fig. 10, p. 45). Males have dark throats during the breeding season, and females have heavier bodies than males.

Adult Plains Spadefoots normally are 1 1/2 to 2 inches in total length. The largest specimen from Kansas measured 2 1/2 inches.

The Plains Spadefoot ranges throughout western Kansas, and is seasonally abundant in the Grasslands. It is an inhabitant of prairies and open floodplains, and prefers areas of loose soil or sand into which it burrows during daylight hours, and from which it emerges in the evening to forage, particularly after rain. The first Plains Spadefoots recorded from the Grasslands were found in August 1926, and they were observed as recently as June 1987 during our expedition. Known months of activity on the Grasslands are May, June, July, and August.

The Plains Spadefoot is an opportunistic breeder in the Grasslands, emerging from its underground retreats for this purpose after any rainfall. Males loudly chorus for females around temporary rain-pools. The male mounts a female, clasping her around the groin with his front limbs. The female deposits the eggs and the male arches his body and fertilizes them in the water. Each female may lay up to 2000 eggs in masses of 10–250 each; they are attached to partly submerged vegetation or other protruding objects. After the eggs hatch, metamorphosis occurs at widely varying intervals depending on water temperature and oxygen content, and competition for food between
tadpoles. Evidently, tadpoles of this frog are cannibalistic under crowded conditions.

Beetles, crickets, grasshoppers, ants, and other small insects are the preferred food of this amphibian. It apparently has few predators, possibly because of its distasteful skin secretions.

GREAT PLAINS TOAD

The Great Plains Toad can be distinguished from other Grassland frogs and toads by the presence of bony crests between its eyes which merge on the snout to form a flat, raised knob or “boss,” and by its pairs of large black, dark green or dark brown blotches outlined with cream or yellow on the back and sides. Its belly is cream or yellow with few or no dark spots on the chest (Fig. 11, p. 46). Females of this species reach larger sizes than males. During the breeding season males have dark throats and horny pads on the inner fingers of each hand.

Adult Great Plains Toads normally are 2 to 3½ inches in total length. The largest specimen from Kansas measured 4 inches.

This toad is found throughout western Kansas. It is a resident of upland short-grass prairies and open floodplains. Like most toads, it remains hidden beneath the ground during the day, emerging on warm nights to search for food. The Great Plains Toad digs its burrows in the shape of a question-mark in bare, sandy areas, with the toad resting at the end of the upper curve. Statewide, it is active from April to September, spending the colder months beneath the ground. Great Plains Toads are apparently uncommon in the Grasslands. An unknown collector first found this animal in Morton County in August 1911. Since that initial record, only three additional examples of this toad have been encountered in the Grasslands, one in August 1926, another in June 1928, and the latest in July 1979. We did not observe it during our field work in 1987.

The Great Plains Toad is an opportunistic breeder, congregating at suitable breeding sites such as temporary pools. Once at the breeding site, males begin to chorus. They attract females and clasp them beneath their front limbs. The eggs, laid and fertilized in the water, are deposited in long strings. Each female may produce up to 20,000 eggs. After hatching, the young tadpoles grow in the pond until they metamorphose to begin life on land.

The Great Plains Toad eats large numbers of insects, a diet that makes it an important part of any environment.
WESTERN GREEN TOAD

Tiniest of Kansas toads, the Western Green Toad is very distinctive from its other Grassland relatives. Its head, body and limbs are green or greenish yellow with black spots or streaks which may form a network pattern, the only toad in Kansas so colored and patterned. The belly is yellowish and may or may not be darkly spotted (Fig. 12, p. 46). Males have dark throats during the breeding season. Females have yellowish throats and are larger in size than males.

Adult Western Green Toads are 1 ¼ to 1 ½ inches in total length. The largest specimen from Kansas was a 1¾ inch female collected by Theodore E. White and Edward H. Taylor on 15 August 1928 along the Cimarron River bluffs in Morton County.

The Western Green Toad is restricted in Kansas to the High Plains of the extreme western part of the state. It generally inhabits regions of open grass plains at elevations of 2000 to 2500 feet or higher and with an average annual rainfall of under twenty inches. It is very secretive and normally is only active at night. There is an unverified report that it was abundant during rainy weather in September 1886 in Morton County, along the Cimarron River, but the first actual Kansas specimens were collected in August 1926 by Edward H. Taylor. Some dead individuals (evidently killed by hail) were reported in a small temporary pool north of the Cimarron River in Morton County that same month. More examples of this small bright-colored toad were discovered beneath rocks on the north bluffs of the Cimarron River in August 1928, but these were the last ever seen from Morton County.

The Western Green Toad is an opportunistic breeder, and mating probably occurs throughout the warmer months during and after rainfall. This toad evidently breeds in shallow ditches, flooded fields, cattle tanks, and other temporary pools. The eggs are laid singly or in short strings which form clumps, and hatch into tadpoles which later metamorphose.

This small toad devours large quantities of small insects.

RED-SPOTTED TOAD

The Red-spotted Toad is unique among Grassland toads because the enlarged gland behind each eye on the neck is round, not elongate or “kidney-shaped,” and because it lacks bony crests between or behind its eyes. The head, limbs, and body of this small toad are a uniform brown or gray with small warts which may or may not be tipped with red. The belly is yellowish with small dark spots (Fig. 13, p. 47). Males have a dark throat during the breeding season, and are smaller than females.
Adult Red-spotted Toads are 1½ to 2½ inches in total length. The largest specimen from Kansas was a 2½ inch female.

This toad is restricted in Kansas to the Red Hills and extreme southern High Plains. It is a species that inhabits rocky areas of dry prairies and canyons. Like most toads, it is nocturnal. During the day it hides beneath rocks where the soil is fairly moist. This toad is often active after rainfall. Red-spotted Toads are apparently very rare in the Grasslands. Only one example has ever been found, and it was taken on the Wood Walsh Ranch prior to the 1930s drought.

The Red-spotted Toad is an opportunistic breeder. After any rainfall, but particularly during spring or summer, this species congregates in small numbers around canyon pools and streams to mate. Males begin calling and attract a female. The male mounts the female and secures his front limbs around her groin. The female deposits her eggs singly as the male fertilizes them. The eggs adhere to plants, other objects, and sometimes to each other to form a small, single-layered mass, or may be scattered randomly in shallow water. After hatching, the free-swimming tadpoles metamorphose to life on land.

Adults emerge from burrows shortly after sundown, and forage along canyon walls and in arroyos. This toad eats beetles, ants, and bees, with ants the preferred food.

WOODHOUSE'S TOAD

The Woodhouse’s Toad is the most abundant toad in the Grasslands, and differs from other frogs and toads found there because its bony crests, located behind the eyes, contact the enlarged, kidney-shaped gland below and behind each eye, and also because its light-colored belly has no spots or only one spot on the breast. Compared to the other toads of the region, it is quite dull in color and pattern, varying from gray or greenish gray to brown, with indistinct dark green-gray or dark brown spots. A dull white or yellowish stripe extends down the back. The belly is white or cream (Fig. 14, p. 47). During the breeding season, males have dark throats and an enlarged, horny pad on the inner finger of each hand; they are smaller than females.

Adult Woodhouse’s Toads are 2½ to 4 inches in total length. The largest specimen from Kansas was 4⅜ inches.

This species is found throughout western Kansas, and occurs anywhere that suitable habitat exists. It appears to prefer lowlands and sandy areas, and is generally the only toad found on the floodplains of streams and rivers. Like most toads, it remains hidden during the day and emerges at night to hunt for food. This species, like many other amphibians and reptiles in western Kansas, appears to use the burrows of small mammals as retreats. Statewide,
the Woodhouse’s Toad is normally active between March and late September, although dates of observation in the Grasslands fall in May, June, July, and August only. This amphibian was first discovered in Morton County on the 41 Ranch near Rolla on 11 August 1926. Most recently, we observed many examples of it during our expedition in June 1987.

This toad breeds opportunistically and appears to prefer pools on river floodplains. Male Woodhouse’s Toads congregate in small numbers at suitable breeding sites when rainfall and temperatures permit. Chorusing begins, a female is attracted, and the male toad mounts her, clasping her behind the front legs with his forelimbs. A female may lay up to 25,000 eggs. The eggs hatch and the free-swimming tadpoles metamorphose to life on land.

