The Kansas School Naturalist

Published by

The Kansas State Teachers College of Emporia

Prepared and Issued by

The Department of Biology, with
the cooperation of the Division of Education

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The Kansas School Naturalist is sent upon request, free of charge, to Kansas teachers and others interested in nature education. Back numbers are sent free as long as the supply lasts, except Vol. 5, No. 3, Poisonous Snakes of Kansas. Copies of this issue may be obtained for 25 cents each postpaid. Send orders to The Kansas School Naturalist, Department of Biology, Kansas State Teachers College, Emporia, Kansas.
The F. B. and Rena G. Ross Natural History Reservation

John Breukelman, Thomas A. Eddy and Emily L. Hartman

On November 17, 1958, the use of a 1040-acre tract of land in west-central Lyon County and northeast Chase County was made available to the Kansas State Teachers College of Emporia by Mr. and Mrs. F. B. Ross, residents of Emporia. The area is known as the F. B. and Rena G. Ross Natural History Reservation. Located approximately four miles west of Americus, or 14 miles northwest of Emporia, the Reservation is primarily rolling bluestem prairie, broken by several shallow ridges and limestone outcrops. A small seasonal creek and several other drainages cross the area.

In January, 1961, Mr. and Mrs. Ross gave to the College the 200-acre tract shown on the map on pages 8 and 9. The gift was accepted by the Board of Regents and the Kansas Legislature. The 200-acre portion of the Reservation is therefore the property of the State of Kansas and officially a part of the campus of the Kansas State Teachers College.

The purpose of this issue of The Kansas School Naturalist is to summarize the history of the area in which the Reservation is located and to suggest briefly the future of the Reservation in terms of teaching, research, service, and conservation. The objectives of the F. B. and Rena G. Ross Natural History Reservation are threefold: to aid in the teaching of biological sciences, to provide an area for research and field study, and to preserve in as nearly as possible its natural state a segment of the Flint Hills-Bluestem grassland.

Of particular interest to elementary and high school teachers and others interested in teaching is the educational objective. Since the Reservation is within easy accessibility of the college campus, field trips and projects may be carried out in conjunction with classroom learning. The Reservation is, in essence, an outdoor classroom or laboratory. Actual field contact with subject matter gives the student and potential teacher of biology, a deeper understanding and appreciation of lasting service to him and the community. Similar benefits de-
rived by the students can be extended to the public in general. Field trips conducted over certain designated areas can acquaint non-college groups with some representatives of the flora and fauna. The importance of land management and conservation can also be pointed out. By such service, public cooperation, appreciation, and support will be enhanced.

**History of the Area**

The original field notes made in 1856 and 1857 described a rolling prairie with considerable amount of good farming land. Some sections were said to be too uneven and stony for cultivation. The brief notations on the sections included within the Reservation were “land rolling or land broken; soil third rate.”

Early descriptions and attitudes shed some light upon what was to be the eventual fate of the land; emphasis was on timber and potential productivity. “Scientific farming” was beginning to change “a desert or open prairie” into a potentially wealthy region, according to the *Emporia Daily Republican*, 1884. This statement clearly indicated that the natural value of the native grass cover was totally incomprehensible at this time. Streams and springs were numerous and furnished adequate water supplies. Wells averaged from 15 to 40 feet deep, indicating a generally higher level of ground water than now exists. The timber belts, consisting of cottonwood, hackberry, walnut, burr oak, hickory, mulberry, Kentucky coffee-tree, elm, locust, and sycamore, were located along the water courses. Orchards were reportedly established and flourishing; these included peaches, apples, pears, cherries, and other small fruits.

Americus, approximately four miles east of the Reservation, was at first the center of settlement in Lyon county. The chief occupations of the settlers were reported in 1881 as farming, stock-raising, and cheese-making. A saw mill and several quarries were also located in the vicinity. One of these quarries is found on the major west-facing outcrop of the Reservation. It supplied building stone for several buildings, including Welch Stadium on the campus of the Kansas State Teachers College of Emporia.

The first available information on landowners in the sections included in the Reservation was published in 1878. The average holdings were 80 acres with two 160-acre plots and several 40’s. The most influential settler, a Quaker missionary to the Shawnee and Kaw Indians, T. H. Stanley, established in the northeastern portion of the area now in the Reservation, an orchard of over 1,200 peach trees and 300 apple trees. Because of these impressive orchards, the community became known as Fruitland.

