Notes on the
Distribution of Amphibia and Reptilia
of Ellis County, Kansas

A Thesis
Submitted to the Department of Zoology and the
Graduate Council of the Fort Hays Kansas State
College in partial fulfillment for the degree
of Master of Science.

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I. Introduction

1. Comparatively little has been done concerning the listing or recording of the Amphibias and Reptilia of Ellis County, Kansas. What records there are of the species are for the most part unpublished. Early papers dealing with Kansas herpetology are few in number. Mozley (1878) listed the snakes in the Museum of the University of Kansas, and four papers by Cragin (1881, 1884, 1885, 1894), and Branson (1904) gave miscellaneous records on the distribution of Kansas amphibians and reptiles. None of these papers gives any records from Ellis County. Housholder (1916) in his thesis on the "Lizards and Turtles of Kansas," does not list any specimens from Ellis County. Considerable work has been done on the "Lizards of Kansas," and Burt (1928) has consolidated and enriched the evidence in his work "Lizards in Kansas." The following species of lizards are reported from Ellis County in his publication.

- *Crotaphytus collaris collaris* (Collared Lizard)
- *Holbrookia maculata maculata* (Spotted Swift)
- *Sceloporus undulatus thayerii* (Thayer's Swift)
- *Phrynosoma cornutum* (Common Horned Lizard)
- *Phrynosoma douglassi hernandesi* (Short-horned Lizard)
- *Ophiurus ventralis* (Glass Snake)
- *Cnemidophorus sexlineatus* (Six-lined Lizard)
Taylor (1929) in his "Revised Checklist of the Snakes of Kansas", likewise, does not list any snakes from Ellis County.

Little has been done in Ellis and the surrounding counties, so there seems to be a need for such an ecological study as has been carried out in this paper—"Notes on the Distribution of Amphibia and Reptilia of Ellis County, Kansas."

2. The objectives kept in mind in preparing this report have been to attempt to show what kinds (species) of amphibians and reptiles are present within this area; the habitat distribution of each species; and the numbers of each species per habitat; and the relation of species to habitats.
II. Environmental Conditions of Ellis County

1. Ellis County is only a short distance west and north of the center of Kansas. The county is square, being thirty miles north and south and thirty miles east and west. It lies between the 99th and 100th meridians at the eastern margin of the High Plains. It contains about 576,000 acres or 900 square miles and is bounded on the north by Rooks County, on the south by Rush County, on the east by Russell County and on the west by Trego County.

The surface of the county is of the same character as that of most of Western Kansas, one vast stretch of prairie, almost completely destitute of trees, except for a narrow portion along the principal streams and here and there near a farm house. The surface of the county, however, is very far from being uniform. Some portions, especially the south-eastern, being quite level; the central portion is very high and uneven; while in the western and northern portions, especially in the vicinity of the Saline River, there are a number of bluffs.

The elevation at Hays, the county seat, is 2000 feet. Along the Smoky Hill River, south of Hays, elevations range from 1900 to 2000 feet. Smooth grassy hills rise between Big Creek and the Smoky Hill River to 2300 feet, and to a somewhat less elevation between Big Creek and the
The county is drained by the Saline River, which runs from west to east along the northern boundary of the county, and the Smoky Hill River, which runs in the same direction close to the southern boundary. Big Creek traverses the county diagonally, midway between the Saline and Smoky Hill Rivers. As may be expected of a stream leading through an arid country, the Smoky Hill and Saline Rivers sometimes run dry. After heavy rains it rises rapidly and is often unfordable. The lesser creeks that flow into these streams are rather insignificant and like the larger streams, often contain very little water.

Ellis County is included in the Upper Sonoran life zone. This zone is divided into two regions, humid and arid, by Merriam (1892), page 1-64, and this particular region is included in the arid division, which extends well into the central part of Kansas.

2. Geology. The rocks exposed in Ellis County are of the Cretaceous System, excepting the sands and gravels along the rivers, which are of a much later period. (Pleistocene) The two great divisions of the Cretaceous, the Benton and the Niobrara, cover the whole area.

The upper member of the Niobrara group, the Smoky
Hill chalk, does not cover much area in Ellis County. The Fort Hays limestone covers approximately the western half of the county, being exposed on the hills. The rock is a yellowish limestone, which is easily dressed and has been used locally as building stone. Just below the Fort Hays Limestone are shales of great thickness, which contain large calcareous concretions.

The upper Benton portions are called the Blue Hill shales and are exposed in the hills west and northwest of Hays. The lower Benton group contains more limestone than the upper division. It is exposed in the eastern part of the county and is known as the Benton limestone, locally called "fence post."

3. Rainfall and Climate. The Weather Bureau, located three miles south of Hays City, Kansas, on the Fort Hays Experiment Station, records an average annual rainfall of 25.055 inches over a period of ten years from 1923-1932, and a rainfall of 15.50 inches for the period from September 1932 to August 1933 when the majority of the field work for this paper was done. This period was the driest known in Ellis County from 1917 to 1933, and the deficiency in precipitation was felt over the entire state. Precipitation generally occurs during the spring and fall months and as in the year 1933, there are likely to be long periods of drought, especially during the
summer months.

The average annual temperature over a period of ten years 1923-1932 was 53.97 degrees Fahrenheit. The temperature recorded for the period of this study was 57.2 degrees Fahrenheit. The temperature of the county varies between ten and ninety degrees Fahrenheit, with exceptions. Generally speaking the summers are long, hot and dry, while the winters are short and relatively cold.

4. Soil of Ellis County. The soils of Ellis County have been formed from limestone, sandstone, and shale, with limestone predominating in most of the area. The soil along the streams of the region is predominating sandy and sand pockets are found along the streams throughout the county.

The soils are typically rather deep and have a wide adaption to general farm crops under the proper climatic conditions.

5. Vegetation of the Region. The plant life of Ellis County is characterized as a Mixed Prairie Association. It is a combination of tall and short grass areas.
Reconnaissance Geological Map of Ellis County, Kansas

By N. W. Bass
Fig. 2. A Map of Kansas showing the location of Ellis County.
III. Methods

The survey of this particular territory, Ellis County, Kansas, extended over the following periods—summers of 1931, 1932 and from September 1932 to November 1933. Collecting of specimens and observations in the field formed a major part of the field work in this study. The entire county was surveyed at various times during which the number of each species of amphibians and reptiles was recorded. Trips were made at different times of the day and night. In addition to the regular field work, the unpublished records of Professor L. D. Wooster, Department of Zoology, Fort Hays Kansas State College, Hays, Kansas; and in a few cases observations of others were used.

Altogether, thirty-nine species of amphibians and reptiles were taken. These are divided as follows:
Amphibia, nine; Reptilia, thirty.

