# SHEEDER PRAIRIE PRESERVE
# A NATURAL PRAIRIE LANDSCAPE IN GUTHRIE COUNTY, IOWA

by

Robert K. Kennedy

Iowa State Preserves Advisory Board
Des Moines

# SHEEDER PRAIRIE PRESERVE:

## a natural prairie landscape in

## Guthrie County, Iowa

A Report

to

The Iowa State Conservation Commission

and to

The Iowa State Preserves Advisory Board

by

Robert K. Kennedy

edited by Mary S. Richards

supervised by Roger Q. Landers

Iowa State University

Department of Botany and Plant Pathology

1970

Table of Contents

List of Figures

# The Natural diversity of Sheeder Prairie

Sheeder Prairie is a distinct exception to the comment, "If you've seen one prairie, you've seen them all." Sheeder Prairie's real, intrinsic beauty is exemplified by its biological and physical diversity. The topography is rolling; a direct reflection of the rolling, loess-mantled Kansan glacial surface (figure 1). Interspersed between the hills are numerous gently-sloping and intersecting drainage ways which ultimately merge at the prairie's west edge. The vegetation follows the topography (figure 2) with the drainage ways containing many of the taller-growing species as well as a number of species which are restricted to the wetter habitats. These are rarely present on the uplands or side-slopes which are best characterized by scattered shrubs of redroot and uplant willow. The grasses are everywhere, varying according to the position on the slope and to available moisture (figure 3).

The drainages are good examples of diversity (figure 4). The obvious dominants are Box Elder, Black Willow, and American Plum while the understory is composed of variously distributed Virginia wild rye, giant ragweed, black snakeroot, avens, violet wood-sorrel, and tall bellflower. As indicated by their habitat these species are more or less shade tolerant. Species associated with the drainages, but growing out of the influence of deep shade are cup plant, horsemint, timothy, various goldenrods, rosinweed, and several others. Many of these lowland species can be considered adventives or invading species because they are plants which establish quickly in disturbed sites.

The most impressive method of observing the diversity on Sheeder

Prairie is to visit the site during early spring and again during the early part of August. The contrast is striking as changes occur in flower color, the type of plant in flower, and plant height. These changes show in a very striking manner the localized habitat of many species and the subsequent zonation from this habitat restriction.

## Historical Notes

Sheeder Prairie is located in the SW corner, Sec. 33, Seely Township, Guthrie County, Iowa, about 4 miles west and one mile north of Guthrie Center. It is 25 acres in size with 23 acres of prairie and the remainder made up of formerly plowed areas around the edges which are gradually reverting to the prairie condition. Zones on the north, northeast corner, and the east are the areas formerly cropped in corn, oats, or barley.

The prairie was purchased in 1961 after several years of negotiation, from Oscar Sheeder, son of the original homesteader of the first farm west of what is now Sheeder Prairie. The purchase price was $200.00 per acre. The fields to the west and north adjoining the prairie have been in cultivation for at least 50 to 60 years while the field to the east has been cultivated for about 65 years.

Under the management of the Sheeder family, the prairie was mowed annually in late fall from ca. 1865 until 1965, with the exception of 1963 when no hay was cut at the request of the State Conservation Commission. When mowing was done the hay was either stacked or baled. Evidence of haying is still present in the form of distinct vegetation zones denoting former haystack sites in the low alluvial area and in the extreme northeast corner of the prairie.

The importance of fire as a management tool was recognized and used at an early date on Sheeder Prairie. The first intentional fire occurred ca. 1890 in late fall after haying had been completed. This practice was continued about every third year until 1946 when an accidental fire burned the entire prairie. This fire was started by a discarded cigarette and consumed the entire hay crop of three stacks, 1000 bales and most of the fence along one side of the prairie. The entire Sheeder family turned out to save the hay crop, but the attempt was unsuccessful and only resulted in severe burns on the hands and arms of Clara Sheeder, Oscar's wife. The prairie has not been burned since then.

Grazing, as far as is known, has never been intensive in Sheeder Prairie and has always occurred in late fall, if at all. Cattle had been allowed to wander into the prairie from adjacent fall stubble fields, but this influence ceased about 1961 when the fencing was completed.

Two old trails run through the prairie; a farm trail which runs from the southwest corner to the northeast corner and an Indian trail which enters near the present gate and exits near the middle of the west border. The Indian trail continues from the west border of the prairie to the tree-covered ridgetop a quarter mile west of the prairie proper. At some point on this ridge-top to the south of the trail, is an old Indian mound which has not been disturbed as far as is known.

## Investigations

Kennedy (1969) studied the vegetation of Sheeder Prairie intensively along two belt transects (Fig 5) which were subjectively placed to obtain representative samples. Each transect was divided into several discrete

Figure 5. Sketch of Sheeder Prairie showing drainage pattern, formerly plowed area, erosion sites and some species observed August 2, 1969.

Area 1-understory
Virginia Wild Rye-dominant
Giant Ragweed
Avens

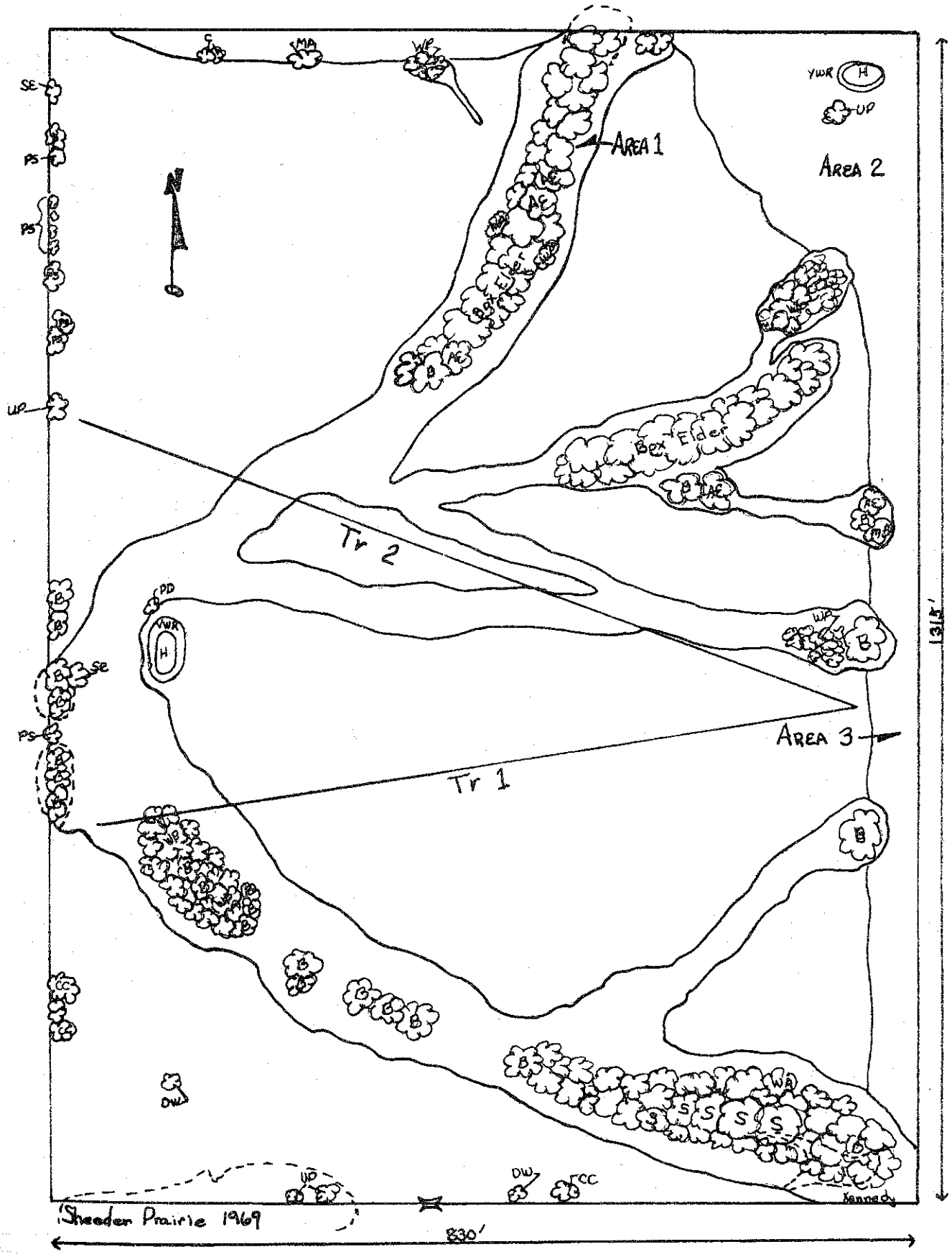
Area 3-formerly plowed
Frequent Species
Golden Alexanders
Rosin-weed
Big Bluestem
Compass Plant
Partridge Pea
Whorled Milkweed
Cinquefoil
Bluegrass