Bees, beetles, insect larvae, spiders, and ants are eaten by this toad. Its abundance, combined with its preferred diet of insects, makes it an economically important species which can consume as much as two-thirds of its own weight in insects in a single day.

**BLANCHARD’S CRICKET FROG**

Blanchard’s Cricket Frog is the smallest frog in the Grasslands, and is distinguished from other frogs and toads because it has a dark triangular mark between the eyes coupled with a stripe extending from behind the triangular mark (where it is widest) down the back (where it is most narrow). Two other characters useful in identifying this creature are an irregular, black, lengthwise stripe on the inside of each thigh, and the pattern on its upper lip, which exhibits alternating light and dark bars. The body, head, and limbs of this species are gray or brown. The triangular mark between the eyes is dark brown. The stripe down the back is quite variable, and may be whitish gray, green, brown, or reddish. The belly is white and the chin of males may be spotted and yellowish during the breeding season (Fig. 15, p. 48).

Adult Blanchard’s Cricket Frogs are the smallest amphibians in Kansas, and normally are 1 to 1¼ inches in total length. The largest specimen from Kansas was 1¾ inches.

The Blanchard’s Cricket Frog occurs throughout Kansas, but is least abundant on the arid High Plains. The activity period of these frogs is from March to November, but a few warm days will cause them to be active during the colder months. The preferred habitat of this tiny frog is muddy, beach-like edges of small, shallow streams and ponds. It avoids deep water. Apparently, this amphibian has a preferred air temperature range of 82–87°F. Blanchard’s Cricket Frogs are scarce in the Grasslands, and are relative newcomers. Only two examples of this frog have ever been recorded there, both taken on 8 April 1978, but each at a different location.

Blanchard’s Cricket Frogs congregate to breed from April to July around
ponds, marshes, roadside ditches, rain pools, springs, and streams. Warm temperatures are necessary to stimulate chorusing. A male calls, attracts a female, and mounts on her back, clasping her behind the front limbs with his front legs. The female lays eggs and the male fertilizes them in the water. Each female may lay up to 400 eggs, deposited singly or in small clusters of 2–7 eggs each. The eggs hatch after 3–4 days into tiny, solitary, secretive tadpoles. The tadpoles metamorphose within five to ten weeks.

Insects and spiders are the preferred foods of this amphibian. Based on the presence of bottom-dwelling aquatic insects found in the stomachs of these frogs, it is possible they feed both underwater and on the surface. Raccoons, skunks, and opossums probably prey on Blanchard's Cricket Frogs around ponds.

**PLAINS LEOPARD FROG**

The Plains Leopard Frog is distinct from other Grassland frogs and toads because it has an irregular pattern of distinct scattered spots on its back and sides, and a raised fold or ridge of skin on each side of the back running from behind the eyes down to the thighs where it is broken, the posterior portion being set inward toward the middle of the back. The head, body, and limbs are gray or tan with dark gray, brown, or black spots, sometimes narrowly edged with black. The hind limbs are darkly banded. The raised fold or ridge on each side of the back is light yellow, gray, or whitish. The belly is white, although the area around the groin may be yellowish (Fig. 16, p. 48). Adult females grow to a larger size than males.

Adult Plains Leopard Frogs are 2½ to 4 inches in total length. The largest specimen from Kansas measured 4 inches.

The Plains Leopard Frog is common throughout Kansas and is found in every aquatic situation, both permanent and temporary. It sometimes wanders a good distance away from water, and evidently has no home range or territory. Statewide, it is active from February to October within a wide range of temperatures. In the Grasslands, it has been observed from April to August. Like Blanchard’s Cricket Frog, sometimes it is active during the winter, but normally it digs into the mud and leaves of pond and river bottoms during winter months, and remains there until warmer weather. These frogs are abundant in the Grasslands. They were first recorded in Morton County in August 1926 by the Taylor Expedition, and most recently we observed them in the Grasslands in June 1987.

This frog normally begins breeding as early as February and may continue into summer. During the breeding season males begin to chorus, attract females, and mount them by clasping the females behind their front limbs. Each female may lay up to 6500 eggs in small masses attached to stems and plants just below the water's surface. The eggs hatch within three weeks, and
the tadpoles may metamorphose during the summer, or overwinter and transform the following spring.

The Plains Leopard Frog feeds primarily on insects. Its predators include raccoons, opossums, and skunks.

**BULLFROG**

The Bullfrog is the largest frog in the Grasslands. Its large size, generally uniform color, and the lack of a raised fold of skin on each side of the back running from behind the eye to the thigh, make it easy to identify. It does have a prominent raised fold of skin behind each eye, but the fold curves down around the large distinct circular ear membrane, instead of continuing down the back, as in the Plains Leopard Frog. The head, body, and front limbs of Bullfrog are green, olive, or brown with large or small indistinct darker spots or blotches. The hind limbs are darkly banded. The throat and belly are white or yellow with gray mottling (Fig. 17, p. 49). Males have much larger ear membranes than females.

Adult Bullfrogs normally are 5–6 inches in total length. The largest specimen from Kansas was a female with a total length of 7¼ inches. The heaviest Kansas example weighed 1½ pounds.

The Bullfrog is found throughout Kansas, but is least abundant on the High Plains. Statewide, this amphibian is active from March to October and is restricted to ponds and rivers. In the Grasslands, it has been observed from April to September. It may live also near permanently filled stock tanks. Bullfrogs apparently spend the winter months burrowed in mud beneath the water of ponds and rivers. Adult Bullfrogs respond to distress calls of smaller Bullfrogs and Plains Leopard Frogs for the purpose of preying on them. This frog is a recent addition to Grasslands wildlife. The Taylor Expedition did not observe it there from 1926 to 1928. This frog was first collected in the Grasslands from Middle Spring by Stanley Roth and Ray E. Ashton on 9 July 1974. It is not native to the area and probably the original population was introduced via fish-stocking efforts. We observed a number of these creatures during our field work in May and June 1987.

The Bullfrog breeds later than other frogs and toads in the Grassland. Males are territorial during the breeding season, and defend their territory against other Bullfrogs by kicking, bumping, and biting. Breeding occurs from late April until mid-July when warm temperatures stimulate the males to chorus around permanent ponds and pools. The male mounts the female, clasping her with his front limbs behind her front limbs. Females may lay up to 40,000 eggs in masses from 1–2½ square feet. The eggs hatch in four or five days and the free-swimming tadpoles spend three to fourteen months in the water before metamorphosing.
Other small frogs are an important part of the diet of the Bullfrog, but it is an opportunistic predator, eating anything that it can swallow.

This frog is considered a game animal in Kansas and can be hunted only from 1 July to 30 September with a valid Kansas fishing license. Its hind limbs are the well-known “frog-legs” served in many restaurants. Natural predators of the Bullfrog include opossums, raccoons, and skunks.

**REPTILES**

**TURTLES**

**COMMON SNAPPING TURTLE**

The Common Snapping Turtle is aquatic, and is distinguished from other Grassland turtles because it has a large upper shell when compared with its much smaller lower shell. Further, it has a very long (at least half the length of the upper shell) saw-toothed tail. The upper shell is tan or brown, and frequently is covered with mud and algae. The small lower shell is white or yellowish. Head, limbs, and tail are brown (Fig. 18, p. 49). Females reach a slightly larger size than males.

Adult Common Snapping Turtles have an upper shell length of 8–12 inches. The largest example from Kansas was a female with a shell length of 14 1/8 inches.

The hardy Common Snapping Turtle is plentiful throughout eastern Kansas, but less abundant on the arid High Plains; it is rare in the Grasslands. It is found in every aquatic situation, but prefers ponds with a soft mud bottom, and sunken logs and branches. It spends much of its time buried in mud in water about the same depth as its long neck, allowing it to raise its head to the surface to breathe. Common Snapping Turtles are active from March to November, digging beneath the mud of ponds and lakes during the coldest months of winter. The only verified record of this turtle from Morton County is a single example found by the Taylor Expedition on 15 August 1926, but it may persist in Middle Spring and in the waterfowl ponds along the Cimarron River.