Specimens of each species were preserved and placed in the Zoological Museum of the Fort Hays Kansas State College, Hays, Kansas.
IV. Annotated List

1. Amphibia

*Rana pipiens* (Schreber).

Leopard Frog

Fig. 3.

This is the most common frog that inhabits this territory. It may be found in every meadow, marsh, stream and pond. In 1933, the first leopard frog seen in the area was on February 28, and in 1934, the first was seen on March 19. Many eggs were found and the prairie ponds are filled with tadpoles each spring.

Distribution: "North America, east of the Sierra Nevada, southwest into Mexico." (Stejneger and Barbour, 1923).

*Rana catesbeiana* Shaw.

Bull Frog

Fig. 4.

The bull frog is common in permanent ponds throughout the region.

Distribution: "Widespread in North America east of the Rocky Mountains". (Stejneger and Barbour, 1923).
Acris gryllus (Leconte).
Cricket Frog

Fig. 5.

These small frogs are very numerous, filling the air at evening with their staccato trills. It is found in the prairie ponds, and streams throughout the county.

Distribution: "Florida to New York in the east; northwest through the central valley from Louisiana and Texas to the Canadian northwest territories." (Steeneger and Barbour, 1923).

Pseudacris triseriata (Wied).
Swamp Cricket Frog

Some thirty specimens were taken from pasture ponds on the Steve Sack and A. Truan farms in 1931. They were also collected from the same ponds in 1932. During the summers of 1933 and 1934, none was collected, due possibly, to the extreme dryness of the spring and summer.

Distribution: "Alleghany Mountains to New Mexico, Arizona and Idaho." (Steeneger and Barbour, 1923).

Ambystoma tigrinum (Green).
Tiger Salamander

Fig. 7.

Twenty larvae and two adults were taken in a prairie pond on the A. Kinderknecht farm, seven miles southwest
of Hays, during the summer of 1933. An adult was taken on the same farm in a culvert on May 16, 1934. They are common throughout this section.

Distribution: "Widely distributed over almost all the United States; east of the Cascade Range and Sierra Nevada, and extending southward over the northern portion of the Mexican Plateau." (Stejneger and Barbour, 1923).

_Bufo cognatus cognatus_ (Say).

*Western Toad*

Fig. 8.

The western toad is not as abundant as _Bufo woodhousii_ in this area.

Distribution: "Arizona, Utah, and Colorado to Texas, Arkansas to Kansas, southern Wyoming and North Dakota." (Stejneger and Barbour, 1923).

_Bufo woodhousii woodhousii_ (Girard.)*

*Woodhouse's Toad*

Fig. 9.

This is the most common toad found in this area; many tadpoles were observed in the prairie ponds in early summer.

Distribution: "Texas to Kansas, Nebraska, and Montana, west to Nevada, Arizona, and southeastern California." (Stejneger and Barbour, 1923).
Scaphiopus hammondii bombifrons (Baird).

Spadefoot Toad

The spadefoot toad is not commonly seen in this area. One specimen was found during the course of this work, it being taken from a housecat in the print shop of St. Joseph's College, Hays, Kansas.

Distribution: "Western and southeastern States from Montana south to Texas and Mexico, and westward to the Pacific Coast states and northern Lower California." (Stejneger and Barbour, 1923).

Gastrophryne texensis (Girard).

Narrow-mouthed Toad

Fig. 6.

Two specimens of this small toad were found in this area, one out in the open at night at Yocemento Hill, seven miles west of Hays and the other under a rock, four miles west of Hays on the Steve Sack farm.

Distribution: "Texas." (Stejneger and Barbour, 1923).
Fig. 3. Leopard Frog. *Rana pipiens*. 
Fig. 4. Bull Frog. *Rana catesbeiana.*
Fig. 5. Cricket Frog. *Acris gryllus*.

Fig. 6. Narrow-mouthed Toad. *Gastrophryne texensis*. 
Fig. 7. Tiger Salamander. *Ambystoma tigrinum*. 
Fig. 8. Western Toad. *Bufo cognatus cognatus.*
Fig. 9. Woodhouse's Toad. *Bufo woodhousii woodhousii*. 

*Note:* The image shows a toad, possibly *Bufo woodhousii woodhousii*, as indicated by the text.
Reptilia

2. Snakes

Tropidoclonion lineatum (Hallowell).
Lined Snake

Fig. 13.

This small snake appears to be rare or at least difficult to find. One specimen was taken during the course of this study under a rocky ledge, near the bottom of a hill near Schoenchen. Other specimens have been found just beyond the county line in Russell County.

Distribution: "Southern Ohio to Iowa and Western Kansas and south to the Gulf of Mexico." (Blanchard, 1928).

Coluber constrictor flaviventris (Say).
Blue Racer

Fig. 50.

Many specimens of the blue racer were seen each year, especially in the prairies. The young specimens are blotched.

Distribution: "From Rocky Mountains east through Texas, western Arkansas, Missouri and Michigan, and northern parts of Illinois, Indiana and Ohio." (Blanchard, 1928).
Fig. 10. Ring-necked Snakes. *Diadophis punctatus arnyi.*
Diadophis punctatus armi (Kennicott).

Ring-necked Snake

Fig. 10.

This species seems to be common, it is found under flat rocks, especially early in spring. On April 13, 1932, fourteen were taken from under flat rocks on a hillside near Schoenchen. They are seldom seen because they spend most of their time under rocks.

Distribution: "Western Illinois, Iowa, Missouri, northwestern Arkansas, west to the Great Plains and south into Texas." (Blanchard, 1928).

Tantilla nigriceps (Kennicott).

Mitre Snake

Fig. 11.

This small snake is rather common in this vicinity, being found in the Rocky areas.

Distribution: "Central and southern Texas, north into Kansas, west to southwestern Utah, south through Arizona and probably into northern Mexico." (Blanchard, 1928).
Crotalus confluentus confluentus (Say).

Prairie Rattler

Fig. 14.

There is only one species of rattlesnake in this area, the Prairie Rattler. In the summer of 1933, fourteen specimens were taken in the prairies of this area. They are reported to be more numerous in 1933 than in 1932.

Distribution: "Great Plains from 96th meridian to Rockies and from southern Canada to Texas." (Blanchard, 1928).

Thamnophis radix radix (Baird and Girard).

Plains Garter Snake

Fig. 20.

This species was common in pastures and gardens but was more often found in the larger streams of the area. One female gave birth to eight young while in captivity.


Thamnophis sauritus proximus (Say).

Western Ribbon Snake

Fig. 21.

According to the records during the course of this
study, only three specimens have been found in this area.

Distribution: "Wisconsin to western Nebraska, south through Texas and Louisiana, and along the coastal regions to Nicaragua." (Blanchard, 1928).

*Masticophis flagellum flavigularis* (Hallowell).