Legend
AE-American elm
DW-Red Osier Dogwood
UP-Siberian Elm
CC-Choke Cherry
SS-Black Willow
WA-White Ash
B-Boxelder
WP-Wild Plum
PS-Wild Cherry
SE-Slippery Elm
PD-Cottonwood
C-Hazel
MA-White Mulberry
H-Hemp
VWR-Virginia Wild Rye

---Erosion areas
⋈ Gate

Area 2-formerly plowed
Frequent Species
Common Ragweed
Red Clover
Timothy
Daisy Fleabane
Whorled Milkweed
Goat's Beard
White Sweet Clover
Canada Wild Rye
Smooth Brome
Hedge Bindweed
Partridge Pea
Cinquefoil

Less Frequent Species
Yellow Coneflower
Flowering Spurge
Common Milkweed
Rosin-weed
Bush Clover


SE
PS
PS
UP
PD
YWR
H
SE
PS
DW
UP
DW
CC
MA
YWR
H
UP
AREA 1
AREA 2
AREA 3
Tr 2
Tr 1
Box Elder
AE
B
WA
S
Kennedy
Sheeder Prairie 1969
830'
1318'

stands based upon the soil parent material and slope position. The transects, which measure 20 m x 230 m (Transect 1) and 20 m x 280 m (Transect 2), may be relocated for further research, by the description in Kennedy's thesis (1969). By random sampling in the transects and other means, Kennedy compiled a species list for the preserve (Appendix 1), investigated the frequency of occurrence of species, determined dominance of species in each stand, estimated the productivity of the grassland, and attempted to correlate the vegetation measurements with the diverse landscape and soils found on the prairie. The following discussion is compiled from his study.

## Topography

Sheeder Prairie is located in the Shelby-Sharpsburg-Macksburg soil association area, which includes soils formed from loess and glacial till primarily under the influence of prairie vegetation. Extensive erosion in this area has removed some or all of the loess from the sideslopes exposing paleosols and unweathered glacial till. The modern landscape consists of soils formed from loess, paleosols, unweathered till, sediment and alluvial materials (Figure 6).

The loess derived soils are well, to moderately well-drained, so provide a fairly dry, gently sloping habitat. Sideslope soils formed on unweathered Kansan and Nebraskan till are also fairly well drained; however, soils formed on the late Sangemon paleosols lie over thick clay subsoils, making drainage poor. Soils derived from sedimentary till over till are generally coarse and steep, therefore dry and often disturbed, although their position on the slope often provides them with a good moisture supply. The flat alluvial soils generally have a high moisture content. On Sheeder

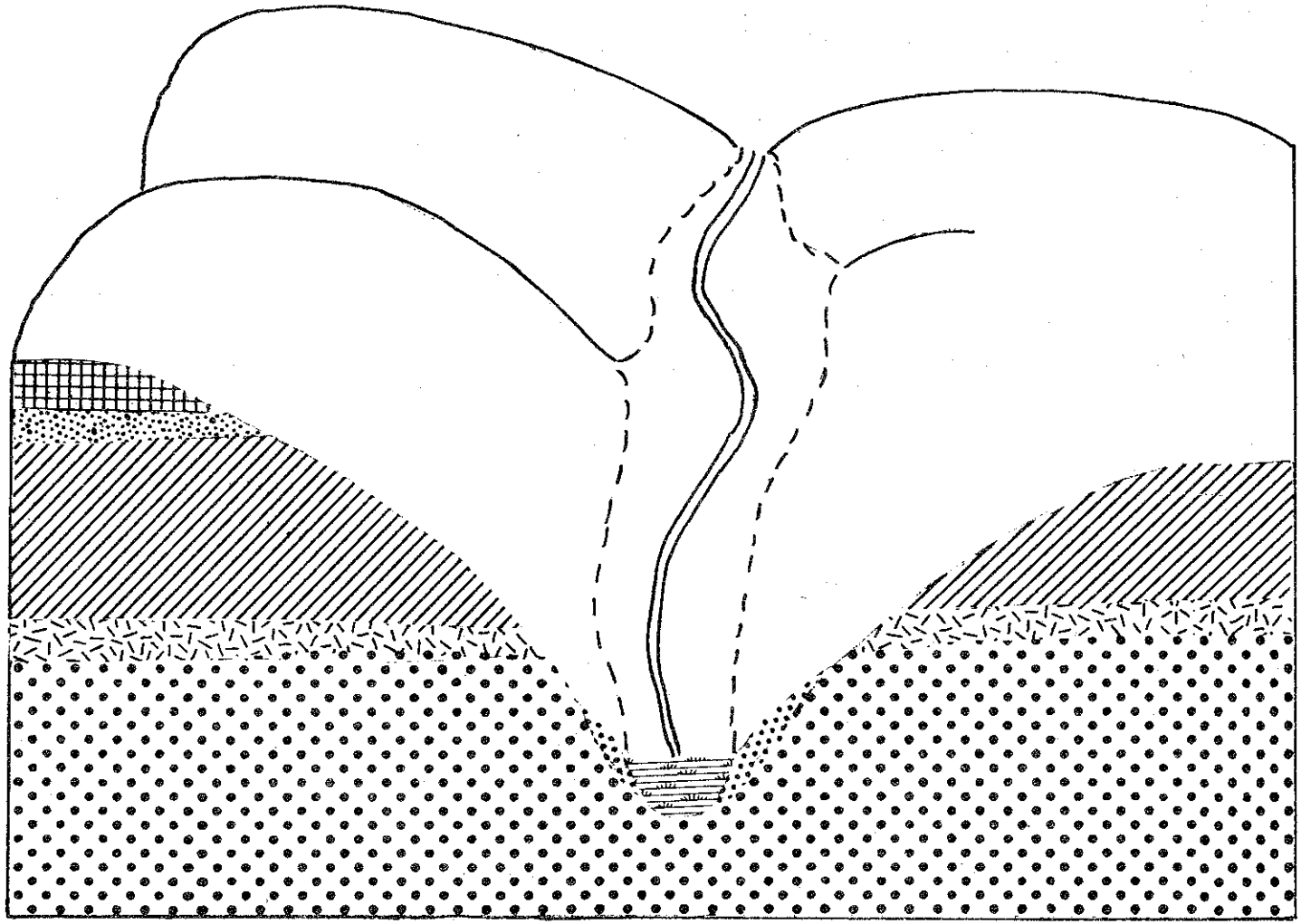
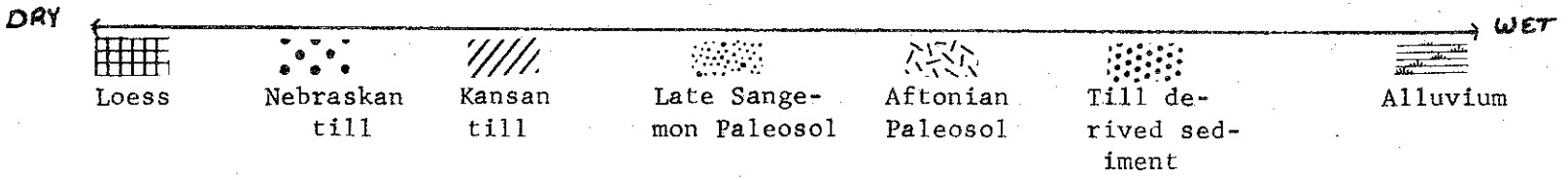