In order to account for the present condition of land on the Reservation, one must consider some of the trends in agricultural practices in the Flint Hills region. The choice farmsites were located on the rich bottomlands. The upland sites were less desirable because of sloping terrain and decreased water sup-
plies. Nevertheless, some of the sod was broken and planted to corn, millet, wheat, oats, and potatoes. Such crops drew heavily upon the subsurface moisture and nutrients that the native grasses had built up. During the seventies, a combination of drought, dust storms, chinch bugs, and grasshoppers brought hardship and poverty to many. The greatest subdivision of farms into small units occurred during this period of depression. The 1880's saw a return of prosperous times. Farms were consolidated into larger holdings and large acreages of Flint Hills pasture were purchased and stock raising established. Then the true value of the prairie was realized. The sequence of events which followed this realization is one common in American history. The exploitation and abuse of the prairie continued until its destruction seemed almost inevitable. Today, the future of this natural resource depends upon wise management, conservation and general public education.

Description of the Area

The soils of the area are best adapted to native pastures, particularly those covering steep slopes and surfacing the upland ridges of limestone outcrops. Cultivation should be limited to stream valleys, smooth gentle slopes and high divides where the soil depth is 10 inches or more. The accompanying map is a modification of a map and report prepared in 1941 by the U.S.D.A. Soil Conservation Service.

The Region A soils are deep, dark, and moderately friable over tight clay or claypan subsoils. Although suitable for cultivation, constant efforts must be made to prevent sheet and gully erosion. There is a two to six percent slope on this land.

In Region B the surface soil is deep to moderately deep, dark, friable, and silty to clayey in composition. This region includes the sloping uplands and slopes below the outcrops on the reservation. This type of region is the one most extensively cultivated elsewhere in the county.

The grayish-brown, silty or gravelly Region C soils are only three or four inches thick. They occur on steep, rough, broken slopes which are frequently littered with limestone boulders. Overgrazing or burning of these areas has resulted in extensive gully erosion.

In Region D the surface soils are light-brown, silty, clay loams with an average depth of three to five

2. Soil regions map of the Reservation (not including the Chase County portion, Section C, page 8).
meridian is often used. West of this region is a transition zone in which local topography greatly influences the prairie. The largest remaining tract of True Prairie in Kansas is the Flint Hills region. The Reservation lies within the True Prairie, with representatives of both warm and cool-season grasses present, as shown by the following list.

Big bluestem (*Andropogon gerardi*)
Warm-season, tall-grass perennial
Little bluestem (*Andropogon scoparius*)
Warm-season, mid-grass, perennial
Indian grass (*Sorghastrum nutans*)
Warm-season, tall-grass, perennial
Tall dropseed (*Sporobolus asper*)
Warm-season, mid-grass perennial
Side-oats grama
(*Bouteloua curtipendula*)
Warm-season, mid-grass, perennial
Hairy grama (*Bouteloua hirsuta*)
Warm-season, short-grass, perennial
Blue grama (*Bouteloua gracilis*)
Warm-season, short-grass, perennial
Buffalo grass (*Buchloe dactyloides*)
Warm-season, short-grass, perennial
Switchgrass (*Panicum virgatum*)
Warm-season, tall-grass, perennial
Canada Wild-eye (*Elymus canadensis*)
Cool-season, tall-grass, perennial
Sloughgrass (*Spartina pectinata*)
Tall-grass, perennial.

There are probably no prairie areas on the Reservation that have not been grazed during the past 10 years. The extent of grazing has

inches. The subsoils are gravelly or cherty. Since these soil areas are still undergoing development, proper land management to decrease erosion is extremely important.

The annual rainfall is about 30 to 38 inches, with 72 percent of the precipitation occurring during the normal growing season of 186 days. Average temperature for July is about 79°F as compared to an average January reading of about 31°F. The grasslands are subdivided by modern ecologists into the True Prairie and the Mixed Prairie.

The western boundary of the True Prairie is indistinct, since the deciding factors are climatic; the line of 20 inch rainfall or the 97th
varied considerably as shown by the contrast between lightly grazed and overgrazed areas. (Fig. 3) The best stands of native grasses are found on the western two-thirds of section B and the northern half of section D. (See pages 8 and 9.) Here little bluestem and Indian grass dominate the unbroken upland.