Western Coachwhip

*Fig. 17.*

The coachwhip is usually found in open prairie country. A specimen laid five eggs while in captivity on July 4, 1932.

Distribution: "Texas except eastern fourth, western Oklahoma, western Kansas, Colorado, New Mexico and south into the central plateau of Mexico." (Blanchard, 1928).

*Elaphe laeta* (Baird and Girard).

Rat Snake

This small snake is found frequently in early spring in the flat rock habitats of the county. On April 30, 1932, thirty specimens were taken across the county line in Russell County in a flat rock area. They have been taken on almost every field trip to this particular habitat.

Distribution: "Kansas south to central Mexico." (Blanchard, 1928).
Heterodon nasica (Baird and Girard).
Hog-nosed Snake (light)

Fig. 50.

This snake is common in the sandy regions of the area.

Distribution: "Arizona to Montana, east to western Iowas, and south through Texas into northern Mexico." (Blanchard, 1928).

Heterodon contortrix (Linne).
Hog-nosed Snake (dark)

Fig. 50.

This species is found within the area but is not as common as the other species of the hog-nosed snakes (light).

Distribution: "Eastern Montana to Massachusetts, south into central Florida and west to central Texas and western Kansas." (Blanchard, 1928).

Natrix sipedon sipedon (Linne).
Brown Water Snake

Fig. 16.

No other water snake was so abundant in the Ellis County region as this species. It occurred commonly about streams and prairie ponds. They were often found under rocks in the shallow waters of Big Creek.

Distribution: "Northern Alabama to southern Maine,
Fig. 11. Mitre Snake. *Tantilla nigriceps.*
west to Minnesota, and Colorado, south to Oklahoma and Arkansas." (Blanchard, 1928).

**Sonora semianulata** (Baird and Girard).
Banded Ground Snake

Fig. 12.

This species was found just over the county line in Russell County by Leo Brown, on April 23, 1932.

Distribution: "From about the 97th meridian in Texas, Oklahoma, and Kansas, west through Arizona and into Nevada." (Blanchard, 1928).

**Lampropeltis getulus holbrookia** (Stejneger).
Say's King Snake

Fig. 16.

This king snake is common in this vicinity but is rarely seen.

Distribution: "Eastern Texas to southeastern Wyoming, east to eastern Illinois, and south to the Gulf of Mexico." (Blanchard, 1928).

**Lampropeltis calligaster** (Harlan).
Prairie King Snake

This king snake is not common in the region. Records are available on only two specimens.

Distribution: "Western Texas to Mississippi, north
to Indians and northwest to Minnesota, thence south to Texas." (Blanchard, 1928).

*Lampropeltis triangulum gentilis* (Baird and Girard).

**Banded King Snake**

*Fig. 50.*

This king snake is fairly common in this region. It is not seen so often, however, because of its secretive habits.

**Distribution:** "South central Texas, to South Dakota, west into Utah and Arizona." (Blanchard, 1928).

*Pituophis sayi* (Schlegel).

**Bull Snake**

*Fig. 15.*

The bull snake is the largest and most common land snake of the county. Specimens were taken on almost every trip into the field.

**Distribution:** "Minnesota to Texas." (Blanchard, 1928).
Fig. 12. Banded Ground Snake. *Sonora semianulata.*
Fig. 13. Lined Snake. *Tropidoclonion lineatum.*
Fig. 14. Rattlesnake. *Crotalus confluentus confluentus*.

Fig. 15. Bull Snake. *Pituophis sayi*. 
Fig. 16. Say's King Snake. Lampropeltis getulus holbrookii.

Fig. 17. Coachwhip Snake. Masticophis flagellum flavigularis.
Fig. 18. Brown Water Snake. *Natrix sipedon sipedon*.

Fig. 19. A Salt and Pepper King Snake eating a Blue Racer.
3. Turtles

Chrysemys bellii (Gray).

Bell's Painted Terrapin

Fig. 25.

This species is extremely common in the permanent ponds and streams throughout the county. On one field trip to the Truan farm, eight miles north of Hays, fifty-four specimens were counted in the prairie ponds.

Distribution: "Great Plains west to the Mississippi, southwest into New Mexico and northern Mexico; northwest into Montana, the Columbia basin, British Columbia and Vancouver Island; northeast into northeastern Minnesota, and upper Michigan." (Stejneger and Barbour, 1923).

Amyda spinifera (Le Sueur).

Soft-shelled Turtle

Fig. 26.

Five small specimens were taken below a dam on Big Creek on June 10, 1933. Two large specimens were taken from Big Creek on November 26, 1933. They are common in the streams of the county.

Distribution: "Mississippi River and tributaries, west to Colorado, north to Montana; St. Lawrence River and tributaries; east to Vermont, western New York and..."
Pennsylvania." (Stejneger and Barbour, 1923).

**Kinosternon flavescens** (Agassiz).

Yellow-necked Mud Turtle

**Fig. 23.**

This mud turtle is strictly an aquatic species. Specimens are rather common in muddy ponds and in the Smoky Hill River in the southern part of the county. A specimen is reported from the Saline River in the northern part of the county by L. D. Wooster.

Distribution: "Texas north to Kansas and Colorado, west to Arizona." (Stejneger and Barbour, 1923).

**Chelydra serpentina** (Linne).

Snapping Turtle

**Fig. 24.**

The snapping turtles are common in permanent ponds and streams of the region. A nest of twenty-four eggs was unearthed in a bank on Big Creek on August 1, 1933 and about three weeks later twenty-three of the eggs hatched.

Distribution: "Eastern North America from southern Canada to the Gulf of Mexico and west to the Rocky Moun-
tains." (Stejneger and Barbour, 1923).
Terrapene ornata (Agassiz).

Box Tortoise

Fig. 22.

Specimens of this species are plentiful especially in the sandy areas along the rivers. Farmers report that considerable destruction of canteloupes is caused by these reptiles. They bite holes in the end of the melons. On June 27, 1933, three observers counted thirty in about thirty minutes in an area near a melon patch adjacent to the Smoky Hill River. On June 24, 1933, twenty-six specimens, fourteen of which were females were observed along the sandy shores of the Saline River.

Distribution: "Indiana, Illinois, and territory between the Missouri and Mississippi rivers and the Rocky Mountains; from the Yellowstone river in the north to the Gulf of Mexico in the south, southern New Mexico and Arizona and northern Mexico." (Stejneger and Barbour, 1925).

4. Lizards.

Crotophytus collaris collaris (Say).

Collared Lizard

Fig. 40.

The collared lizards are common on flat rock hill-sides. They are restricted to these flat rock areas. On April 18, 1934, six specimens were found under flat rocks
and four were very stiff, probably still in a state of hibernation.

Distribution: "Arkansas south to middlewestern and northwestern Texas and west to eastern New Mexico." (Stejneger and Barbour, 1923).