Figure 6. Schematic Model of soil parent materials on Sheeder Prairie



Prairie the soil moisture grades from dry to wet as follows: loess, till, Sangemon paleosol, Aftonian paloesol, till-derived sediment over till, and alluvium. Figures 7 and 8 show the position of the stands in Transects 1 and 2 in relation to slope position, aspect and parent material. When specific stands are considered, this ranking may not hold true due to the differences in degree of slope and aspect. For example, stands 9 and 17 have the same parent material but differ in aspect and slope degree. Stand 9 faces ESE while stand 17 faces WSW. On this basis stand 17 would be expected to be drier, but due to a much steeper slope stand 9 probably has less available soil moisture. Such varying combinations of factors make it difficult to predict where any given species might occur, or explain exactly why it does occur in a specific site.

## Species Frequency

Although 54 plant families contribute to the flora of Sheeder Prairie, it is obvious that certain families contribute much more than others. Table 1 compares the contribution of selected families to the prairie flora. Although there are 180 species in this table, in actuality, not all species are represented equally. Some are very rarely seen, in fact, 84 species were never sampled on the belt transects. Other species were found in almost every plot. Of the 84 unsampled species, 23 may be placed into three categories, namely: early spring plants which had disappeared before sampling started, woody plants which are restricted to the drainage ways and species found in areas of local disturbance such as animal mounds, erosion sites and sites of former haystacks. Such species are listed below.

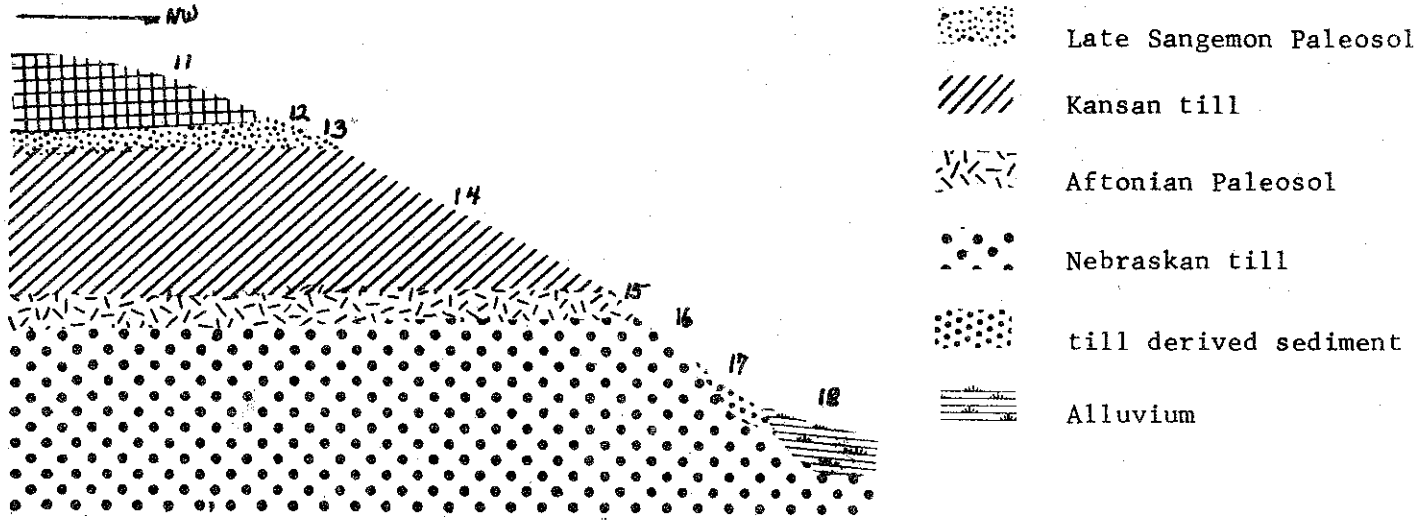



Figure 8. Relationship between parent materials and stands in Transect 1.



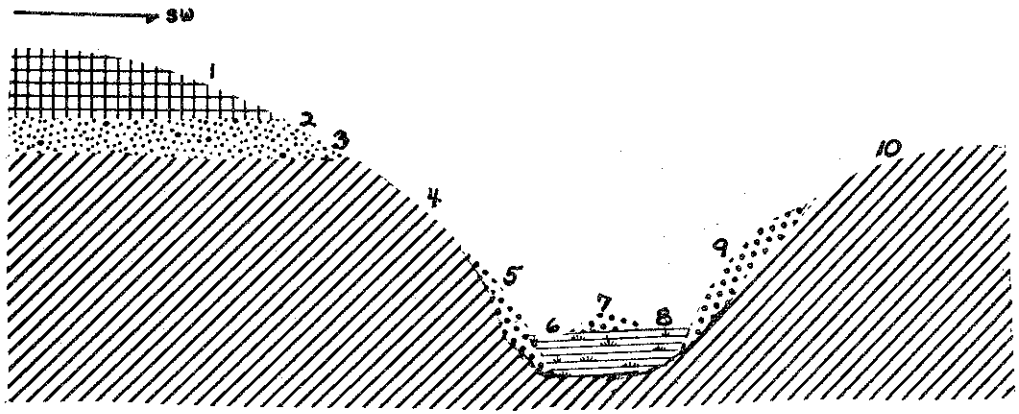



Figure 7. Relationship between parent materials and stands in Transect 2.