The scattered moderately-grazed areas have a thinner cover of little bluestem, side-oats grama, and tall dropseed. The latter species provides an early warning of disturbance. Some stands of little bluestem contain an equal amount of side-oats grama and indicate recovery rather than degeneration of prairie. On shallow ridges of outcrops, a marginal community of side-oats grama, blue grama, dropseed, and some buffalo grass dominates. (Fig. 4) Completely denuded areas particularly around the base of rocks are invaded by hairy grama and dropseed. The major prairie ravines (Fig. 5) are capped on the ridges by smooth sumac.

and spillway bank were seeded with bermuda grass. Around the margins of several older stock ponds are side-oats grama, Canada wild-rye, dropseed, and buffalo grass. These frequently migrate up the small ravines feeding into the ponds.

The Reservation is traversed by three drainages. One of these originates in the wooded ravine in Chase County and flows east, then north. The second forms on the east slope of the prairie upland and flows northeast. The third consists of the watershed for the Gladfelter Pond and flows northeast along a scrubby and wooded course. The courses of all three may be seen on the aerial photograph on pages 8 and 9. These creeks vary in amount and duration of flow through the year. For the most part, their banks are abrupt, some grassed and some bare. (Fig. 7) Occasionally they fan out into small local flood plains which are seepy in places and dotted with permanent or semi-permanent pools. In such areas, the tall grasses of the lowlands find a suitable habitat. The most extensive spring (Fig. 8) has at its source and scattered along its

5. Prairie ravine below, with sumac-capped ridge.

6. Dr. Hartman (center) and graduate students making limnological observations of Gladfelter Pond.
On this aerial photograph of the Ross Natural History Reservation are shown most of the readily identifiable features of biological interest. The squares drawn on the photograph outline the ten-acre grid sections that are marked with steel posts and numbered to indicate their locations. The 200 acres owned by the State of Kansas are shown by the double line extending southward and eastward from the northwest corner of grid section B34. Entrance into the headquarters area, located on the old farm site in A57, is gained through a gate near the southeast corner of this grid section. The route of the nature trail is indicated by the broken line that begins in A57. The numbered white circles indicate the stations, which include:

1. Herbaceous Prairie
2. Tall Grass Prairie
3. Spring
4. Shrub
5. Woodland
6. Stream
7. Prairie
8. Pond

Pond is the only impoundment on the property, and the list includes the main types of vegetation found.
illustrate communities within the
site, as follows:

- Regerow field edge (Osage orange)
- Grass (bluestem-Indian grass)
- Sedge-march (sedge-watercress)
- Sub (sumac-dogwood-plum)
- Woodland (boxelder-maple-cotton-
  -stream-wash (willow-sloughgrass)
- Prairie creek

Sections and numbers of the 10-acre
grid sections are shown in outline.

A24, at the side of B32, in B48, and in
D10.

Natural features can be detected by
careful examination of the photograph.
Three major drainages can be seen. The
forking white lines in C34 indicate the
headwaters of the drainage that courses
through C33, B40, B26, and leaves the
Reservation in B7. The second drainage
starts in B44 and flows northeast. The
third begins in B47 and after passing
through Gladfelter Pond leaves the Reser-
vation in A21. Major limestone out-
crops can be seen as broad wavy ribbons
in B59, B60, and B61, and another in
B27, B26, and B39. Most of the stone
used in building Welch Stadium on the
KSTC campus came from a quarry in
B26. Examples of severe gully erosion are
seen in A25 and B51. Natural wooded
areas are noticeable in C33 and along the
creek in A21, A27, and A38. Windbreak
or fencerow plantings are in evidence in
A10, C49, and D25. Terraces may be
located as lines following the land contour
in B35 and B46, B49, B62, A24 and A25,
and in A12, A21, and A22.
course mats of watercress along with water plantain, great bulrush, clumps of Indian grass, and big bluestem. A marshy community of slough-grass and great bulrush occupy a midway position on its downward course to the east wooded creek.