Mating generally occurs at any time between April and November. These animals mate in the water when water temperatures are high enough. Courtship is variable, but usually a pair of turtles will face each other and wave their heads and necks sideways in opposite directions from each other. They may gulp water and violently expel it through their nostrils, causing turbulence at the surface. A male mounts a female by gripping her upper shell with his claws. He curls his tail beneath hers until their cloacal openings are in contact. The female may retain potent sperm for several years. She lays 25–30
white, round eggs (maximum is 83) and may produce two clutches per season. The eggs are laid on land in nests dug by the female. The eggs hatch in 55–125 days, depending on temperature and humidity, and the young turtles have a shell length of 1–1½ inches at birth.

The Common Snapping Turtle is evidently omnivorous, eating whatever is available including aquatic plants, insects, crayfish, earthworms, clams, snails, fish, frogs, toads, salamanders, snakes, other turtles, birds, small mammals, and carrion.

Common Snapping Turtles have a nasty disposition. Large individuals exhibit an unhappy temper when cornered on land, and can inflict a painful bite if approached too closely. In addition, when disturbed, this turtle emits a foul-smelling musk. But despite its annoying habits it is excellent to eat, and is probably the only reptile in Kansas of any commercial value due to its abundance and large size. Predators on the eggs and young of the Common Snapping Turtle are numerous, and include skunks, raccoons, crows, herons, hawks, bullfrogs, large fish, and snakes. The main predators of adults are humans.

YELLOW MUD TURTLE

The Yellow Mud Turtle is aquatic, and can be easily identified because its short tail ends in a horny, claw-like tip, and because its lower shell has a distinct movable hinge. The only other Grassland turtle with a movable hinge on the lower shell is the terrestrial Ornate Box Turtle. The upper shell of the Yellow Mud Turtle is plain brown or olive-brown with dark brown margins around each scute. The lower shell is yellowish-brown with dark brown margins around each scute. The head, limbs, and tail are grayish, and the chin is yellow (Fig. 19, p. 50). Adult males have longer and thicker tails, and grow slightly larger than females.

Adult Yellow Mud Turtles normally have an upper shell length of 4 to 5 inches. The largest individual from Kansas was a male with a shell length of 5½ inches.

In aquatic situations in the Grasslands, the Yellow Mud Turtle does well. It prefers quiet ponds with a mud or sand bottom, and has been found in sloughs, backwaters, swamps, sinkholes, rivers, cisterns, roadside ditches, and cattle tanks. Yellow Mud Turtles are active at air temperatures from 65–90°F. They have been found between May and August in the Grasslands, but are probably active as early as April and as late as September. Apparently their daily activity is divided into two periods — from afternoon to dusk and from midnight to sunrise. This species may forage on land, and is frequently found crawling from one body of water to another. It is also known to bask on brush or logs at the waters edge. During winter, Yellow Mud Turtles select various
burrows in which to reside. They sometimes burrow in mud above or below water, or reside in muskrat dens or old stump holes. This is the most common aquatic turtle in the Grasslands. It was first discovered in Morton County on 15 August 1926 by the Taylor Expedition, and most recently observed by us during June 1987.

Breeding in this species probably takes place before June of each year. Courtship involves the male approaching other turtles from the rear and smelling their tails, evidently to determine sex. Upon discovering a female, the male moves to her side and nudges the underedge of her shell with his nose. The male mounts atop the female by clasping her shell with his clawed feet. He pinions her tail up between his rear legs and positions his cloaca to hers. During copulation the male extends his head forward and rubs and bites the females head. Nesting probably occurs in June. Females lay one to four elongate, white eggs, which hatch within three months.

Yellow Mud Turtles are omnivorous, eating insects, crayfish, snails, earthworms, amphibians, dead fish, and aquatic vegetation. Their acute sense of underwater smell aids them in locating food. Fish, other turtles, and snakes eat young Yellow Mud Turtles. Humans are the only major predators on adults. This turtle can emit a foul-smelling musk when excited.

ORNATE BOX TURTLE

The Ornate Box Turtle is the official State Reptile of Kansas, having received this formal designation by action of the Kansas Legislature and the Governor in April of 1986. Because of this legislation, it joins our other state symbols, the Buffalo (State Mammal), Meadowlark (State Bird), Honeybee (State Insect), Cottonwood (State Tree), and Common Sunflower (State Flower), as representatives of natural Kansas.

This terrestrial creature has distinct light radiating lines on the upper and lower shells, a pattern and color possessed by no other Grassland turtle. The upper shell is dark brown or reddish brown (sometimes with a yellow line down the middle), and both upper and lower shells are covered with yellow or yellow-orange radiating lines. The lower shell has a movable hinge, more movable than that of the Yellow Mud Turtle. The head and limbs are dark brown, gray, or greenish, and are covered with yellow or orange-yellow spots. The dark tail may have a yellow stripe on its upper surface (Fig. 20, p. 50). Adult males have red eyes whereas those of females are yellowish brown. Females grow slightly larger than males.

Adult Ornate Box Turtles normally are 4 to 5 inches in upper shell length. The largest example recorded from Kansas was a female with an upper shell length of 6 1/2 inches.

Ornate Box Turtles are found throughout Kansas, reaching their greatest
abundance on the western open prairie. This turtle is normally active at air temperatures ranging from 60–95°F, and is particularly observable in the Grasslands during the hot months of June, July, and August. With the approach of winter, it digs beneath the ground or enters the dens or burrows of other animals. In open grasslands it may dig to a depth of 18 inches. Ornate Box Turtles are diurnal, spending the daytime basking, feeding, and at rest. These reptiles have an individual home range of about five acres, but are not possessive of this plot of land, several turtles utilizing the same general area.

Mating in Ornate Box Turtles occurs most commonly in the spring and autumn, but may take place throughout the summer. In courtship the male mounts the female, hooking his claws on the rear edge of her lower shell. The female secures the males hind limbs by wrapping her own about them. The male positions his cloaca against that of the female and copulation occurs. Frequently, when dismounting from the female, the male will fall on his back, but generally he can right himself with little difficulty. Nesting and egg deposition occur at least once a year in all females, and probably a third of the females lay a second clutch in the same season. Nesting is most common in June, but may occur from May to July. Each female lays from two to eight elongate, white eggs that hatch in a little over two months. The young become sexually mature at 7–8 years of age, and may live to over thirty years of age.

The Ornate Box Turtle is primarily carnivorous, feeding on beetles, caterpillars, grasshoppers, cicadas, earthworms, and dead vertebrates. Also, it is fond of berries and other fruits. People appear to be the chief predators of our State Reptile, slaughtering them in great numbers on Kansas roads and highways. Other mammals, such as coyotes and skunks, prey on this turtle for food.

**WESTERN PAINTED TURTLE**

The aquatic Western Painted Turtle is distinguished from other Grassland turtles because it has a pattern of bright red on the edges of the lower shell. The upper shell is gray, brown, or green with red markings around the edge. The lower shell is yellow with a bold gray and red pattern. Head, limbs, and tail are dark gray or green with yellow lines (Fig. 21, p. 51). Adult males are smaller than females and have very long claws on the front feet.

Adult Western Painted Turtles normally are 4 to 7 inches in upper shell length. The largest individual from Kansas had a shell length of 8 ½ inches.

The Western Painted Turtle is abundant throughout Kansas, but is least common on the southern High Plains. This reptile resides in slow-moving shallow rivers and shallow ponds having soft bottoms with aquatic plants and emergent logs and branches on which to bask in the sun. Usually it is active at air temperatures of 68°F or above, but it has occasionally been observed
actively swimming at a temperature as low as 50°F. During the cold winter months it burrows as deep as 1½ feet beneath the mud in the bottoms of streams and ponds. Throughout its active season, the Western Painted Turtle is diurnal, sleeping at night beneath the water on submerged logs or on the bottom. It divides its daytime hours between basking and feeding. The Western Painted Turtle is uncommon in the Grasslands, and was only recently discovered there. The shell of a single individual was found by Stanley D. Roth and Ray E. Ashton along the Cimarron River on 10 July 1974.