| Early Spring group | Woody group | Weedy group |
|---|---|---|
| Prairie False Dandelion | Hazel | Water Hemp |
| Groundsel | White Ash | Pigweed |
| Ground Plum | Black Cherry | Hemp |
| Blue-eyed Grass | Choke Cherry | Hedge Bindweed |
| Larkspur | Cottonwood | Wartweed |
| Common Lousewort | Black Willow | Pepper-grass |
| Star Grass | Siberian Elm | Smartweed |
| | Frost-grape | Sour Dock |

Table 1. Contribution of selected families to the floral composition of Sheeder Prairie.

| | number of | | | total species percent |
|---|---|---|---|---|
| | families | genera | species | |
| >two genera/family | 8 | 75 | 112 | 62.2 |
| Compositae | | 28 | 46 | 25.5 |
| Gramineae | | 18 | 29 | 16.1 |
| Fabaceae | | 10 | 15 | 08.3 |
| Rosaceae | | 5 | 8 | 04.4 |
| Umbelliferae | | 5 | 5 | 02.8 |
| Labiatae | | 3 | 3 | 01.7 |
| Ranunculaceae | | 3 | 3 | 01.7 |
| Scrophulariaceae | | 3 | 3 | 01.7 |
| two genera/family | 8 | 16 | 18 | 10.0 |
| one genus/family | 38 | 38 | 50 | 27.8 |
| Totals | 54 | 129 | 180 | 100.0 |

The remaining unsampled species were probably missed due to their inherent rarity on the preserve.

Species that were encountered most frequently in transect 1, although not necessarily dominant, were rosette panic grass, porcupine grass, leadplant, prairie phlox, golden alexanders, flowering spurge, and little bluestem. Porcupine grass, rosette panic grass and little bluestem were the most frequently found species on Transect 2. Most species, if encountered at all, were encountered several times. Only 8 species in Transect 2 and 15 species in Transect 1 occurred in no more than one plot. Only blazing star and field crest occurred at this low frequency category in both transects.

## Dominance

When cover data were taken, 16 species in Transect 1 and 15 species in Transect 2 were considered dominants, that is, they occupied 50% or more of the cover and were taller than most other species. (Table 2). Eleven of these species were dominant in both transects.

When productivity data were considered in addition to cover estimates, dominance was based upon the $g/m^2$ (grams per square meter) of oven-dry-weight in each stand. Eight species emerged as dominants in Transect 1 and 12 species in Transect 2, a total of 14 different species including 8 grasses, 3 forbs and 3 woody shrubs (Table 2). Six of these were dominant on both transects. A comparison of this list of dominants with that determined by cover estimates reveals 5 species considered dominant by both methods in transect 1 and 10 species in Transect 2. Most species listed are included on more than one list, in fact, leadplant, big bluestem, little bluestem, redroot, Kentucky bluegrass, upland willow, rosinweed, Indian grass,

Table 2

Dominant species determined by cover estimation and oven dry weights in transects 1 and 2.

| Transect 1 | | Transect 2 | |
|---|---|---|---|
| Cover dominants | Mass Dominants | Cover Dominants | Mass Dominants |
| Ambrosia trifida | | | |
| Amorpha canescens | Amorpha canescens | Amorpha canescens | |
| Andropogon gerardi | Andropogon gerardi | Andropogon gerardi | Andropogon gerardi |
| Andropogon scoparius | Adropogon scoparius | Andropogon scoparius | Andropogon scoparius |
| Aster ericoides | | Aster ericoides | |
| | | Baptisia leucophaea | |
| Ceanothus ovatus | Ceanothus ovatus | Ceanothus ovatus | Ceanthous ovatus |
| | | Elymus canadensis | Elymus canadensis |
| Elymus virginicus | | Elymus virginicus | |
| | Eryngium yuccifolium | | |
| Monarda fistulosa | | | |
| | | | Muhlenbergia racemosa |
| Poa compressa | | Poa compressa | |
| Poa pratensis | | Poa pratensis | Poa pratensis |
| | | Rhus radicans | |
| Salix humilis | | Salix humilis | Salix humilis |
| Silphium integrifolium | | Silphium integrifolium | Silphium integrifolium |
| | Sorghastrum nutans | Sorghastrum nutans | Sorghastrum nutans |
| Sporobolus heterolepis | Sporobolus heterolepis | Sporobolus heterolepis | Sporobolus heterolepis |
| | Stipa spartea | Stipa spartea | Stipa spartea |
| | | | Veronia Baldwini |
| Zizia aurea | | | |

prairie dropseed and porcupine grass appear on three of the four lists, verifying their importance in the prairie vegetation. Of these dominant species, 8 are most characteristic of the upland areas, principally Sharpsburg, Shelby and Adair soil types. They are leadplant, little bluestem, false indigo, redroot, upland willow, Indian grass, prairie dropseed and porcupine grass. In all the stands sampled, at least one of the 3 grasses, little bluestem, prairie dropseed and porcupine grass, was dominant (figure 9).

## Species Distribution

Study of species distribution reveals two basic categories of plants, those that are widely distributed and difficult to relate to site characteristics, and those that are restricted to particular conditions. Those species that are present in most stands include Kentucky bluegrass, rosette panic grass, prairie phlox, golden alexanders, flowering spurge, purple coneflower and yellow coneflower (figure 10).

Species restricted to the drainage ways are box elder, wild plum, black willow, white ash, cottonwood, common elder, poison ivy, tall bellflower, Culver's root, black snakeroot, Missouri goldenrod, giant ragweed, bedstraw, northern bedstraw, stinging nettle and horsemint.

Local disturbances (figure 11) in the broad alluvial area allowed the appearance of hemp, virginia wild rye, pigweed, water hemp, lamb's quarters and horseweed. Other species in this area were Pennsylvania smartweed, self-heal, wild lettuce, groundsel, sour dock, hedge bindweed, white grass and redtop.

Two woody species found almost exclusively in the relatively stable upland areas are redroot and upland willow. The upland willow was found in stands 1, 2, 3, 11 and 12 and was dominant in 11 and 12. These stands are all on relatively well drained parent materials, loess and lower Sangemon paleosol. Redroot occurs in stands 2 and 12 in conjunction with the upland willow, and also in stand 9 which is a steep, relatively dry sideslope based on till-derived sediment. Two non-dominant forbs also found exclusively on the upland loess and late Sangemon paleosol are blazing star and frostweed.

False prairie indigo is another dry-area species found only on the well drained Nebraskan till of stand 16. Leadplant, little bluestem and porcupine grass were also important on this site.

Side-oats grama and compass plant were important on the steep slope of stand 5. This was the dryest stand sampled. Little bluestem was also important here, as it dominated 85% of the plots in which it was present. False gromwell was found exclusively on stands 7 and 9, also dry sites. Stand 7 occupied a position between two alluvial stands, while stand 9 occupied a steep, much disturbed slope where giant ragweed, yellow foxtail and Kentucky bluegrass were locally important.

The wetter stands supported a greater variety of species than the drier areas. Several species not found on any other parent material grew in the broad alluvial areas which contained the greatest number of species. Simple aster, thistle and yarrow occur exclusively in these areas but were infrequently sampled. Poison ivy, prairie dropseed, big bluestem and golden alexanders are dominants in these areas, although not restricted to them.