Phrynosoma cornutum (Harlan).
Common Horned Lizard

Fig. 37.

Specimens of this common species have been taken over the entire county near and on rocky hills.

Distribution: "From Kansas to the northern states of Mexico, west to Colorado and New Mexico." (Stejneger and Barbour, 1923).

Phrynosoma douglassii bernardesi (Girard).
Short-horned Lizard

Fig. 51.

A single specimen is in the museum of the Fort Hays Kansas State College. On basis of this specimen, C. E. Burt (1929) records it from Ellis County.

Ophisaurus ventralis (Linne).
Glass Snake

Fig. 36.

Two specimens are in the museum of the Fort Hays
Kansas State College at Hays. Occasionally they are re-
ported as being seen within the range of this study.
However, none were collected during the course of this
work.

Distribution: "Southern United States, in the east
distributed northward to Virginia, and Tennessee, in the
central valley to Wisconsin, westward to New Mexico and
southward to the state of Vera Cruz, Mexico." (Stejneger
and Barbour, 1923).

Cnemodophorus sexlineatus (Linne).
Six-lined Lizard

Fig. 38.

Six-lined lizards or race-runners as they are fre-
quently called are common along the railroad right-of-ways
and in sanded areas. It has been taken in all parts of
the county.

Distribution: "Maryland to Florida, west to northern
Mexico and Arizona, and up the Mississippi Valley as far
north as Lake Michigan." (Stejneger and Barbour, 1923).
**Eumeces obsoletus** (Baird and Girard).

Sonoran Skink

*Fig. 41.*

This large skink was found most often under large flat rocks in more or less open situations, exposed prairie hillsides or sparsely wooded pasture lands along the streams.

**Distribution:** "Utah and Kansas southward to northern Mexico." (Stejneger and Barbour, 1923).

**Holbrookia maculata maculata** (Girard).

Spotted Sand Swift

*Fig. 39.*

The spotted sand swift is common throughout the county being found near trees and in sand or gravel. This swift is not as plentiful as "Thayer’s Swift.

**Distribution:** "Northern Texas, west to Arizona and northward to Wyoming and Nebraska." (Stejneger and Barbour, 1923).

**Sceloporus undulatus thayerii** (Baird and Girard).

Thayer’s Swift

*Fig. 39.*

This species is common in Ellis County.

**Distribution:** "Eastern States, New Jersey to Florida." (Stejneger and Barbour, 1923).
Fig. 20. Garter Snake. *Thamnophis radix radix.*
Fig. 21. Western Ribbon Snake. *Thamnophis sauritus proximus.*
Fig. 22. Box Tortoise. *Terrapene ornata*. 
Fig. 23. Mud Turtle. *Kinosternon flavescens.*
Fig. 24. Snapping Turtle. *Chelydra serpentina*.

Fig. 25. Bell's Terrapin. *Chrysemys bellii*. 
Fig. 26. Soft-shelled Turtle. *Amyda spinifera.*
V. Description of Habitats.

Ellis County affords a choice of several habitats for the animals found in it. For the purpose of logical consideration of the Amphibian and Reptilian Fauna, the habitats of this region will be discussed under two main headings: (I) Terrestrial, and (II) Aquatic.

I. Terrestrial.

1. Mixed Prairie.
2. Flat Rock Hillside.
3. Rocky Hillside.

II. Aquatic.

1. Stream.
2. Swamp.

There is a variation among the species as to their distribution in the different habitats. Some of the habitats have a wide distribution of species, some species are exclusive to one habitat and others are scattered among the different habitats.

As is well known, the fauna of any definite area is constantly undergoing modification and change. Environment plays a great part in the general distribution of animals and new species may be found that are not tabulated
Here due to the fact that animals are migrating to habitats more suited to their needs.

1. Mixed Prairie Habitat.

Under natural conditions the prairies, the tops and slopes of the hills in the county were covered with a thick growth of prairie vegetation. Of these original prairie conditions, a few areas remain which show, apparently, the original conditions. The fact that the open rolling country afforded excellent opportunities for farming has caused the greater portion of the area to be put under cultivation.

Grasses and sedges cover the ground and grow to a height of almost a foot. Among the important species of grasses in this mixed prairie habitat are: the short grasses, buffalo (*Bulbilis dactyloides*), and grama (*Boutelous oligogaster*); the tall grasses, big blue stem (*Andropogan furcatus*), and little blue stem (*Andropogan scoparius*), the latter being dominant.

In the rougher parts, the hills and the outcroppings of limestone make it difficult to cultivate, hence an abundant growth of the typical prairie grasses.
Fig. 27. A view of the Smoky Hill River.
Fig. 28. A view of the Saline River.
Fig. 29. Short-horned Toad. *Phrynosoma douglassii hernandesi*.
2. Flat-rock Hillside Habitat.

The Flat-rock Hillside Habitat is formed by rocks that are an outcropping of the Benton limestone. As the outcropping is on the brow of the hills, the slopes are covered with flat rocks of various shapes and sizes, from about three inches to eight inches in thickness. Many are large, eight or ten feet across, sometimes imbedded in the ground. These flat stones make an excellent shelter for animals, field mice, etc., and especially amphibians and reptiles. The dominant plant in this habitat is the Little Blue Stem.

3. Stream Habitat.

The streams of Ellis County, namely, Big Creek, Smoky Hill River, and the Saline River have been grouped together and classified as a Stream Habitat.

Big Creek crosses the county in a southeasterly direction about midway between the Smoky Hill and Saline Rivers. This stream is fed by springs, and dams are being built at various places causing the stream to widen out above them.

The Smoky Hill River, which flows from west to east in the southern portion of the county, flows in a sandy bed rarely more than a few hundred feet in width.

The Saline River flows in the same direction as the Smoky Hill River but is located in the northern portion
of the county. It is a narrow and shallow river, with occasional pools, rarely more than five feet deep. All through Ellis County, it is situated between rocky bluffs sometimes sixty feet in height.

These streams are all sandy, though Big Creek has less sandy areas than the two rivers. The two rivers are very likely to go dry during the very dry season, but Big Creek, due to the springs, always manages to hold its own.

Inconstancy, however, is a leading characteristic of stream environment, and this has its chief cause in the bestowal of rain. Practically all water courses are subject to overflow of their channels, not being large enough to carry flood waters.

Big Creek went out of its banks in Ellis County in 1932 and caused considerable damage to property in the city of Hays.

These streams are well lined with trees, among them, the American elm, box-elder, hackberry, cottonwood, honey locust, ash, mulberry, willows and cedars, the cedars being prominent along portions of the Saline River. Intermingled with the trees are such shrubs as the sumac, the wild plum, the wild grape and the wild cherry.
4. Rocky Hillside Habitat.