Mating in this species normally occurs from March to June, but may continue into the summer. Courtship starts with a slow pursuit of the female by the male. Upon catching up with her, the male faces her and strokes her head and neck with the long claws on his front feet. The male periodically swims away as if trying to entice the female to follow. After a period of time the female sinks to the bottom and the male swims down and mounts her back. He secures himself on her upper shell with his claws, curls his tail down under hers until their cloacal openings meet, and copulation occurs. A female lays 4–20 elongate, white eggs in a nest, sometime between May and July. The nest is dug in soft soil by the female, who uses her hind limbs to excavate the earth. The eggs generally hatch in 2–2½ months, and the young turtles dig free of the nest and rapidly crawl to the water. However, the eggs may not hatch immediately, or if they do, the young may not emerge until late fall during cold weather. In the latter case they remain in the nest during the winter and hatch or emerge the following spring.

The Western Painted Turtle is omnivorous, but the young are more carnivorous than adults. This creature eats plant and animal matter. Enemies of adult Western Painted Turtles are primarily humans and their pesticides. The eggs and young are eaten by squirrels, skunks, badgers, raccoons, muskrats, crows, snakes, other turtles, bullfrogs, and large fish.

LIZARDS

NORTHERN EARLESS LIZARD

The Northern Earless Lizard differs from all other Grassland lizards because it lacks an ear opening on each side of the head. The head, body, limbs, and tail of this species are light gray or gray-brown. The upper surface of the neck, back and tail base are patterned with 9–14 dark brown spots. The belly is grayish and unmarked except for two or three blue-bordered, short, black bars which barely extend up onto the sides of the lizard (Fig. 22, p. 51). Adult males have grayer throats than females. Pregnant females develop an orangish coloration on their sides.

Adult Northern Earless Lizards normally attain 4 to 5 inches in total length.
The largest specimen from Kansas was a female with a total length of 4½ inches.

The Northern Earless Lizard is found in Kansas from the western edge of the Flint Hills west and gradually northward onto the High Plains. It prefers flat, sandy, or gravelly areas of loose soil with little or no vegetation. Statewide, this species is active from April to September when optimal temperatures prevail. In the Grasslands, it has been observed abundantly from May to August. The colder months are spent beneath the ground to avoid adverse temperatures. This reptile was first discovered in Morton County in June 1925. More recently, we observed it to be common in the Grasslands in June 1987.

Northern Earless Lizards love to bask in the sun, and spend most of their time engaged in this and foraging for food. During the extremely hot afternoon, these lizards frequently retreat to the shade of burrows. Like many lizards, this species has a home range and is territorial. Males of this species display dominance by executing "push-ups" or "bobbing" in a distinct cadence.

A courting male Northern Earless Lizard rapidly nods his head upon approaching a female and may nudge her on the side or beneath the tail with his nose. The male then grasps the receptive female by the loose skin between her shoulders and curls the rear of his body beneath her tail until their cloacae meet. Females lay two to ten eggs during May or June. The eggs hatch in one to two months.

Three-quarters of the diet of this lizard consists of grasshoppers and bugs. Evidently this species consumes large numbers of harmful insects, making it beneficial to farmers. Predators of the Northern Earless Lizard include birds, small mammals, snakes, and larger lizards.

NORTHERN PRAIRIE LIZARD

Unlike the Northern Earless Lizard, the Northern Prairie Lizard has an ear opening on each side of the head. Its upper body is covered with rough, raised scales, like a Texas Horned Lizard, but it lacks horns sticking out from the back of its head. The head, body, limbs, and tail vary from gray to brown, with a pattern of narrow, dark irregular crossbands, dark spots, or dark and light stripes on the back. The belly and throat are gray-white, sometimes with bright bluish green or blue patches on each side (Fig. 23, p. 52). These patches are more brilliant in males and indistinct or absent in females. Females grow larger than male.

Adult Northern Prairie Lizards normally are 4 to 6½ inches in total length. The largest example of this species from Kansas was a female with a total length of 6½ inches.

In Kansas, the Northern Prairie Lizard is found from the western edge of the
Flint Hills to the Colorado border. It inhabits low, sandy regions and frequently is found along rock outcrops. Statewide, these lizards are active from March to October at temperatures above 70°F. In the Grasslands they have been observed as abundant from April to August. During winter months they burrow beneath the ground to avoid cold temperatures. This lizard is active during the day, and has a small home range of one-tenth of an acre. Each male generally has a harem of two to three females within his territory. The Northern Prairie Lizard spends much time basking on rocks and looking for food. In the Grasslands, it appears to be active from late morning to early afternoon, avoids the extreme mid-afternoon heat, and is again active in late afternoon. This reptile was first found in Morton County by the Taylor Expedition in August 1926. We observed it frequently in June 1987.

Breeding takes place during the warm months from May to August, and females probably produce two or three clutches of eggs per season. Courtship involves the male quickly approaching the female, mounting her, and curling his hindquarters beneath her tail until their cloacae meet and copulation occurs. Four to seventeen eggs are laid in nests in loose soil, and hatch in about two months.

The Northern Prairie Lizard feeds on ants and other small insects, as well as spiders. Predators of this lizard include larger lizards, snakes, birds, and small mammals.

**TEXAS HORNED LIZARD**

The squat, chubby Texas Horned Lizard is the only Grassland lizard with large spines projecting out from the back of its head. The general color of this lizard ranges from yellowish brown to reddish brown. There is a dark brown blotch on each side of the neck and a series of dark spots on each side of the back separated by a yellow or white line. The belly is white with small gray spots (Fig. 24, p. 52). External sexual differences are few, but females grow slightly larger than males.

Adult Texas Horned Lizards normally are 2½ to 4 inches in total length. The largest specimen from Kansas was a male with a total length of 5½ inches. This lizard occurs across southern Kansas from the Cherokee Plain west to the High Plains (south of the Arkansas River). It generally inhabits dry, flat areas with a sandy or rocky surface and little vegetation. Statewide, it is active from April to September — in the Grasslands it has been observed during the hot months of June, July, and August. This reptile is strictly diurnal, spending the day basking in the sun, foraging for food, or hiding just below the soil surface. Its coloration makes it difficult to observe. Little is known of its daily cycle, but its temperature preference may be higher than that of many other lizards. This lizard is not territorial. It was first found in Morton County by the Taylor Expedition in July 1926, and more recently observed by us to be abundant in the Grasslands in June 1987.
Although this lizard is well known to many people, few observations on its breeding habits have been made. Mating probably occurs no earlier than May or June. Courtship is unknown. Each female probably lays a single clutch of eggs per season (with an average of 22 eggs per clutch), in a nest dug in loose soil or under rocks.

Ants make up the major part of this lizard’s diet, but other small insects and spiders are also eaten. Although the Texas Horned Lizard is widespread in Kansas, it should not be kept as a pet. These lizards are difficult to maintain in captivity, are not good pets, and most captive individuals die from improper care.

The Texas Horned Lizard, when surprised or disturbed, may squirt a small stream or several drops of blood from its eyes. This behavior occurs naturally when the lizard’s head reaches a higher temperature than that of the body, and release of the blood in this manner permits the lizard to achieve a cooler overall temperature. When handled, any slight pressure may induce an overheated lizard of this species to exhibit this behavior. This ability by the Texas Horned Lizard to eject blood from the eyes has been presumed to be a defense mechanism in which the blood was considered offensive to a potential predator. Under captive conditions, we observed coyotes biting this lizard, drawing blood from the head, and licking the blood before consuming the lizard. The coyotes showed no ill effects. We doubt that the blood of a Texas Horned Lizard tastes bad to its predators — apparently the head spines don’t offer much protection either, at least not from coyotes.

GREAT PLAINS SKINK

The sleek and shiny Great Plains Skink differs from other Grassland lizards by its having flat, smooth scales on its body, a pattern of dark spots that create a striped appearance, and by having the scale rows on each side of the body between the front and hind limbs slanting upward from front to back. The head, body, limbs, and tail are gray with dark borders on each scale that create a light and dark striped pattern. The unpatterned belly is whitish gray (Fig. 25, p. 53). Young are jet black, have blue tails, and display small bluish-white to orange spots on the sides of the head. Distinguishing between males and females is extremely difficult. During breeding the heads of males are slightly swollen.