Attempts to demonstrate gross changes in productivity with changes in parent material and soil moisture were largely unsuccessful. Stand 2 on Kansan-till parent material had the highest average dry-weight of standing material of any stand, yet the average for till in all the stands was the lowest of all the parent materials. Stand 8 on alluvial soils had the widest range of oven-dry weights per plot, ranging from 295 g to 1495 $g/m^2$ while the average for alluvial soils was 505 $g/m^2$.

A native prairie is a productive community; in this study a meter-square quadrat averaged about 448 g oven-dry weight. The slope, aspect and moisture conditions vary tremendously, and so do the plants found on the various sites. Although the native species are growing where they are best adapted to successfully complete their life cycles, production varies greatly from one site on the prairie to another. There appeared to be no significant correlation between site moisture and production.

## Summary

In summary, the vegetation of Sheeder Prairie changes in relation to the variable landscape. The upland areas are generally dominated by little bluestem and porcupine grass with prairie dropseed scattered throughout and increasing down slope. Redroot and Upland willow also characterize these relatively stable upland slopes. Big bluestem is scattered throughout the prairie with major occurrence on the lower slopes and alluvial areas. The larger drainage ways are dominated by box elder associated with black willow and spreading American plum thickets, and several large herbaceous species. With the exception of the species occupying the drainage ways, the vegetation of Sheeder Prairie is a good example of the native prairie that once covered extensive areas of the Iowa landscape.

## The Prairie Preserve, Some Observations toward Management

The designation of Sheeder Prairie as a state preserve implies at least three things: 1) that the prairie is a unique entity by virtue of its geographical position, topography, vegetation, soil, and local climate; 2) that the area will be preserved for its esthetic value and for posterity; 3) that some form of management will be employed.

The uniqueness of the prairie denotes the practical value of illustrating prairie soil types in place, of relating topography and climate to geographical location, of protecting a natural resource, of relating vegetation to topography and soil type, and of establishing a field laboratory for scientific investigation.

Preservation of this relict area implies some degree of management and management of any specific area implies the imposition of a set of values concerning that specific area. Management can only be successful if the objective (end result of the value set) is achieved. This can only be done by allowing the objective to define the management approach. Landers (1966) outlines four basic proposals as a preliminary step toward the needed general overhaul of practices for natural landscapes in the state of Iowa. Slightly modified they are:

1. The definition of permanent objectives for each specific area to give direction to management.
2. When the definition of permanent objectives gives rise to conflicts of interest over the objectives, that objective which modifies the area least will have first priority.
3. To provide interpretive services by broadening the natural history information available for natural areas.

4. To increase the availability of funds for research on natural areas which will provide information ultimately for management.

The acceptance of these proposals by both government agencies and the general public could conceivably start a trend toward effective and meaningful preserve management.

A few observations and opinions are outlined below. These may prove useful in establishing the value set and subsequently the objectives for Sheeder Prairie management.

1. Regardless of the management objectives, the accurate and current documentation of all management and research activities should have the utmost priority. Without this documentation meaningful and effective management does not exist.

2. No valid arguments are currently available to justify the use of any chemical spray or other agent to control "weedy species" which invade disturbed areas in this preserve or other pests which may be temporarily present from time to time. The use of these toxic chemicals only succeeds in prolonging a temporary upset in the ecological stability of the site. One example of natural biological weed control is the gradual replacement of two stands of hemp on former haystack sites (Figure 11). These areas provide an interesting observation of the competition between native prairie species and "weedy" adventives. In one of these sites Cannabis sativa, hemp, comprised a solid oval stand some 18 feet by 38 feet in October 1968. Surrounding the hemp is a ring of Elymus virginicus, virginia wild rye, which varies in width from five to fifteen feet with the prairie adjoining the outside border. With each succeeding season the stand

of hemp, an annual, becomes smaller as the wild rye replaces it and other prairie plants expand into Virginia wild rye. In a few years the hemp will be relegated to an insignificant role on this site.

3. There seems to be no justifiable reason to allow further damage to the prairie from vehicle traffic. Currently there are numerous vehicle tracks through the prairie which are visible in the aerial photos (Figure 1). On the ground they persist as ruts or solid areas of bluegrass sod which is a strong competitor under continued disturbance. Any vehicle traffic, even for research purposes, should be carefully considered and definitely controlled. This might be easily accomplished by providing a substantial lock for the gate and controlling access to the keys. Mowing can be ruled out for lack of an economic incentive or a definite management advantage at this time.

4. This prairie reflects the attributes of topography, vegetation, and watershed development. Any attempt to remove the large trees would result in an almost catastrophic disruption of the ecological balance now present in the area. Major drainage way species which are reproducing are box elder and American Plum. Black willow is also abundant in the south drainage. The major areas of reproduction are down the drainage way with very little lateral movement. It might be important to note that these drainage ways, except for the trees, might have become huge gulley cuts which are in evidence throughout the country. At any rate, Sheeder Prairie would certainly lose much of its character and beauty were these trees removed. The reproduction of the box elder and the American plum can probably be controlled through spring burning on selected sites. This would provide informa-

tion on fire effects on the woody species of the area and facilitate the future deliniation of concrete objectives relating to these species.

5. Fire as a management tool may also prove useful on the remaining area of the prairie as evidenced by one recent Iowa study (Richards, 1969). Controlled burning seems to favor the growth and development of many prairie species while at the same time reducing the amount of litter material. Large amounts of organic litter tend to tie up many nutrients and inhibit the growth of native prairie species while promoting the growth of bluegrass. Because Sheeder Prairie is in a drier region than Kalsow Prairie, where much of the fire research has been conducted, fire management should not be recommended for Sheeder until local research can be conducted.

6. The formerly cropped areas along the north, northeast corner, and east borders of the prairie are showing distinct signs of the slow process of return to prairie after plowing. Several of the prairie species have already invaded these sites, and under the influence of fire this process may be speeded up somewhat.

7. Several erosion sites should be documented with some provision for control. The formerly plowed area in the northeast corner is tending toward stability as is the road borrow area just west of the entrance. Small gullies are apparent in both the northern most and the southern most drainage ways at the fence lines. All of these areas are potential trouble spots; however, little can be done to prevent gully formation except to divert the water which is highly impractical in this situation. In all of these situations the plant cover seems to be holding its own as the gullies seem to be active mainly in early spring.

8. The fence along the west border is down in several places and should be replaced with material of the same quality as that on the east and south borders. This should then become one of the few routine preventive maintenance tasks needed in this area.

9. The entrance approach needs to be reworked and widened to accommodate at least two parked vehicles. This would get visitors off the county road to reduce a potential hazard. This can be done in the existing space between the fence and road and needn't impinge on the preserve property in any manner. An area of about two to four acres on the east edge of the prairie was released from cultivation at the same time as the east buffer strip and this area may prove to be an advantageous entrance in the future if it can be acquired.

10. It would be in the best interests of the Sheeder Prairie Preserve to offer interpretive services from the Springbrook State Park office. Descriptive information and scheduled tours should be made available for visitors with instructions posted at the entrance of Sheeder Prairie.