The Rocky Hillside Habitat is composed of rocks which are an outcropping of the Fort Hays limestone and the rocks are sometimes very large and heavy. This habitat does not have the flat rocks of the Benton limestone formation and, consequently, the difference in the kinds of rocks seems to make a difference in the kinds (species) of animals found there. These large rocks are sometimes ten feet in thickness. This limestone disintegrates much faster than the Benton limestone and the ground is covered with small portions of these rocks.

5. Swamp Habitat.

Swamps represent the halfway mark between a body of standing water and dry land. Here the vegetation is generally rich but hydrophytic and shades into the mesophytic at the margins. The soil of the swamp is super-saturated with moisture throughout the year. Half disintegrated plant fragments accumulate and continue for a longer or shorter time unchanged. In this region, they have decomposed to form what is known as muck, which is soft, ossey and paste-like in texture, black in color, and gives off a peculiar odor.
Fig. 30. A view of a Flat Rock Habitat.

Fig. 31. A view of a Rocky Hillside Habitat.
Fig. 32. A view of a Swamp Habitat.

Fig. 33. A temporary Prairie Pond.
Algae of all kinds are found here. The "blanket algae", whose densely felted mats may smother many submerged animals, is most common. The arrow head and the water plantain are also very common here.

6. Permanent Mixed Prairie Pond Habitat.

Many artificial prairie ponds have been built in Ellis County to dam up the water so that it can be used for cattle. In the hilly pasture areas, many gullies and draws have been made into artificial ponds to reserve the water. In some instances, the permanent ponds, that is, ponds that contain water all the year round, are fed by springs, while some depend on rain. The ponds are bordered by the characteristic short grasses, namely, buffalo and grama, while the water is covered with algae in some instances.

7. Temporary Mixed Prairie Pond Habitat.

The temporary prairie ponds of the region are generally slight depressions in the surface of the short grass pasture land or in gullies and draws. These ponds are fed by flood waters and often go dry in periods of drought.

The grasses grow up to the edge of the low places
and sometimes the typical prairie grasses are covered with water, forming a temporary pond.
Fig. 34. A view of Big Creek.
VI. Number of Species Found in Each Habitat.

The figures opposite the names in the following lists of species of amphibians and reptiles indicate the numbers of individuals collected or positively identified in the different habitats.

1. The Mixed Prairie Habitat.

Rana pipiens. Leopard Frog ------------------24
Bufo cognatus cognatus. Western Frog ---------2
Bufo woodhousii woodhousii. Woodhouse's Toad -150
Pituophis sayi. Bull Snake,------------------20
Tantilla nigriceps. Mitre Snake -------------1
Thamnophis radix radix. Garter Snake -------1
Crotalus confluens confluens. Rattlesnake -10
Coluber constrictor flaviventris. Blue racer --16
Heterodon nasicus. Hog-nosed Snake ---------1
Lampropeltis triangulum gentilis. Banded King Snake -------------------------------1
Lampropeltis getulus holbrooki. Say's King Snake ----------------------------------1
Masticophis flagellum flavigularis. Coachwhip Snake -----------------------------1
Terrapene ornata. Box Tortoise -------------32
Cnemidophorus sexlineatus. Race runner -----40
Holbrooki maculata maculata. Spotted Swift ---6
Sceloporus undulatus thayerii. Thayer's Swift -10
Phrynosoma cornutum. Common Horned Lizard ------ 9

2. The Flat Rock Hillside Habitat.

<table>
<thead>
<tr>
<th>Species</th>
<th>Habitat</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Gastrophryne texensis</em></td>
<td>Narrow-mouthed Toad</td>
<td>1</td>
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<tr>
<td><em>Crotaphytus collaris collaris</em></td>
<td>Collared Lizard</td>
<td>49</td>
</tr>
<tr>
<td><em>Eumeces obsoletus</em></td>
<td>Sonoran Skink</td>
<td>26</td>
</tr>
<tr>
<td><em>Sceloporus undulatus thayerii</em></td>
<td>Thayer's Swift</td>
<td>63</td>
</tr>
<tr>
<td><em>Holbrookia maculata maculata</em></td>
<td>Spotted Swift</td>
<td>8</td>
</tr>
<tr>
<td><em>Cnemidophorus sexlineatus</em></td>
<td>Race runner</td>
<td>3</td>
</tr>
<tr>
<td><em>Phrynosoma cornutum</em></td>
<td>Horned Lizard</td>
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<td><em>Pituophis sayi</em></td>
<td>Bull Snake</td>
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<tr>
<td><em>Tantilla nigriceps</em></td>
<td>Mitre Snake</td>
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<tr>
<td><em>Tropidoclonion lineatum</em></td>
<td>Lined Snake</td>
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<tr>
<td><em>Coluber constrictor flaviventris</em></td>
<td>Blue Racer</td>
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<tr>
<td><em>Diadophis punctatus arnyi</em></td>
<td>Ring-necked Snake</td>
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<tr>
<td><em>Crotalus confluens</em></td>
<td>Rattlesnake</td>
<td>2</td>
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<tr>
<td><em>Elaphe laeta</em></td>
<td>Rat Snake</td>
<td>48</td>
</tr>
<tr>
<td><em>Lampropeltis getulus holbrookia</em></td>
<td>Say's King</td>
<td>3</td>
</tr>
<tr>
<td><em>Lampropeltis triangulum gentilis</em></td>
<td>Banded King</td>
<td>3</td>
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</table>

3. The Rocky Hillside Habitat.

<table>
<thead>
<tr>
<th>Species</th>
<th>Habitat</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Gastrophryne texensis</em></td>
<td>Narrow-mouthed toad</td>
<td>2</td>
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<tr>
<td><em>Rana pipiens</em></td>
<td>Leopard Frog</td>
<td>10</td>
</tr>
<tr>
<td><em>Sceloporus undulatus thayerii</em></td>
<td>Thayer's Swift</td>
<td>5</td>
</tr>
<tr>
<td><em>Cnemidophorus sexlineatus</em></td>
<td>Race runner</td>
<td>7</td>
</tr>
</tbody>
</table>
Fig. 35. A view of a Collared Lizard on a flat rock.
Fig. 36. Glass Snake. *Ophisaurus ventralis*.