Great Plains Skinks are the largest of North American skinks. Adults normally are 6½ to 9 inches in total length. The largest specimen from Kansas was a female with a total length of 13¾ inches.

The Great Plains Skink is found throughout Kansas, where it lives on open rocky hillsides with low vegetation. It is active from March to early October, providing high enough temperatures prevail. Only seven examples of this
lizard have been recorded from the Grasslands, all during May and June. This probably reflects a combination of a lack of field work and the secretive nature of this animal. During the winter this species burrows beneath the soil or into crevices where it remains deep enough to avoid freezing temperatures. Adult males emerge earlier in the spring than females. Great Plains Skinks generally remain hidden beneath rocks. They rarely bask in open sunlight, evidently obtaining sufficient heat beneath sun-warmed rocks. This species has an average home range approximately fifty feet in diameter. First discovered in Morton County in 1926 by the Taylor Expedition, this reptile was observed by us as fairly common in the Grasslands in June 1987.

Great Plains Skinks breed in May. Courtship is brief, consisting of the male approaching the female and touching her with flicks of his tongue. After pursuit, the male grasps the female with his mouth, bites the loose skin on her shoulder, and loops his hindquarters beneath hers. Copulation occurs for several minutes. Evidence indicates that some females do not breed each year. Pregnant females dig deep burrows beneath large boulders. In the nest a female lays about eleven eggs and remains with them during their one to two month incubation period.

The Great Plains Skink eats beetles, roaches, grasshoppers, spiders, and snails. In captivity it will eat small rodents and other lizards. Predators of the Great Plains Skink consist of snakes, birds, and small mammals. Mortality from predation in this species is evidently slight due to its habit of remaining hidden beneath rocks during much of its yearly activity period.

PRAIRIE RACERUNNER

The swift Prairie Racerunner has smooth, tiny granular scales on the back which are much smaller than those on the belly, and seven light stripes running down the back, one in the middle and three on each side. By these characters it can be told from other Grassland lizards. The stripes range from greenish blue to yellow, and may be indistinct in older adult males. Areas between the stripes vary from brown to dark green. The throat, chest, and forward sides of the body are suffused with bluish green, particularly in males. The tail is brownish (Fig. 26, p. 53). Adult males have a broader head than females, and females are heavier-bodied.

Adult Prairie Racerunners normally are 6–8 inches in total length. The largest specimen from Kansas was a male with a total length of 9 inches.

This reptile is abundant in the Grasslands, where it prefers dry, open, sandy areas with little vegetation. It also inhabits open, rocky, grazed regions, and is often abundant in sandy basins. In order to remain active, this lizard requires warmer weather than most other Kansas species. It prefers an optimal air temperature near 93°F and is active from May to September. Prairie Racerun-
ners are fast, nervous animals active only during the day; they exhibit a peak of activity during the hottest, sunniest part of the day. During extreme heat, however, even this lizard rests in shade or in small burrows. These reptiles have a home range of less than one-fourth of an acre, and are not territorial. This lizard was observed by us to be common in the Grasslands in June 1987; the Taylor Expedition first found it in Morton County in June 1927.

Prairie Racerunners mate in May and June. Courtship initially involves the male displaying his brightly colored throat and chest. He bites the female on the neck or flank, pinions her, and twists his rear body around and under her tail until their cloacal openings meet. Copulation is brief, lasting only a few minutes. Female Prairie Racerunners nest in June or July and may produce more than one clutch of eggs per season. The eggs are buried a few inches deep in sandy soil and hatch in two months. Each female lays two to six white eggs with an average of three per clutch.

Spiders, snails, and insects such as grasshoppers and moths are eaten by this lizard. Predators of the Prairie Racerunner include snakes, birds, and small mammals.

SNAKES

NEW MEXICO BLIND SNAKE

The New Mexico Blind Snake looks like a pinkish tan worm. It is distinguished from other Grassland snakes by its belly scales, which are the same size as the scales on its upper body. The eyes of this subterranean reptile are tiny black dots (Fig. 27, p. 54). Males have slightly longer tails than females.

Adult New Mexico Blind Snakes normally are 5 to 8 inches in total length. The largest example from Kansas was a female with a total length of 10½ inches.

This snake is found along the southern border of Kansas from the Red Hills of Sumner County west to the Cimarron National Grasslands. New Mexico Blind Snakes are secretive creatures that frequent ant burrows. They prefer moist areas and sometimes are found in loose soil or sand beneath rocks. Nothing is known of the annual activity cycle of this snake. This creature uses an interesting defensive technique to withstand attacks by ants. If bitten or attacked, it assumes a ball-like coil and writhes, smearing cloacal fluid over its body; the fluid repels further ant attacks. The New Mexico Blind Snake was first discovered in the Grasslands during our 1987 trip. Two of our field trip participants, Kelly Irwin and Errol Hooper, Jr., found four examples of this secretive reptile on 31 May.

Because of its subterranean habits, nothing is known of courtship and mating in this snake. Females brood their eggs in small colonies within
cavities beneath the ground at depths ranging from 18–30 inches. New Mexico Blind Snakes feed on the eggs, pupae, and larvae of ants, and on termites. Predators of this reptile include other snakes, birds, and small mammals.

**PLAINS HOGNOSE SNAKE**

The Plains Hognose Snake is distinguished from other Grassland snakes by its keeled body scales, sharply turned up snout, and by having its belly and the underside of the tail extensively colored jet black. The body, head, and tail vary from gray to yellow or light brown. There are 23–50 dark brown blotches down the back, and rows of smaller, similarly colored spots alternating on the sides. The jet black areas on the belly and underside of the tail may be edged with yellow (Fig. 28, p. 54). Adult males have fewer blotches on the back and longer tails than females. Females grow larger than males.

Adult Plains Hognose Snakes normally are 14 ¾ to 27 ⅛ inches in total length. The largest specimen from Kansas was a female with a total length of 34 inches.

Plains Hognose Snakes occur throughout the western two-thirds of Kansas. They generally are found in grassland or sand prairie and are active from mid-April to October at optimal air temperatures of 70–95°F. When not active this snake burrows beneath sandy loose soil to maintain an optimal body temperature. The home range of Plains Hognose Snakes is quite variable, depending on available habitat and food. This animal is not territorial. During winter it burrows deep beneath the ground to avoid cold temperatures. The Taylor Expedition found two of these serpents in August 1926 and one in July 1927, all in Morton County. A fourth was taken north of Elkhart in July 1971. Most recently, Steve Kamb, a member of our field crew, discovered a single example in the Grasslands on 3 June 1987.

The Plains Hognose Snake usually mates during May after emergence from winter inactivity. The number of eggs per clutch varies from 4–23 (with an average of nine); eggs are laid in July in nests a few inches below the soil. Evidently females deposit a clutch every other year. Incubation time for the eggs is 50–60 days. Courtship has not been observed.

This reptile detects its prey by smell, digging a food item from its burrow beneath the soil. The up-turned snout of this species makes it very efficient at digging up toads, reptile eggs, and small lizards and snakes, all of which are eaten. In addition, this snake consumes rodents and birds when it can capture them. Predators of Plains Hognose Snakes are not well known.

This snake exhibits an interesting behavior when disturbed. If approached too closely it generally attempts to escape by crawling clumsily away. When more closely threatened it may attempt to conceal its head beneath its coils.
If this does not dissuade an aggressor, the snake spreads a “hood” by flattening its neck, and will hiss loudly. Occasionally the snake may “strike” at the aggressor, but in all instances the strike is short and the mouth is closed. If this fails to frighten the aggressor the Plains Hognose Snake will writhe and contort, disgorge recently eaten food, and roll over on its back and “play dead.” The snake may feign death for up to five minutes. If left alone it rolls over on its belly and crawls away.