# BIBLIOGRAPHY

Landers, R.Q. 1966. Management of natural landscapes in Iowa: an appraisal. Iowa Academy of Science Proceedings 73: 155-160.

Kennedy, R.K. 1969. An analysis of tall-grass prairie vegetation relative to slope position, Sheeder Prairie, Iowa. Unpublished M.S. Thesis, Ames, Iowa, Library, Iowa State University of Science and Technology.

Richards, Mary Seitz. 1969. Observations on responses of prairie vegetation to an April fire in Central Iowa. Unpublished M.S. Thesis. Ames, Iowa, Library, Iowa State University of Science and Technology.

Appendix I

List of species observed on Sheeder Prairie during 1968-69 arranged alphabetically by family and including common names

| | |
|---|---|
| ACERACEAE | |
| Acer Negundo L. | Box Elder |
| AMARANTHACEAE | |
| Acnida tamariscina (Nutt.) Wood. | Water Hemp |
| Amaranthus retroflexus L. | Pigweed |
| AMARYLLIDACEAE | |
| Hypoxis hirsuta (L.) Cov. | Star Grass |
| ANACARDIACEAE | |
| Rhus radicans L. | Poison Ivy |
| APOCYNACEAE | |
| Apocynum sibiricum Jacq. | Indian Hemp |
| ASCLEPIADACEAE | |
| Asclepias tuberosa L. | Butterfly Weed |
| Asclepias syriaca L. | Common Milkweed |
| Asclepias verticillata L. | Whorled Milkweed |
| Asclepias viridiflora Raf. | Green Milkweed |
| BETULACEAE | |
| Corylus americana Walt. | Hazel |
| BORAGINACEAE | |
| Lithospermum canescens (Michx.) Lehm. | Hoary Puccoon |
| Onosmodium occidentale Mackenzie. | False Gromwell |
| CAESALPINIACEAE | |
| Cassia fasciculata Michx. | Partridge Pea |
| CAMPANULACEAE | |
| Campanula americana L. | Tall Bellflower |
| CAPRIFOLIACEAE | |
| Sambucus canadensis L. | Common Elder |
| CHENOPODIACEAE | |
| Chenopodium album L. | Lamb's Quarters |
| CISTACEAE | |
| Helianthemum Bicknellii Fern. | Frostweed |
| COMMELINACEAE | |
| Tradescantia bracteata Small. | Spiderwort |

(Continued)

| | |
|---|---|
| COMPOSITAE | |
| Achillea Millefolium L. | Yarrow |
| Agoseris glauca (Pursh) D. Dietr. | Prairie False Dandelion |
| Ambrosia artemisiifolia L. | Common Ragweed |
| Ambrosia trifida L. | Giant Ragweed |
| Antennaria neglecta Green. | Pussy-toes |
| Antennaria plantaginifolia (L.) Richards. | Plantain-leaved Pussy-toes |
| Artemisia ludoviciana Nutt. | Mugwort |
| Aster azureus Lindl. | Azure Aster |
| Aster ericoides L. | Many-flowered Aster |
| Aster laevis L. | Smooth Aster |
| Aster sericeus Vent. | Silky Aster |
| Aster simplex Willd. | Simple Aster |
| Cacalia tuberosa Nutt. | Indian Turnip |
| Cirsium altissimum (L.) Spreng. | Thistle |
| Conyza canadensis (L.) Cron. | Horseweed |
| Coreopsis palmata Nutt. | Tickseed |
| Crepis sp. L. | Hawksbeard |
| Echinacea pallida Nutt. | Purple Coneflower |
| Erigeron strigosus Muhl. | Daisy Fleabane |
| Eupatorium rugosum Houtt. | White Snakeroot |
| Helenium amarum (Raf.) Rock. | Sneezeweed |
| Helianthus grosseserratus Martens. | Sunflower |
| Helianthus laetiflorus Pers. | Sunflower |
| Heliopsis helianthoides (L.) Sweet. | Ox-eye |
| Hieracium longipilum Torr. | Hawkweed |
| Kuhnia eupatorioides L. | False-boneset |
| Lactuca biennis (Moench) Fern. | Wild Lettuce |
| Lactuca canadensis L. | Wild Lettuce |
| Lactuca Serriola L. | Prickly Lettuce |
| Liatris aspera Michx. | Blazing-star |
| Liatris ligulistylis (A. Nels.) K. Schum. | Blazing-star |
| Liatris pycnostachya Michx. | Blazing-star |
| Liatris squarrosa (L.) Michx. | Blazing-star |
| Ratibida pinnata (Vent.) Barnh. | Yellow Coneflower |
| Senecio obovatus Muhl. | Groundsel |
| Silphium integrifolium Michx. | Rosin-weed |
| Silphium laciniatum L. | Compass-plant |
| Silphium perfoliatum L. | Cup-plant |
| Solidago canadensis L. | Goldenrod |
| Solidago gigantea Ait. | Goldenrod |
| Solidago missouriensis Nutt. | Missouri Goldenrod |
| Solidago rigida L. | Rigid Goldenrod |
| Solidago speciosa Nutt. | Goldenrod |
| Taraxacum officinale Weber. | Common Dandelion |
| Tragopogon dubius Scop. | Goatsbeard |
| Vernonia Baldwini Torr. | Ironweed |

(Continued)

| | |
|---|---|
| CONVOLVULACEAE | |
| Convolvulus sepium L. | Hedge Bindweed |
| CORNACEAE | |
| Cornus stolonifera Michx. | Red Osier Dogwood |
| CRUCIFERAE | |
| Lepidium campestre (L.) R. Br. | Field Cress |
| Lepidium virginicum L. | Pepper-grass |
| CUCURBITACEAE | |
| Echinocystis lobata (Michx.) T. & G. | Wild Cucumber |
| CUPRESSACEAE | |
| Juniperus virginiana L. | Red Cedar |
| CYPERACEAE | |
| Carex sp. L. | Sedge |
| EQUISETACEAE | |
| Equisetum arvense L. | Common Horsetail |
| Equisetum kansanum Schaffner. | Horsetail |
| EUPHORBIACEAE | |
| Euphorbia corollata L. | Flowering Spurge |
| Euphorbia maculata L. | Wartweed |
| FABACEAE | |
| Amorpha canescens Pursh. | Lead-plant |
| Amphicarpa bracteata (L.) Fern. | Hog-peanut |
| Astragalus canadensis L. | Milk-vetch |
| Astragalus crassicarpus Nutt. | Ground Plum |
| Baptisia leucantha T. & G. | Prairie False Indigo |
| Baptisia leucophaea Nutt. | False Indigo |
| Desmodium illinoense Gray. | Tick-trefoil |
| Lespedeza capitata Michx. | Bush Clover |
| Melilotus alba Desr. | White Sweet Clover |
| Melilotus officinalis (L.) Desr. | Yellow Sweet Clover |
| Petalostemum candidum (Willd.) Micx. | White Prairie Clover |
| Petalostemum purpureum (Vent.) Rydb. | Prairie Clover |
| Psoralea argophylla Pursh. | Silver-leaved Scurf Pea |
| Psoralea esculenta Pursh. | Prairie Turnip |
| Trifolium pratense L. | Red Clover |
| GENTIANACEAE | |
| Gentiana puberula Michx. | Gentian |
| GRAMINEAE | |
| Agrostis alba L. | Redtop |