Fig. 37. Common Horned Lizard. *Phrynosoma cornutum*. 
Phrynosoma cornutum. Horned Lizard ------------------- 1
Terrapene ornata. Box Tortoise ---------------------- 2
Pituophis sayi. Bull Snake -------------------------- 7
Tantilla nigriiceps. Mitre snake --------------------- 1
Tropidoclonion lineatum. Lined Snake --------------- 2
Masticophis flagellum flavigularis. Coachwhip ---- 1
Coluber constrictor flaviaventris. Blue racer ------ 1
Crotalus confluens confluens. Rattlesnake --------- 2
Lampropeltis getulus holbrookia. Say's King Snake ----------------------------------------------- 1

4. The Stream Habitat.

Ambystoma tigrinum. Tiger Salamander -------------- 2
Rana catesbeiana. Bull Frog.---------------------- 42
Acris grylls. Cricket Frog ------------------------ 165
Rana pipiens. Leopard Frog ----------------------- 465
Terrapene ornata. Box Tortoise ------------------- 30
Chelydra serpentina. Snapping Turtle ------------- 31
Amyda spinifera. Soft-shelled Turtle ------------- 8
Chrysemys bellii. Bell's Terrapin ---------------- 4
Pituophis sayi. Bull Snake ---------------------- 1
Natricis sipedon sipedon. Brown Water Snake ---- 18
Thamnophis radix radix. Garter Snake ----------- 6
Coluber constrictor flaviaventris. Blue racer ---- 1

5. The Swamp Habitat.

Thamnophis radix radix. Garter Snake ---------- 6
Fig. 38. Race Runner. *Cnemidophorus sexlineatus*. 
Fig. 39. Thayer's Swift, *Sceloporus undulatus thayerii* (left). Spotted Swift, *Holbrookia maculata maculata* (right).
Matrix sipedon sipedon. Brown Water Snake ------ 4
Chelydra serpentina. Snapping Turtle ---------- 3
Kinosternon flavescens. Mud Turtle ----------- 4
Acris gryllus. Cricket Frog ------------------ 120
Rana pipiens. Leopard Frog ------------------ 45
Rana catesbeiana. Bull Frog ------------------ 1

6. The Permanent Prairie Pond Habitat.
Rana pipiens. Leopard Frog ------------------ 1450
Acris gryllus. Cricket Frog ------------------ 1543
Rana catesbeiana. Bull Frog ------------------ 241
Kinosternon flavescens. Mud Turtle ----------- 11
Terrapene ornata. Box Tortoise ---------------- 3
Chrysemys bellii. Bell's Terrapin ----------- 118
Chelydra serpentina. Snapping Turtle ---------- 68
Pituophis sayi. Bull Snake ------------------- 1
Thamnophis radix radix. Garter Snake ------- 20
Matrix sipedon sipedon. Brown Water Snake ---- 30

7. Temporary Mixed Prairie Pond Habitat.
Rana pipiens. Leopard Frog ------------------ 391
Acris gryllus. Cricket Frog ------------------ 12
Ambystoma tigrinum. Tiger Salamander ------- 20
Pituophis sayi. Bull Snake ------------------- 1
Thamnophis sauritus proximus. Ribbon Snake ---- 1
Fig. 40. Collared Lizard. *Crotaphytus collaris collaris*.

Fig. 41. Sonoran Skink. *Eumeces obsolatus*. 
Thamnophis radix radix. Garter Snake 10
Natrix sipedon sipedon. Brown Water Snake 12
Chrysemys bellii. Bell's Terrapin 8

Figures 42 to 49 show in a statistical form the
habitat distribution of the species of Amphibia and
Reptilia found in Ellis County, Kansas.
Fig. 42. Diagram showing the species of Amphibia and Reptilia found in the Rocky Hillside Habitat. Forty-five individuals, including 13 species, were observed in this habitat.
<table>
<thead>
<tr>
<th>Species</th>
<th>Frequency</th>
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<tr>
<td>Bull Snake</td>
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<td>Nitre Snake</td>
<td>6</td>
</tr>
<tr>
<td>Blue Racer</td>
<td>3</td>
</tr>
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<td>Lined Snake</td>
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<tr>
<td>Say's King Snake</td>
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<td>Rat Snake</td>
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<tr>
<td>Ribbon</td>
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<td>Collared Lizard</td>
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<td>Shink</td>
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<td>Mottler</td>
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</table>

Fig. 43. Diagram showing the species of Amphibis and Reptilia found in the Flat-rock Hillside Habitat. One hundred seventy-three individuals, including 16 species, were observed in this habitat.
Fig. 44. Diagram showing the species of Amphibia found in the Permanent Mixed Prairie Pond. Two thousand two hundred and thirty-four individuals, including 3 species, were observed in this habitat.
Fig. 45. Diagram showing the species of Reptilia found in the Permanent Mixed Prairie Pond. Two hundred and sixty-five individuals, including 7 species, were observed in this habitat.
Fig. 46. Diagram showing the species of Reptilia and Amphibia found in the Mixed-Prairie Habitat. Two hundred eighty-five individuals, including 18 species, were observed in this habitat.
Fig. 47. Diagram showing the species of Reptilia and Amphibia found in the Swamp Habitat. One hundred and eighty-three individuals, including 7 species, were observed in this habitat.
Fig. 48. Diagram showing the species of Reptilia and Amphibia found in the Temporary Prairie Pond. Four hundred and fifty-five individuals, including 8 species, were observed in this habitat.
Fig. 49. Diagram showing the species of Amphibia and Reptilia found in the Stream Habitat. Seven hundred and forty-seven individuals including 12 species were observed in this habitat.
Fig. 50. (1) Blue Racer. (2) Banded King Snake. (3) Bull Snake (upper) and a young Blue Racer (below and to the right). (4) Hog-nosed Snakes, two species (light and dark).
Table I. Habitat Distribution of Amphibia.

<table>
<thead>
<tr>
<th>Name</th>
<th>Mixed Prairie</th>
<th>Temporary Mixed Prairie</th>
<th>Permanent Mixed Prairie</th>
<th>Stream</th>
<th>Swamp</th>
<th>Flat-rocks Hillside</th>
<th>Rocky Hillside</th>
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<tbody>
<tr>
<td>Leopard Frog</td>
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<td>391</td>
<td>1450</td>
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</tr>
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Table II. Habitat Distribution of Snakes.

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<th>Permanent Prairie Pond</th>
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<th>Swamp</th>
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<td>&quot;&quot; (dark)</td>
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<td>Rattle Snake</td>
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<td></td>
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<td></td>
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<tr>
<td>Rat Snake</td>
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<td></td>
<td>48</td>
</tr>
<tr>
<td>Say's King Snake</td>
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<td></td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Banded King Snake</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mitre Snake</td>
<td></td>
<td></td>
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</table>
Table III. Habitat Distribution of Lizards.

<table>
<thead>
<tr>
<th>Name</th>
<th>Mixed Prairie</th>
<th>Prairie Pond</th>
<th>Permanent Pond</th>
<th>Stream</th>
<th>Swamp</th>
<th>Flat Rock</th>
<th>Hillside</th>
<th>Rocky Hillside</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collared Lizard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skink (sonoran)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thayer's Lizard</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63</td>
<td>5</td>
<td></td>
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<tr>
<td>Spotted Lizard</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Six-lined Lizard</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td>7</td>
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</tr>
<tr>
<td>Horned Lizard</td>
<td>9</td>
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<td></td>
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Table IV. Habitat Distribution of Turtles.