The wooded ravine beginning in Chase County and extending eastward across the county line is the most heavily wooded area on the Reservation. (Fig. 9) Thick stands of smooth and fragrant sumac, coralberry, and dogwood cover the rock-strewn slopes, crest the outcrops, and migrate marginally out into the adjacent prairie. Also scattered along the ridges are Osage orange, red haw, and honey locust. The largest trees in this area are hackberry, red elm, American elm, green ash, black walnut, and red cedar. Core samples of three trees in this area revealed the following approximate ages: hackberry, 35 years old; black walnut, 38 years old; and red cedar, 55 years old.

Clumps and scattered trees of cottonwood, Osage orange, green ash, and box elder occur along the
wooded creek in section A. Dogwood, sumac and red cedar seedlings occupy the lower slopes adjacent to the creek. One large cottonwood sampled was over 103 years old. The most common hedgerow consists of Osage orange and honey locust. The most diverse hedgerow contains Osage orange, honey locust, red elm, American elm, and hackberry, with dogwood, coralberry, and sumac thickets interspersed. The trees found around the old farmsites include red cedar, green ash, hackberry, Kentucky coffe-tree, black locust, and honey locust. Plum thickets also remain in some areas. The largest tree on the Reservation is a silver maple over 79 years old located in A 27. One of the green ashes in the headquarters region is over 57 years old.

10. A grid marker, at the intersection of grid sections B31, B32, B33, and B34.

11. Data card showing grid sections, drainages, and landmarks; actual size of card about 50% larger than this Figure.
sections of the grid lines. (Fig. 10) Data cards showing the grid sections drainages, and landmarks (Fig. 11) are used for field notes and sight records.

Over a period of years, the accumulated field data will provide an insight into such problems as ecological succession and its effect upon animal populations, the interaction of plants and animals in an undisturbed area, and the biotic responses to climatic change. Studies on natural grassland recovery as well as studies correlating soil factors with range sites and biotic associations will provide a basis for the interpretation of land conditions adjacent to the Reservation. Not all of the important studies are in themselves of such extended duration. Many of them can be completed in one or two years and thus serve as excellent research problems for advanced students. Plant and animal surveys are needed; as are life histories and animal behavioral studies.

In January, 1960, a small (7 × 13 feet) storage building was moved from the campus to serve as a temporary laboratory. It was equipped with electricity, a lab table, chairs, bookcase and shelves, field reference books, a microscope, and minimum collecting equipment. This building and contents were destroyed by fire in August, 1960. The sheet steel structure now serving as a temporary laboratory is somewhat larger and has a separate storage space for tools and equipment. Plans are underway for an approximately 35 × 100 classroom and laboratory building with teach-
ing and research facilities. It is hoped that this building will be in actual construction before the end of 1961.

**Weather**

The activity of animals and the growth of plants is largely influenced by the weather. A clear understanding of the effects of weather on animal and plant life is important to the biologist. Those who are using the Reservation for teaching or research have access to the weather information compiled at the Reservation Station.

Instruments record relative humidity, temperature, barometric pressure, and rainfall. These instruments have pen devices for recording the readings automatically on a chart fastened around a revolving drum. A week’s measurements are recorded on a single chart. Wind direction and speed both in drawing the overall picture of the climate of the area and, more importantly, in relating variations in the life of the area with climatic variations.

**Conservation Practices**

Several types of conservation practices have been done as part of class projects. These have included both land improvement and wildlife management. Using large limbs and brush, natural enclosures and lean-to shelters (Fig. 16) were constructed. These offer protection to wildlife and should provide interesting study areas in the future.

14. This instrument automatically records changes in barometric pressure.

15. The weather station located in grid section B49; temperature, humidity, and barometric pressure instruments in the instrument shelter; rain gauge to the left and evaporation gauge to the right.