**EASTERN HOGNOSE SNAKE**

The Eastern Hognose Snake is a very rare Grassland snake, and is now probably extirpated. Its roughly keeled scales and sharply up-turned snout serve to distinguish it from other Grassland serpents, and its dark-colored belly (with the underside of the tail much lighter) separate it from the Plains Hognose Snake. The Eastern Hognose is highly variable in color. The back, head, and tail may be yellow, brown, reddish, olive, or gray with a series of 20–30 dark brown or black blotches on the back and similarly colored bands on the tail. The sides of the body have two or three series of small, dark spots which alternate with the blotches on the back. The belly is yellowish, gray, olive, or reddish and becomes darker toward the cloaca. The undersides of the tail and the chin are usually much lighter than the belly (Fig. 29, p. 55). Adult males have longer tails and fewer blotches on the back than females. Females grow larger than males.

Adult Eastern Hognose Snakes normally are 18 to 30 inches in total length. The largest specimen from Kansas was a female with a total length of 42 inches.

The Eastern Hognose Snake lives along rivers, and reaches the western limit of its range in the United States in the Grasslands. Most of Kansas (except along the eastern border) is not optimal habitat for this snake and populations of this species in western Kansas may be isolated. Eastern Hognose Snakes are active from late April to October at optimal air temperatures of 65–95°F. This species has a daily activity period and habits similar to that of the Plains Hognose Snake. Home ranges of the Eastern Hognose Snake are larger than those of the western species, but are poorly defined. Population density in the Eastern Hognose Snake is no more than one per acre. During winter months this snake burrows deep into loose soil or sand to avoid cold temperatures. Only one example of this fascinating snake has been found in Morton County. It was discovered on the 81 Ranch in July 1927 by the Taylor Expedition. During our field work in 1987, we did not observe it. The drought conditions of the 1930s may have eliminated this snake from the Cimarron River Valley, because it is highly dependent on toads for food, and toad populations do not fare well during dry times.
Mating in the Eastern Hognose Snake occurs during April and May after emergence from winter inactivity. Courtship is not known. Females lay a single clutch of eggs each year; the number of eggs varies from 4–61 with an average of twenty-two. The eggs are deposited in late June or July in nests burrowed out by the female several inches deep in the soil or sand. Incubation requires 50–65 days.

This species feeds primarily on toads, although in Kansas it has been recorded eating a Barred Tiger Salamander. Primary predators of the Eastern Hognose Snake are hawks and large snakes.

The Eastern Hognose Snake exhibits a defensive pattern similar to that of its western cousin except that immediate attempts to escape by crawling away or to hide the head beneath body coils are not used as frequently. Instead the Eastern Hognose Snake more readily spreads its “hood,” hisses, and “strikes.” Apparently it engages in “playing dead” for much longer periods than the Plains Hognose Snake.

PLAINS BLACKHEAD SNAKE

The Plains Blackhead Snake differs from other Grassland snakes because it has a dark head in sharp contrast with its unpatterned light yellowish brown body, and its belly is pink (Fig. 30, p. 55). Adult males have slightly longer tails than females.

Adult Plains Blackhead Snakes normally are 7 to 10 inches in total length. The largest example from Kansas was a female with a total length of 14 ¾ inches.

Found in Kansas from the Flint Hills westward, the Plains Blackhead Snake inhabits rocky hillsides of grassland prairies. It is secretive, spending most of the day beneath flat rocks. This species is active from April to October, and is probably nocturnal, but little is known of its day-to-day activity. During winter it burrows beneath the ground, sometimes to a depth of at least eight feet, to avoid cold temperatures. Only five examples of this snake have been recorded from Morton County, the first three records near Elkhart on 19 August 1926 by the Taylor Expedition, a fourth from the Walsh Ranch in June 1928, and more recently the fifth from the Grasslands by Steve Kamb on 31 May 1987.

Nothing is known of the breeding habits of this species. Presumably it mates during the spring, females deposit their egg clutches in nests during summer, and the eggs hatch in late summer or fall.

The Plains Blackhead Snake eats centipedes, and probably soft-bodied grubs as well. Predators of this snake are birds, small mammals, lizards, and other snakes.
EASTERN YELLOWBELLY RACER

The swift and slender Eastern Yellowbelly Racer has smooth scales, a uniform yellow or yellowish belly with no pattern, and a uniform blue-gray or greenish blue upper body. No other Grassland serpent resembles it (Fig. 31, p. 56). Young of this reptile, however, have a pattern of large, light-edged blotches on the back alternating with smaller spots on the sides. This pattern is distinct on the front half of the body and fades toward the rear. Young specimens also have scattered dark speckles on the belly (Fig. 32, p. 56). As they grow older, young Eastern Yellowbelly Racers lose all pattern and attain the uniform appearance of adults. Adult males have slightly longer tails than females, and females grow slightly larger than males.

Adult Eastern Yellowbelly Racers grow 30 to 48 inches in total length. The largest specimen from Kansas was a female with a total length (snout to tip of tail) of 55½ inches.

This snake is found everywhere in Kansas, preferring open grassland, pasture and prairie areas during the summer and rocky hillsides only in spring and fall. Statewide, it is active normally from April to mid-November at air temperatures ranging from 60-90°F. In the Grasslands, it has been observed from May to August. The Eastern Yellowbelly Racer is diurnal, spending the day basking in the sun or gliding smoothly over the ground in search of food. This snake has an average home range of 25 acres, but does not appear to be territorial. During winter these reptiles crawl deep into rock crevices on hillsides where they remain inactive until spring. The number of snakes in a single den can exceed one hundred. Nonetheless, this is apparently not a commonly observed snake in the Grasslands. Only six examples of this serpent have been recorded from Morton County. The Taylor Expedition took one each in the years 1926, 1927, and 1928; two were found near Point of Rocks in May 1975; and we caught one in June 1987 (we also observed two others, but could not catch them).

Breeding in this species occurs in May. Courtship involves a male positioning himself alongside the female and rippling his body spasmodically as he positions his cloaca beneath her tail. Once cloacal contact is made copulation occurs and lasts several minutes. While copulating the female may move forward slowly, dragging the attached male with her. Females lay their eggs from mid-June to early August usually in tunnels or burrows of small mammals such as moles. More than one female may use the same nest site at the same time. The number of eggs per clutch ranges from 8 to 22, and averages 11-12. Incubation takes from two to three months.

The Eastern Yellowbelly Racer relies primarily on sight to locate food. Any
small animal that moves is pursued and eaten. This snake eats lizards, mice, frogs, other snakes, and insects. In turn, it is eaten by hawks and small mammals.

The Eastern Yellowbelly Racer is one of the fastest snakes in Kansas, but relies on distracting of its predators plus speed to make its escape. A surprised specimen thrashes vigorously in one spot, attracting the predator's vision to that area, then quickly and quietly glides away into rocks and brush.

WESTERN COACHWHIP

The Western Coachwhip differs from other Grassland snakes because it has a slender body that is always yellowish brown, and its body scales have a braided appearance, hence the name "coachwhip." The belly is whitish with indistinct small spots (Fig. 33, p. 57). Young specimens, differently colored and patterned than adults, are yellowish brown, with dark brown crossbands on the front of the body that fade and disappear on the rear. The belly is white with two rows of dark spots on the front half. Adult males have longer tails than females.

Adult Western Coachwhips normally are 42–60 inches in total length. The largest specimen from Kansas was a male with a total length of 70½ inches.

The Western Coachwhip ranges throughout Kansas west of the Flint Hills. It is a large, alert, and active snake, found in open grassland prairies. These serpents are active statewide from April to October — on the Grasslands they have been observed during the hot months of June, July, and August. They are completely diurnal, foraging for food even during the hottest hours of the day. When surprised, Western Coachwhips race away from an intruder with considerable speed and when cornered they rapidly vibrate their tail and strike repeatedly. During winter this species enters deep crevices on rocky hillsides or small mammal burrows on open prairies to avoid cold weather. This creature was first discovered in Morton County on 20 August 1926 by the Taylor Expedition. We found it to be fairly abundant in the Grasslands, recording five examples, the most recent on 5 June 1987.

Little has been observed of the breeding habits of this species in Kansas; courtship is unknown. Mating probably occurs in April or May followed by egg-laying in summer and hatching in fall. The eggs are laid in loose soil, sometimes as much as a foot below the surface.

Although this is probably the fastest snake in Kansas, it cannot move as fast as person can run. It feeds on bats, mice, birds, lizards, and smaller snakes.