<table>
<thead>
<tr>
<th>Name</th>
<th>Mixed Prairie</th>
<th>Temporary Prairie Pond</th>
<th>Permanent Prairie Pond</th>
<th>Stream</th>
<th>Swamp</th>
<th>Flat Rock Hillside</th>
<th>Rocky Hillside</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mud Turtle</td>
<td></td>
<td>11</td>
<td></td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Box Tortoise</td>
<td>32</td>
<td></td>
<td>3</td>
<td>30</td>
<td></td>
<td></td>
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<td>Bell's Terrapin</td>
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<td></td>
<td>118</td>
<td></td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Snapping Turtle</td>
<td></td>
<td></td>
<td>68</td>
<td>37</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soft-shelled Turtle</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>
VII. Relationship between Species and Habitat.

1. Mixed Prairie Habitat.

Of the thirty-nine species of amphibians and reptiles reported in this paper, twenty-one species were found in this habitat. Four species of amphibians, four species of lizards, one species of turtle and twelve species of snakes were included. Eleven species reaching their maximum abundance here are: Box Tortoise, Race runner, Common Horned Lizard, Woodhouse’s Toad, Western Toad, Spadefoot, Bull Snake, Blue Racer, Rattlesnake, Hog-nosed Snakes (light and dark).

The Hog-nosed Snakes were exclusive in this habitat. There were more species of amphibians and reptiles found here than in any other habitat. Snakes were more numerous in this habitat than in any other.

2. Flat Rock Hillside Habitat.

Fifteen species were found in this habitat; one species of amphibian, five species of lizards, and nine species of snakes.

Eight species of reptiles reached their maximum abundance here. They are: Collared Lizard, Sonoran Skink, Rat Snake, Thayer’s Swift, Spotted Swift, Ring-necked Snake and Say’s King Snake.
Fig. 51. A Woodhouse Toad near a flat rock.
Three species of reptiles were exclusive to this habitat, namely Collared Lizard, Sonoran Skink and the Rat Snake.

Lizards were more numerous in this habitat than in any other.

That the flat rocks of the Benton formation afford more shelter than the rocks of the Fort Hays limestone is evidenced by the numbers of individuals collected in the flat rock areas.

3. Stream Habitat.

Thirteen species were found here, being divided as follows: four species of amphibians, five species of snakes and four species of turtles.

There were more species of amphibians represented in the Stream Habitat than in any other habitat. This is a natural occurrence as the amphibian must have water in which to deposit their eggs.

Four amphibia were not observed in the Stream Habitat (Narrow-mouthed Toad, Western Toad, Woodhouse's Toad and the Spadefoot). These all deposit their eggs in water but the writer did not observe any adults in this particular habitat.

One species of snake (ribbon snake) reached its maximum abundance in this habitat.
Fig. 52. Showing location of a Snapping turtle's nest in a creek bank.
One species of turtle (soft-shelled) reached its maximum abundance here.

4. Rocky Hillside Habitat.
Thirteen species were found in this habitat; two species of amphibians, three species of lizards, seven species of snakes and one species of turtle.

Two species reached their maximum abundance here; Narrow-mouthed Toad and the Lined Snake. The Narrow-mouthed Toad was also exclusive to this habitat.

5. Swamp Habitat.
This habitat is represented by the smallest number of species in comparison to the other habitats. Seven species were found in this semi-aquatic habitat; two species of turtles, two species of snakes and three species of amphibians. None reached their maximum abundance here and none were exclusive to this habitat.

6. Permanent Prairie Pond Habitat.
Ten species were found in this habitat; three species of amphibians, three species of snakes and four species of turtles.

Turtles were represented here by more species than they were in any of the other habitats. Permanent ponds furnished them a home throughout the year.
Fig. 53. A mass of Leopard Frog eggs.

Fig. 54. Young Snapping Turtles soon after hatching.
Fig. 55. A view of a Rocky Hillside Habitat.
Fig. 56. An artificial Pasture Pond.
Fig. 57. A permanent Prairie Pond.
Six species reached their maximum abundance here. They are as follows: Mud Turtle, Bell's Terrapin, Snapping Turtle, Leopard Frog, Cricket Frog and the Bull Frog.

The Bull Frog (Rana catesbeiana) was found in the permanent ponds and not in the temporary ponds. Evidently they require a habitat that contains water all the year round.

The Mud Turtle is found in the Smoky Hill River in the southern part of the county. A specimen is reported from the Saline River by L. D. Wooster. None has been observed in Big Creek, which might indicate a difference in the habitat characteristics of the two streams.

7. Temporary Prairie Pond Habitat.

Eight species were found in this habitat. Four species of snakes, one species of turtle and three species of amphibia were listed here.

One species (Tiger Salamander) reached its maximum abundance in this habitat.

The Tiger Salamander was found only in the temporary ponds of the region. Many larvae were found in these habitats.
VIII. New Distribution Records.

This study has brought out five new distributional records of species hitherto unreported in this region: *Eumeces obsoletus*, Sonoran Skink; *Sonora semianulata*, Banded Ground Snake; *Tropidoclonion lineatum*, Lined Snake; *Gastrophryne texensis*, Narrow-mouthed Toad; *Diadophis punctatus armyi*, Ring-necked Snake.

Burt (1928) listed all the lizards of Ellis County, with one exception, the Sonoran Skink, *Eumeces obsoletus*. This species is very common in the flat rock areas throughout the region. During the course of this study, 26 specimens were observed. Specimens were also collected in the flat rock areas in Russell County.

The ring-necked snake was found in this territory. Taylor (1929) says, "It is highly probable that the species is confined to the eastern part of the state, although one specimen in the University collection purports to come from Cove County. I strongly suspect that this locality is erroneous."

During the course of this study many specimens were collected in Ellis and Russell Counties. Fourteen specimens were taken from a flat rock area in the southern part of Ellis County. They are very common in the flat rock areas in early spring.
The Banded Ground Snake was found in this vicinity. Taylor (1929) says, "Specimens of this diminutive species have been taken only in the southeastern corner of the state where they appear to be common."

Two specimens of this snake were taken in a flat rock area just across the county line in Russell County by Leo Brown, on April 23, 1932.

The Lined Snake was rare or at least hard to find among the Reptilian fauna of this county. Taylor (1929) says, "It is confined to the eastern third of the state."

One specimen was taken during the course of this study under a rocky ledge, near the bottom of a hill near Schoenchen in Ellis County.

Many specimens were collected in Russell County in a flat rock area. They were found to be plentiful here in early spring, being found under the large flat rocks on the hillsides.

The Narrow-mouthed Toad is being reported for the first time from this region. Two specimens were found in the study area. One was found out in the open at night at Yocemento Hill, seven miles west of Hays and the other under a rock, four miles west of Hays on the Steve Sack farm.