16. Lean-to shelter for winter protection of bobwhite and other wildlife.
REPTILES

Common snapping turtle  
(*Chelydra serpentina*)
Ornate box turtle (*Terrapene ornata*)
Collared lizard (*Crotaphytus collaris*)
Great plains skink (*Eumeces obsoletus*)
Prairie skink (*Eumeces septentrionalis*)
Blue racer (*Coluber constrictor*)
Rat snake (*Elaphe guttata*)
Pilot black snake (*Elaphe obsoleta*)
Bull snake (*Pituophis melanoleucus*)
Red-side garter snake
(*Thamnophis radix*)
Plains garter snake
(*Thamnophis ordinatus*)
Ribbon snake
(*Thamnophissauritus proximus*)
Lined snake (*Tropidoctphon lineatum*)

MAMMALS

Opossum (*Didelphis marsupialis*)
Short-tailed shrew (*Blarinia brevicauda*)
Eastern mole (*Scalopus aquaticus*)
Eastern cottontail (*Sylvilagus floridanus*)
Black-tailed jack rabbit
(*Lepus californicus*)
Fox squirrel (*Sciurus niger*)
Plains pocket gopher
(*Geomys bursarius*)
Western harvest mouse
(*Reithrodontomys megalotis*)
Deer mouse (*Peromyscus maniculatus*)
Woods mouse (*Peromyscus leucopus*)
Eastern wood rat (*Neotoma floridana*)
Prairie mole (*Microtus ochrogaster*)
Coyote (*Canis latrans*)
Raccoon (*Procyon lotor*)
Striped skunk (*Mephitis mephitis*)
Spotted skunk (*Spilogale putorius*)

A bird list, including summer and winter residents and migrants, is in preparation but is still quite incomplete.

NATURE TRAIL

Many days would be required for a visitor to see and learn the complex interrelationships of habitats, plants, and animals on the Reservation. He might study for weeks its many acres of upland prairie and
associated wooded ravines, thickets, and aquatic habitats.

Not many visitors can spend days or weeks, so a nature trail is being established to enable the interested student to see representative communities of plants and animals found on the prairie of eastern Kansas. An hour or two spent on this trail is enough for a brief glimpse of the life on the vast prairie.

The nature trail leads to eight stations on the prairie which represent rather distinct assemblages of living things. The communities, named after the dominant plants that occur in the selected areas, are shown on the aerial photo on page 9.

If you are planning a visit, write the Ross Natural History Reservation Committee, Department of Biology, Kansas State Teachers College, Emporia, Kansas, asking for an application form for a guided field trip. All field trips within the Reservation are supervised by personnel of the Department of Biology.

Anyone interested in a more technical description of the natural history and geology of the area may receive a copy of The F. B. and Rena G. Ross Natural History Reservation, by Emily L. Hartman. This was published as Volume 8, Number 4, of The Emporia State Research Studies, June 1960; it may be obtained by writing Thomas A. Eddy, Department of Biology, Kansas State Teachers College, Emporia, Kansas.

Surface evaporation is recorded at intervals by measuring the change in water level over a given period of time, usually not less than 24 hours.

THE COVER PICTURE, showing Mr. Ross with members of the Department of Biology at the main entrance to the Reservation, was taken by David Stormont, student in the Department of Art. Most of the other photographs were taken by various students and faculty members, mostly incidental to field trips. Figures 2 and 11 were reprinted from Hartman (1960). The aerial photograph, pages 8 and 9 was obtained through the help of the local Soil Conservation Service. The grid section lines and other symbols were drawn on this map by Robert F. Clarke and Robert J. Boles of the faculty of the Department of Biology.

THE 1961 WORKSHOP IN CONSERVATION will be conducted in two sections, from June 5 to June 23, and from June 26 to July 14, inclusive. As in the past several years, the Workshop will cover water, soil, grassland, wildlife conservation, and conservation teaching. The first section is open to any interested person; the second is limited to those with an established interest in conservation education and some teaching experience. For further information write the director, Thomas A. Eddy, Department of Biology, Kansas State Teachers College, Emporia, Kansas.
Our dream visualizing the introduction of the principles of the great out-of-doors laboratory into the education of Kansas teachers has become a reality by the establishment of the Natural History Reservation. The Reservation, being under the jurisdiction of the Kansas State Board of Regents, is an extension of the campus of the Kansas State Teachers College. We are happy for the opportunity of entrusting it to the use of the faculty and students of the Department of Biology, confident that the challenge of unlocking the vast storehouse of Nature's riches will command their best efforts and that in the development of the teaching and research programs of the Reservation it may increasingly serve future generations of inquiring minds.

It is our hope that you who are teachers in the schools of Kansas will find it possible and profitable to use the facilities of the Reservation in your teaching programs.

F. B. Ross
RENA G. ROSS
Emporia, Kansas
April, 1961