KANSAS GLOSSY SNAKE

The Kansas Glossy Snake has a double row of scales on the underside of the tail, a uniform white belly, a pattern of 39–69 distinct dark gray or brown,
black-edged blotches on its body, and a smooth, “glossy” appearance, hence its name. In addition to the blotches on the back there are two alternating rows of dark spots on each side of the body. A dark line extends from the angle of each jaw forward through the eyes (Fig. 34, p. 57). Males have slightly longer tails than females.

Adult Kansas Glossy Snakes normally are 27–36 inches in total length. The largest specimen from Kansas was a male with a total length of 46 inches.

The Kansas Glossy Snake generally ranges from the northern High Plains province south and southeast through the Low Plains province in Kansas. It is found in dry, open, sandy areas. During the day it retires beneath rocks or into burrows to avoid heat and predators. Apparently it is active statewide from April to October and is primarily nocturnal, prowling for food. In the Cimarron National Grasslands it has been observed only during the months of May, June, and July. The Taylor Expedition first recorded this reptile in Morton County on 25 June 1927. Our field team discovered four of these serpents in May and June 1987.

This snake mates during May, June, or July following emergence from winter inactivity. Courtship has not been observed. The female evidently lays a single clutch of eggs during the summer. The number of eggs per clutch ranges from 3–23 with an average of eight. The eggs hatch in two to three months.

The Kansas Glossy Snake kills its food by constriction, and feeds primarily on lizards and small rodents. Its predators probably include snakes, small mammals, and owls.

**BULLSNAKE**

The Bullsnake is the largest snake in the Grasslands, and can be distinguished from other species by its keeled scales and pattern of 33–73 large brown or black blotches on the brownish yellow body. The tail has alternating yellow and black bands. The belly is yellowish with variable dark mottling (Fig. 35, p. 58). Adult males have longer tails than females.

Adult Bullsnakes normally are 48 to 66 inches in total length. The largest specimen from Kansas was a female with a total length of 88½ inches and a weight of nearly eight pounds.

The Bullsnake is found everywhere in Kansas, preferring to live in open grasslands, but also in open woods along rivers. It is also common in cultivated fields where there is an abundance of rodents, its preferred food. This snake is active from April to November at air temperatures above 60°F. It is generally diurnal, although it may be active at night also. During the day this snake basks in the sun or forages for food. With the approach of winter it seeks out deep crevices on rocky hillsides or the burrows of small mammals.
where it normally remains inactive until spring. This is one of the most abundant snakes in the Grasslands. It was first reported from Morton County by the Taylor Expedition on 15 August 1926. More recently, we observed numerous examples in May and June 1987.

Bullsnakes mate during April and May after emergence from winter inactivity. Courtship involves the male crawling along and over the female until he eventually rests almost entirely on top of her. During this process the male exhibits jerking body movements. The female is passive except for elevating and waving her tail. Just prior to copulation the male may seize the female with his mouth, biting her on the head or neck. He curls his tail beneath hers until their cloacal openings meet; copulation commences and may last over an hour. Female Bullsnakes lay their eggs in soft earth beneath large rocks or logs. The number of eggs per clutch ranges from 5 to 19, with 12 being the average; the young are about eleven inches long.

The Bullsnake is probably the most economically beneficial snake in Kansas, consuming large quantities of rodents and saving farmers much grain loss. This snake eats pocket gophers, rats, mice, rabbits, and ground squirrels. It also occasionally eats birds and bird eggs. Like Hognose Snakes, it will emit a loud "hiss" when disturbed or frightened. Predators of Bullsnakes include large carnivorous birds and mammals. Young Bullsnakes may also be eaten by larger snakes.

CENTRAL PLAINS MILK SNAKE

The Central Plains Milk Snake is strikingly different from other Grassland snakes. It has slick smooth scales, a bold white and black pattern on the belly, the top of its head is black or orange with a black snout, and it has 20 to 32 orange-red bands on the body. The orange-red bands are interspaced with narrower yellow, white, or cream bands, and these are bordered by narrow black bands (Fig. 36, p. 58). Adult males grow larger than females.

Adult Central Plains Milk Snakes normally are 16 to 28 inches in total length. The largest Milk Snake from Kansas was a male with a total length of 33¼ inches.

The Central Plains Milk Snake is found throughout western Kansas, where it inhabits the rocky outcrops and ledges of prairie canyons and hillsides. It is active statewide from April to November, but all eighteen records of this serpent from the Grasslands were found in May and June. This reptile normally prowls actively by day, but during the hot summer it may become nocturnal. It rarely basks in the sun, preferring to remain hidden beneath sunwarmed rocks to maintain its optimal body temperature. During winter the Central Plains Milk Snake retreats into dens on rocky, wooded hillsides or into
mammal burrows to avoid cold temperatures. First found in Morton County on 9 June 1928 by the Taylor Expedition, four of these animals more recently were taken in the Grasslands by us during May and June 1987.

Mating in this species occurs during spring after emergence from winter inactivity. Little is known about courtship except that the male bites the female on the neck a few inches behind the head to hold her during copulation. The eggs are laid in nests during June or July, and the number of eggs per clutch varies from 5–9 with an average of six to seven. A female from the Grasslands laid four eggs on 3 July 1987; all four eggs hatched on 4 September and the young were about 8½ inches in total length. Incubation probably requires one to two months, depending on the prevailing temperature.

Prey is killed by constriction in this species. It feeds primarily on small lizards and snakes, but also eats newborn mice. Specific diet items include the Northern Prairie Lizard and Prairie Racerunner, both residents of the Grasslands. Predators of Central Plains Milk Snakes include birds, mammals, and larger snakes.

**TEXAS LONGNOSE SNAKE**

The Texas Longnose Snake is easily distinguished from other Grassland snakes. The ground color of this brightly colored serpent is yellowish or cream with 18–35 black blotches on its body separated by pink or reddish interspaces. In addition, at least half the scales on the underside of the tail are not divided into two rows, a character not found in any other harmless snake in Kansas. The tail has 6–17 blotches. It normally has a white, unpatterned belly, but occasional specimens have black or brown markings (Fig. 37, p. 59). Adult males have slightly longer tails and grow larger than females.

Adult Texas Longnose Snakes are 22 to 30 inches in total length. The largest specimen from Kansas was a male with a total length of 29 inches.

This reptile is restricted to the Red Hills and southern High Plains of southwestern Kansas. It is rare in the state, and little is known of its habits. Probably it is active from April to September on open prairies, sandy regions, and beneath rocks along the slopes of canyons. Texas Longnose Snakes are nocturnal, retreating to underground burrows during the day. During winter this snake avoids cold temperatures by burrowing deep beneath the ground. Only three examples of this snake are known from the Grasslands. The first example was recorded in May 1934, the second in July 1963, and the most recent in July 1979. We did not observe this snake during our field work in 1987.

Mating in this species occurs during spring after emergence from winter
inactivity. A female lays from four to nine eggs (average six) in an underground nest and the eggs hatch in two to three months.

The Texas Longnose Snake feeds on small rodents, lizards and lizard eggs, small snakes, and occasionally insects. Predators of this species include large birds, mammals, and other snakes.

CHECKERED GARTER SNAKE

The Checkered Garter Snake differs from other Grassland snakes by the large, yellow or cream crescent-shaped mark on each side of the head behind the angle of the jaws, and by the stripe on each side of the body being situated on the third and fourth scale rows (counting from the belly up). In addition to the narrow yellowish stripes on each side of the body, there is a similarly colored stripe down the middle of the back. All three stripes start at the head and run down the body onto the tail. The area between and below the stripes is brownish yellow with a bold checkered pattern of dark brown or black spots. The belly is yellowish with no pattern (Fig. 38, p. 59). Adult males have longer tails than females. Females grow larger than males. This snake is easily confused with the more common Western Plains Garter Snake.

Adult Checkered Garter Snakes are 18 to 24 inches in total length. The largest specimen from Kansas was a female with a total length (snout to tip of tail) of 33¼ inches.