(Continued)

| | |
|---|---|
| GRAMINEAE (Continued) | |
| Agrostis hiemalis (Walt.) B.S.P. | Ticklegrass |
| Andropogon Gerardii Vitman. | Big Bluestem |
| Andropogon scoparius Michx. | Little Bluestem |
| Bouteloua curtipendula (Michx.) Torr. | Side-oats Grama |
| Bromus inermis Leyss. | Smooth Brome |
| Bromus japonicus Thunb. | Japanese Brome |
| Bromus tectorum L. | Downy Chess |
| Elymus canadensis L. | Canada Wild Rye |
| Elymus virginicus L. | Virginia Wild Rye |
| Hordeum Jubatum L. | Squirrel-tail Barley |
| Koeleria cristata (L.) Pers. | June Grass |
| Leersia virginica Willd. | White Grass |
| Muhlenbergia racemosa (Michx.) B.S.P. | Muhly-grass |
| Panicum capillare L. | Witchgrass |
| Panicum implicatum Scribn. | Rosette panic-grass |
| Panicum leibergii (Vasey) Scribn. | Posette panic-grass |
| Panicum scribnerianum Nash. | Panicum |
| Panicum virgatum L. | Switchgrass |
| Phleum pratense L. | Timothy |
| Poa compressa L. | Canada Blue Grass |
| Poa pratensis L. | Kentucky Blue Grass |
| Setaria lutescens (Weigel) F.T. Hubb. | Yellow Foxtail |
| Sorghastrum nutans (L.) Nash. | Indian Grass |
| Spartina pectinata Link. | Sloughgrass |
| Sphenopholis obtusata (Michx.) Scribn. | Wedgegrass |
| Sporobolus asper (Michx.) Kunth. | Tall Dropseed |
| Sporobolus heterolepis (A. Gray) A. Gray | Prairie Dropseed |
| Stipa spartea Trin. | Porcupine Grass |
| HYPERICACEAE | |
| Hypericum sphaerocarpum Michx. | St. John's wort |
| IRIDACEAE | |
| Sisyrinchium campestre Bickn. | Blue-eyed Grass |
| LABIATAE | |
| Monarda fistulosa L. | Horsemint |
| Prunella vulgaris L. | Self-heal |
| Pycnanthemum virginianum (L.) Durand & Jackson. | Mint |
| LINACEAE | |
| Linum sulcatum Riddell. | Flax |
| LOBELIACEAE | |
| Lobelia spicata Lam. | Spike-lobelia |

(Continued)

| | |
|---|---|
| MALVACEAE | |
| Hibiscus Trionum L. | Flower-of-an-hour |
| MORACEAE | |
| Morus alba | White mulberry |
| NYCTAGINACEAE | |
| Mirabilis hirsuta (Pursh) MacM. | Four-o'clock |
| OLEANCEAE | |
| Fraxinus americana L. | White Ash |
| ONAGRACEAE | |
| Gaura biennis L. | Biennial Gaura |
| Oenothera biennis L. | Evening Primrose |
| ORCHIDACEAE | |
| Spiranthes cernua (L.) Rich. | Common Lady's Tresses |
| OXALIALACEAE | |
| Oxalis europaea Jord. | Yellow Wood-sorrel |
| Oxalis stricta L. | Yellow Wood-sorrel |
| Oxalis violacea L. | Violet Wood-sorrel |
| POLEMONIACEAE | |
| Phlox pilosa L. | Prairie Phlox |
| POLYGONACEAE | |
| Polygonum pensylvanicum L. | Smartweed |
| Polygonum scandens L. | False Buckwheat |
| Rumex crispus L. | Sour Dock |
| PRIMULACEAE | |
| Lysimachia ciliata L. | Loosestrife |
| RANUNCULACEAE | |
| Anemone cylindrica Gray. | Thimbleweed |
| Delphinium virescens Nutt. | Larkspur |
| Ranunculus abortivus L. | Small-flowered Crowfoot |
| RHAMNACEAE | |
| Ceanothus ovatus Desf. | Redroot |
| ROSACEAE | |
| Fragaria virginiana Duchesne. | Wild Strawberry |
| Geum canadense Jacq. | Avens |
| Potentilla canadensis L. | Cinquefoil |
| Potentilla norvegica L. | Cinquefoil |
| Prunus americana Marsh. | Wild Plum |
| Prunus serotina Ehrh. | Black Cherry |
| Prunus virginiana L. | Choke Cherry |
| Rosa suffulta Greene. | Prairie Rose |

(Continued)

| | |
|---|---|
| RUBIACEAE | |
| Galium Aparine L. | Bedstraw |
| Galium boreale L. | Northern Bedstraw |
| SALICACEAE | |
| Populus deltoides Marsh. | Cottonwood |
| Salix humilis Marsh. | Upland Willow |
| Salix nigra L. | Black Willow |
| SANTALACEAE | |
| Comandra umbellata (L.) Nutt. | Bastard Toad-flax |
| SCROPHULARIACEAE | |
| Pedicularis canadensis L. | Common Lousewort |
| Verbascum Thapsus L. | Mullein |
| Veronicastrum virginicum (L.) Farw. | Culver's Root |
| SOLANACEAE | |
| Physalis virginiana Mill. | Ground Cherry |
| Solanum nigrum L. | Black Nightshade |
| ULMACEAE | |
| Ulmus pumila L. | Siberian Elm |
| Ulmus rubra Muhl. | Slippery Elm |
| Ulmus americana | American Elm |
| UMBELLIFERAE | |
| Eryngium yuccifolium Michx. | Rattlesnake-master |
| Pastinaca sativa L. | Wild Parsnip |
| Polytaenia Nuttallii DC. | |
| Sanicula marilandica L. | Black Snakeroot |
| Zizia aurea (L.) Koch. | Golden Alexanders |
| URTICACEAE | |
| Cannabis sativa L. | Hemp |
| Urtica dioica L. | Stinging Nettle |
| VERBENACEAE | |
| Verbena hastata L. | Blue Vervain |
| VIOLACEAE | |
| Viola sp. L. | Violet |
| Viola pedata L. | Bird-foot Violet |
| Viola pedatifida G. Don. | Prairie Violet |
| VITACEAE | |
| Parthenocissus quinquefolia (L.) Planch. | Virginia Creeper |
| Vitis riparia Michx. | Frost-grape |