Specimens were also collected in Russell County. The writer, has a specimen in his private collection,
which was taken in Lincoln County by Leo Brown in 1932.

This study brought out the presence of two species of toads, Western Toad and Woodhouse's Toad, which were not recorded heretofore from this county. This was probably due to the fact that no intensive study had been made of the amphibia of the county.

The only published records of Ellis County, amphibia and reptilia found by the writer, were of the following species: Collared Lizard, Spotted Lizard, Thayer's Swift, Short-horned Toad, Common Horned Toad, Six-lined Lizard, Glass Snake, recorded by Burt (1928). Burt (1933) also recorded the Prairie King Snake.

Many species were known and listed in the unpublished records of L. D. Wooster, Department of Zoology, Fort Hays Kansas State College, Hays, Kansas. These were officially recorded in a paper before the Kansas Academy of Science and published in the Transactions of the Academy (Brennan, 1934).
IX. Summary.

This survey shows thirty-nine species of amphibians and reptiles, which were found in Ellis County. They were divided among the two classes as follows: amphibia, 9; reptilia, 30. The reptiles were divided as follows: snakes, 17; turtles, 5; and lizards, 8. (Alligators and crocodiles are not found in this region.) The amphibians were divided as follows: frogs, 4; toads, 4; and salamander, 1.

Of the thirty-nine species represented here, thirty-six species were collected by the writer and the remainder (3) were taken from the unpublished records of L. D. Wooster, Department of Zoology, Fort Hays Kansas State College. The three species are: Glass Snake, Short-horned Lizard, and Prairie King Snake.

The species listed are as follows:

Amphibians.

1. Ambystoma tigrinum (Greene).
2. Scaphiopus hammondii bombifrons (Baird).
3. Bufo cognatus cognatus (Say).
4. Bufo Woodhousii woodhousii (Girard).
5. Gastrophryne texensis (Girard).
6. Acris gryllus (LeConte).
7. Pseudacris triseriata (Wied).
8. Rana pipiens (Schreber.)
Snakes

1. *Didophis punctatus armi* (Kennicott).
2. *Heterodon contortrix* (Linne).
4. *Coluber constrictor flaviventris* (Say).
7. *Pituophis sayi* (Schlegel).
8. *Lampropeltis getulus holbrookia* (Stejneger).
17. *Tantilla nigricans* (Kennicott).

Lizards.

1. *Crotaphytus collaris collaris* (Say).
2. *Sceloporus undulatus thayerii* (Baird and Girard).
3. *Holbrookia maculata maculata* (Girard).
4. *Phrynosoma cornutum* (Harlan).
5. *Phrynosoma douglasi* hirsutum (Girard).
7. *Cnemidophorus sexlineatus* (Linne).
8. *Eumeces obsoletus* (BaIRD and Girard).

**Turtles.**

1. *Chrysemys belli* (Gray).
2. *Chelydra serpentina* (Linne).
4. *Amyda spinifera* (Le Sueur).

A total of 5563 individuals were observed among the 36 species, during the course of this study. Amphibia, 4784; Snakes, 232; Turtles, 320; Lizards, 227.

The county was divided into seven habitats for a logical consideration of the amphibian and reptilian fauna.

Each habitat has living within it a characteristic amphibian and reptilian fauna. Aquatic habitats contain more amphibians because a water medium is necessary for these creatures to propagate their kind—they all lay their eggs in water.

New distribution records established:


X. Appendix.

The following list shows the results of an incidental survey of snakes and lizards made by a twenty-two year old "fence rider" recorded as he rode over his territory on the Bob Hall Ranch in the northeastern part of Ellis County, in a region locally known as "Lost Canyon."

The writer has verified the identification of the specimens. This record was kept during the month of August, 1933.

August 1. 1 Rattlesnake (Prairie).

2. 2 Rattlesnakes.

3. 1 Rattlesnake, 3 Spotted Lizards.

4. 1 Rattlesnake, 1 Horned Lizard, 1 Bull Snake.

5. 1 Coachwhip Snake.

6. 1 Hog-nosed (light), 1 Race Runner.

8. 1 Bull Snake.

10. 1 Horned Lizard.

11. 2 Rattlesnakes, 2 Horned Lizards.

13. 1 Rattlesnake, 1 Hog-nosed Snake (light).

14. 2 Rattlesnakes.

15. 1 Blue Racer, 1 Garter Snake, 1 Spotted Lizard.

16. 2 Rattlesnakes, 5 Horned Lizards.

17. 1 Bull Snake, 2 Spotted Lizards.
August 18. 2 Rattlesnakes, 1 Horned Lizard.
19. 1 Rattlesnake, 3 Horned Lizards.
20. 1 Rattlesnake.
21. 1 Bull Snake, 5 Horned Lizards.
22. 1 Rattlesnake, 2 Spotted Swifts.
23. 1 Hog-nosed (light).
24. 1 Rattlesnake, 2 Horned Lizards, 1 Race Runner.
25. 1 Rattlesnake, 4 Horned Lizards.
26. 1 Rattlesnake, 1 Horned Lizard,
    2 Spotted Swifts.
27. 1 Rattlesnake.
28. 1 Garter Snake.
29. 1 Rattlesnake.
30. 1 Rattlesnake, 2 Horned Lizards,
    3 Race Runners.
31. 2 Rattlesnakes, 3 Horned Lizards.

Rattlesnakes ----------------------------------- 25
Horned Lizards --------------------------------- 30
Coachwhip Snake ------------------------------- 1
Bull Snake ------------------------------------- 3
Blue Racer ------------------------------------- 1
Spotted Swifts --------------------------------- 11
Race Runners ---------------------------------- 4
<table>
<thead>
<tr>
<th>Snake Type</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>Hog-nosed Snakes</td>
<td>3</td>
</tr>
<tr>
<td>Garter Snakes</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>
XI. BIBLIOGRAPHY


A geological description of Ellis County. Useful in this study.


Used as an authority on snakes. Very useful in this study.


Distribution records of state. Does not list any specimens from this county.


Distribution records of county. Very useful in this work.

Excellent descriptions of Kansas lizards. Very useful in this study.


Lists one species found in Ellis County.


Distribution records. Does not list any Ellis County specimens.


Does not list any specimens from Ellis County.


Does not list any specimens from Ellis County.

A popularized work on the structure and habits of Amphibians. Very useful in this study.


A popularized work on the structure and habits of reptiles. Very useful in this study.


Does not list any Ellis County specimens.


Contains keys to vertebrates. Useful in this study.


An excellent study of life zones in North America.

No specimens from Ellis County listed in this paper.


A complete check list with distribution records. Very valuable in this study.


Lists specimens by counties. Does not list any specimens from Ellis County.


An excellent description of different soils in the state. Useful in this study.