The Checkered Garter Snake is restricted in Kansas to the southern border of the state from the Flint Hills west to the Cimarron National Grasslands. The Taylor Expedition made the earliest (and only) habitat observations on this rare species in Kansas. Their two specimens were collected 18 August 1926 near springs in Morton County on what is now the Grasslands. But this reptile has not been reported from the Grasslands since. It is a snake that is active from April to October. It forages for food by day around water, but may become nocturnal during extremely hot weather. During winter it retreats into small mammal burrows or deep in crevices on rocky hillsides to avoid cold temperatures. It is possible that this serpent no longer occurs in the Grasslands, having succumbed to the “Dust Bowl” drought of the 1930s, when water was scarce and one of its favorite foods, amphibians (frogs and toads), were few.

Mating in this species occurs during the spring after emergency from winter inactivity. Courtship is not known. Each female may produce from 6-18 young during June, July, or August.

The Checkered Garter Snake feeds on frogs, toads, and small rodents. Its predators include large birds, mammals, and other snakes.
The Western Plains Garter Snake is distinguished from other Grassland snakes, particularly the Checkered Garter Snake, because the stripe on each side of its body is situated on the third and fourth scale rows (counting from the belly up). This serpent has dark vertical bars on the upper lips, and alternating rows of black spots between the stripes on the back. It is greenish gray, light olive, or tan with black spots between the three stripes on the body. The stripe running down the middle of the back may be bright yellow or orange whereas the stripes on the sides are normally yellow. The belly is white, grayish, or greenish with a row of black spots down each side (Fig. 39, p. 60). Adult males have longer tails than females. Females grow slightly larger than males.

Adult Western Plains Garter Snakes normally are 20 to 28 inches long. The largest specimen from Kansas was a female with a total length of 36 ¾ inches. This reptile is most abundant west of the Flint Hills in Kansas. Western Plains Garter Snakes prefer open grassy prairies, particularly along the edges of springs and ponds. They are normally active from March to November, but during a warm spell in the coldest winter months they will emerge from their underground retreats. This snake is usually active during the day, basking in the sun or foraging for food. This reptile has been recorded more often than any other snake in the Grasslands. It was first found in Morton County by the Taylor Expedition on 16 August 1926. We observed them to be abundant in the Grasslands around Middle Spring and the waterfowl ponds in May and June 1987.

This snake mates during April and May and sometimes in the fall. One or more courting males crawl over and alongside a female with jerking, writhing movements of their bodies. A successful male curls his tail beneath the female’s until their cloacal openings meet and copulation occurs. More than one male may mate with a female. During late July, August or September each female gives birth to a litter of young which may range in number from 5–60.

The Western Plains Garter Snake feeds on earthworms, toads, frogs, salamanders, fish, and small rodents. Predators of this harmless reptile include large birds, mammals, and other snakes.

PRAIRIE RATTLE SNAKE
VENOMOUS. The Prairie Rattlesnake is distinguished from other Grassland snakes by the rattle on its tail. The head, body and tail are greenish gray to brown. There are 30–55 dark gray or brown blotches on the back. The tail
bands are similar in color to the body blotches. The belly is grayish or white (Fig. 40, p. 60). Adult males have longer and thicker tails than females. This is the only snake found on the Grasslands that may be harmful to people.

Adult Prairie Rattlesnakes normally are 35 to 45 inches in total length. The largest specimen from Kansas was a male with a total length of 48 1/2 inches.

The Prairie Rattlesnake is common on the arid High Plains of western Kansas. It prefers rocky canyons or open prairies with an abundance of small burrows, particularly those of rodents. Statewide, this reptile is active from April to October at preferred air temperatures of 80–90°F. In the Grasslands, it has been observed only during the hot months, from June to August. Little is known of its home range or habits in Kansas. During extremely hot daytime temperatures it retreats into small mammal burrows. In winter it again uses these burrows to avoid extreme cold. The Taylor Expedition first reported this snake from Morton County on 22 August 1926. We frequently observed it during May and June 1987.

Prairie Rattlesnakes mate in early spring after emergence from winter inactivity, or in the fall. Females produce litters only every other year. The young are born in spring, summer, or fall (depending on time of mating) and are venomous at birth. The average number of young per litter is eleven. Each newborn rattlesnake has a single button and gains an additional segment each time it sheds its skin.

This snake feeds on rats, mice, gophers, young prairie dogs, and small lizards.

Male Prairie Rattlesnakes engage in combat dances, possibly to establish dominance. Prairie Rattlesnakes are defensive when surprised or provoked, and they have a quick temper. They usually rattle when approached too closely, and should be recognized as the only dangerous snake found in the Grasslands. However, they will not attack people! Should you encounter this snake, leave it alone. Above all, do not kill it. If you do so, the balance of nature will be just that much more off-center. People are the main predators of Prairie Rattlesnakes, and they shouldn’t be.
This is a bibliography of the amphibians and reptiles of the Grasslands, a list of 44 books or papers that in some way deals with or mentions specifically amphibians and reptiles collected or observed in Morton County, Kansas. This compilation is reasonably complete, and should be referred to when more in-depth information is desired about the Grasslands herpetofauna.


**RELATED BOOKS FOR ADULTS AND CHILDREN**

This section of related books may or may not directly mention Grasslands amphibians and reptiles. Readers may use these to further their knowledge of amphibians and reptiles, and their appreciation of other aspects of the wildlife of the Grasslands.


Reptiles and Amphibians
Of the
Cimarron
National Grasslands,
Morton County, Kansas

Color Photographs
By
Suzanne L. Collins
&
Joseph T. Collins
1. The Cimarron National Grasslands is in spring green as Joe Collins searches for reptiles along the rim of a bluff.

2. Lifting small rocks on the Grasslands may reveal all sorts of creatures.
3. Rugged Grassland habitat is good for larger snakes.

4. The Ornate Box Turtle searches for food on this Grassland slope.
5. Small snakes live beneath the rocks shown on this Grassland hillside.

6. The Cimarron River is home for most aquatic amphibians and reptiles.
7. This Grassland pond provides permanent water for frogs and turtles.

8. Western Plains Garter Snakes are abundant at this Grassland pond.

10. An adult Plains Spadefoot.
11. An adult Great Plains Toad.

12. An adult Western Green Toad.

15. An adult Blanchard’s Cricket Frog.

17. An adult Bullfrog.

18. An adult Common Snapping Turtle in a defensive posture.
19. An adult Yellow Mud Turtle.

20. An adult male Ornate Box Turtle.
21. An adult Western Painted Turtle.

22. An adult Northern Earless Lizard.
23. An adult female Northern Prairie Lizard.


27. An adult New Mexico Blind Snake.

28. A subadult Plains Hognose Snake just prior to "playing dead."
29. An adult Eastern Hognose Snake spreading its hood in a “threat” posture.


32. A young Eastern Yellowbelly Racer.
33. An adult Western Coachwhip.

34. An adult Kansas Glossy Snake.
35. An adult Bullsnake.

36. An adult Central Plains Milk Snake.
37. An adult Texas Longnose Snake.

38. An adult Checkered garter Snake.

40. An adult Prairie Rattlesnake.

Map of Kansas showing the general location of the Cimarron National Grasslands in Morton and Stevens counties in the extreme southwestern corner of the state. The pleasant community of Elkhart, located on the Oklahoma border in southern Morton County, provided a base of operations during our 1987 field work.
About the Authors

JOSEPH T. COLLINS has written more books about Kansas wildlife than any other person in the history of the state. His titles include Amphibians and Reptiles in Kansas (two editions), Fishes in Kansas (with Frank B. Cross), Turtles in Kansas (with Janalee Caldwell), and Natural Kansas. He also edited Mammals in Kansas and Birds in Kansas (Volume One), and is co-author (with Roger Conant) of the forthcoming third edition of the Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America.

SUZANNE L. COLLINS is a wildlife photographer, with credits in numerous magazines and journals, and in such books as The American Milk Snake, Amphibians of Oklahoma, and Natural Kansas. A portfolio of her work, entitled Amphibians in Kansas is on display at the Museum of Natural History, The University of Kansas. She and her husband have traveled extensively throughout Kansas in search of wildlife and the photographic opportunities they provide, and were the 1990 winners of the Wildlife Photography Contest, sponsored by the Kansas Department of Wildlife and Parks.