# Appendix II. Special Figures

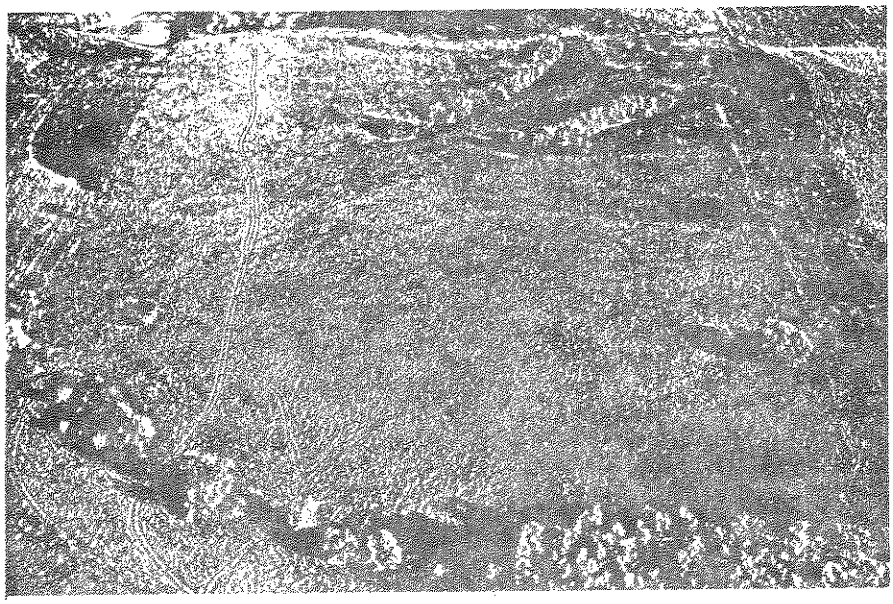


Figure 1. Sheeder Prairie at 1000 feet facing East

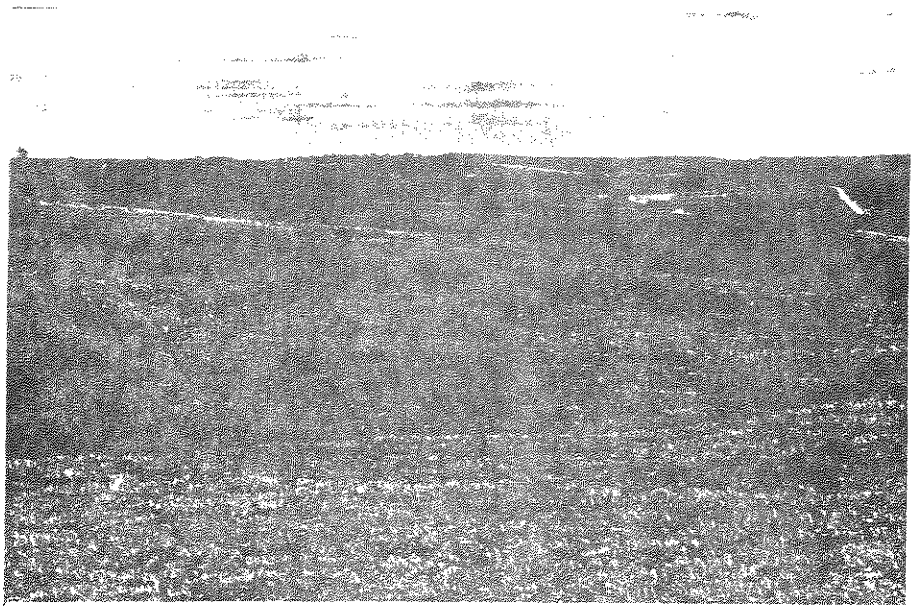


Figure 2. View facing South from NW slope, September, 1969

Figure 3. Timothy and smooth brome projecting above bluegrass in the understory, July 22, 1969

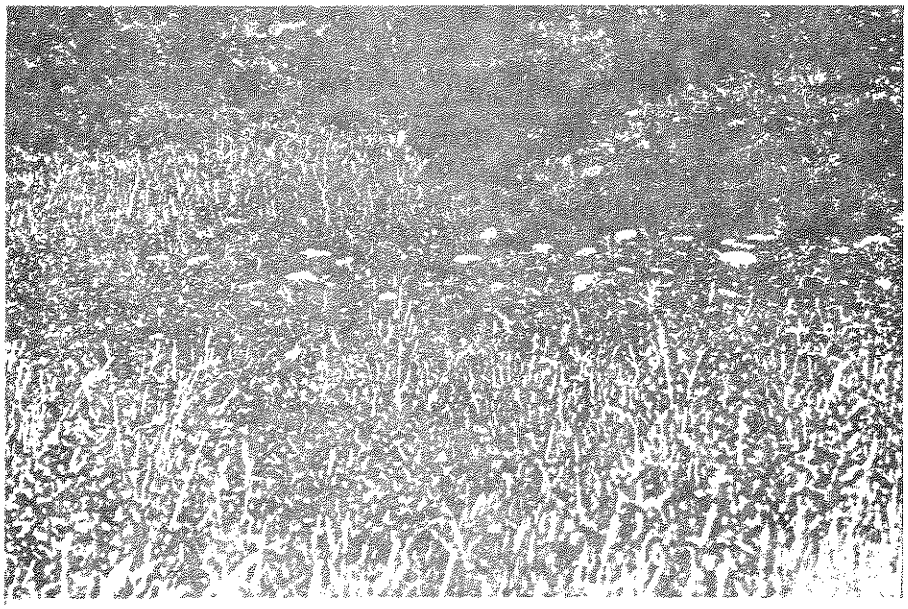


Figure 4. Common elderberry, American plum and boxelder in broad alluvial area at end of a drainage, July 22, 1969

Figure 9. Mixed prairie vegetation on the east slope, August, 1969

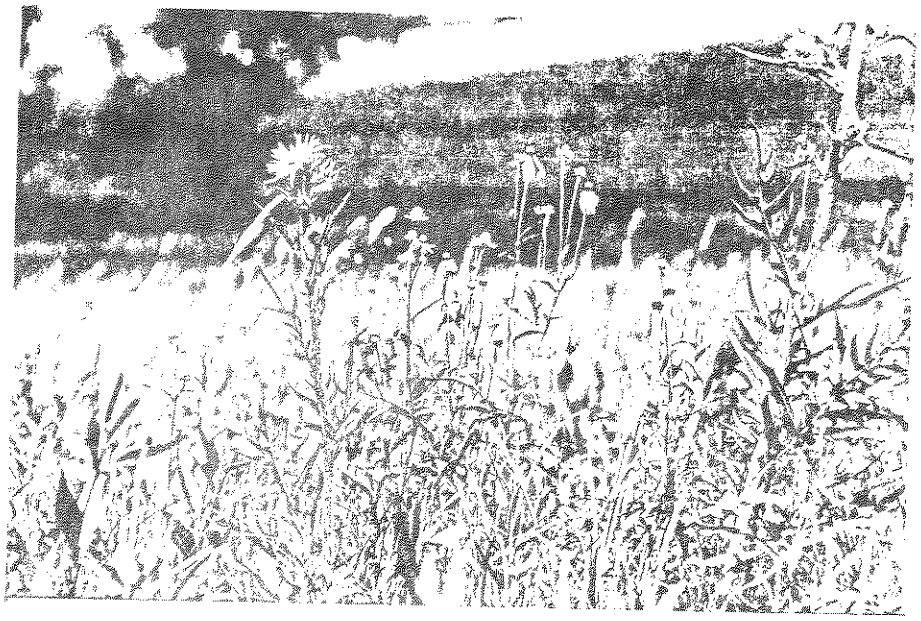


Figure 10. Mixed prairie vegetation with compass plant in foreground, yellow coneflower in background, and rattlesnake-master to the left

Figure 11. Site of a former haystack, hemp in the center being replaced by a surrounding zone of Virginia wild rye