STILL IN QUESTION: THE FATE OF AN UNMANAGED RELICT BLACKLAND PRAIRIE

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ABSTRACT

Historical information on the distribution of native blackland prairie flora has been documented for Stults Meadow and Coit Meadow in 1957 and 1978 respectively. The quantitative study of species distribution, density, and frequency in Coit Meadow, a relict Blackland Prairie is described. Computer maps were generated from field data to illustrate the distribution of several species. Aerial photographs from May 1979 and May 1986 are compared to assess the attrition that has occurred in the climax grass communities of this unmanaged relict prairie. Particular attention is given to the rapid development of Prunus rivularis (Hog Plum). Very little of the blackland prairie of north central Texas is left in its original condition. Isolated fragments such as Coit Meadow have little chance of surviving the rapid urban expansion north of Dallas. Historical studies such as the Stults and Coit Meadow projects may be the only means of preserving information about the flora association unique to these relict prairie lands.

INTRODUCTION

In 1957 the Renner Research Foundation, historically affiliated with the University of Texas at Dallas, identified several locations, north of Dallas, that could be considered native Blackland Prairie. Having never been plowed, these relict areas displayed a characteristic microrelief of low mounds and shallow depressions, and a flora unique to the Houston Black and Austin clay soils. The isolated fragments were few and several of the sites identified have been engulfed by the rapid urban expansion north of Dallas. Coit Meadow, the largest of the sites identified, is the prairie whose fate is still in question.

A quantitative study of species distribution, density, and frequency in Coit Meadow was conducted in 1978 and 1979. Results of this investigation are presented. Grass associations are discussed with reference to the Blackland Prairie plant communities described by Collins, Smeins, and Riskind in 1975. Coit Meadow was maintained as a hay meadow with semiannual mowing until 1978. Release from mowing has allowed the rapid development of Prunus rivularis thickets. Aerial photographs illustrate this attrition of climax grass communities.

FIELD METHOD AND SITE DESCRIPTION

Coit Meadow is located in Collin County, Texas, just north of Renner Road and west of Custer Road. A residential area has developed south of Renner Road and cultivated fields are located to the north and east of the site. The cultivated areas are separated from the prairie by the St. Louis and Southwestern Railroad on the northern boundary and by a dirt road on the eastern boundary. The city of Richardson has designated the prairie R-1500 which is the category for unzoned land within the city limits. The City of Plano has designated the land north of the prairie as light industrial. The twenty-five acre property was formerly owned by Henry W. Coit and is now owned by Hunt Properties.

The Coit Meadow study was designed to yield statistical information and to provide a data base for computerized mapping of the species distribution. Belt transects were selected as the sampling method. Each transect samples a continuous cross section through an area of vegetation and can be used to relate changes in vegetation with changes in the environment (Smith, 1974). Twenty transects were chosen to represent approximately 25 acres of Coit Meadow, Figure 1. Each transect is divided into 25 one-square meter sampling units, quadrats. These quadrats were spaced every other meter in the prairie; thus, each belt transect represents approximately a 50 by 1 meter strip of Coit Meadow.

The composition of the prairie flora varies continuously from late February to November; therefore, permanent transects were marked in the field. It was necessary to repeat the sampling procedure every month during the growing season. Species abundance was recorded for each quadrat from March through August of 1978. The data from April and May characterize the spring flora in this relict Blackland Prairie (Oslin, 1978). A specimen of each plant was collected and is preserved in the Lundell Herbarium at the University of Texas at Dallas.

Sampling transects were positioned to relate drainage, soil type, topography, and disturbance to the species distribution. Figure 1 illustrates the location of each transect in relation to drainage and soil type. Canyon Creek is typical of other streams in this area. The flow fluctuates seasonally. The stream usually reaches peak flows in April and May. During the summer and fall months it is characterized by alternating pool and riffle areas. The drainage east of Canyon Creek is intermittent and dries completely between periods of rainfall.

Figure 1. Twenty sampling transects were positioned in Coit Meadow to relate drainage, soil type, topography, and disturbance to species distribution.
Houston Black clay and Austin silty clay are the soil types found in Coit Meadow. This Houston Black - Austin association makes up about 52 percent of Collin County. Thus as a relict prairie, Coit Meadow provides a unique situation to study the vegetation characteristic of both the Austin-Stephen-Eddy and Houston Black-Heiden-Ferris Associations.

The elevation ranges from 620-680 feet above sea level. Highest elevations occur in the east part of the prairie. The terrain gently slopes into the east drainage, then continues the gradual decline westward. An approximate 30 foot drop is associated with the banks of Canyon Creek.

To what extent this relict prairie can withstand perturbation by man and still retain a native composition is not clear. Prior to 1978 several dirt roads were opened into the area. Numerous large piles of "fill" dirt were dumped into the area of transect 17 and heavy motorcycle traffic had occurred in the drainage area represented by transects 6, 7 and 8. A pipeline was laid parallel to the railroad track. A large section of ground was removed in the area represented by transect 11. This section of prairie was transplanted to the campus at the University of Texas at Dallas in 1970 (Lundell, 1972). The undisturbed areas of Coit Meadow are represented by transects 4, 9, 10, 12, 13, and the western halves of 2 and 16.

RESULTS

Statistical information was tabulated by species for all transects. Relative density, mean density, and frequency per transect were calculated for 288 species in all. The Poisson distribution and Chi-square goodness-of-fit test were used to distinguish between random, uniform and clumped distributions. Sixty-eight of the 288 distributions were found to be random and 220 were clumped.

In the 1978 description of spring flora 38 families were represented by 104 species (Osling, 1978). The distribution of native species, as well as, introduced species were summarized in the report. Several of the observed distributions were mapped using SYMAP and SYMVU computer mapping programs. Figure 2 illustrates the SYMAP distribution map generated from the transect data for Prunus rivularis. The interpolated distribution is not reliable in areas where transect data was not collected. Figure 3 illustrates the SYMVU distribution map produced for Rosa foliolosa. The height of peaks corresponds to the number of plants or flowering stems per quadrat.

The observed climax grass association for each soil type at Coit Meadow corresponded to community types described by Collins, Smeins, and Riskind in 1975. The Sorghastrum-Andropogon association was typical of the Austin-Stephens-Eddy soils in the central part of Coit Meadow. Sorghastrum secundum and Andropogon gerardii retained their dominance in the undisturbed areas. Panicum virgatum and Tripsacum dactyloides formed colonies in the lower areas. Bouteloua curtipendula, Schizachyrium scoparium, Bothriochloa saccharoides, and Stipa leucotricha were major components of the grass community. These species are characteristic of meadows moved to frequently and increase with disturbance (Collins et al. 1975). Gaillardia pulchella also tends to increase with frequent mowing (Smeins 1972). This forb was a dominant element of the summer flora in both soil types of Coit Meadow. Aristida purpurea and Bouteloua rigidiflora were the grasses associated with exposed Austin chalk outcrop.

The Sorghastrum-Schizachyrium community type (Collins et al. 1975) best represented the plant association of the Houston Black soils of Coit Meadow. Sorghastrum secundum and Schizachyrium scoparium were climax dominants. Sorghastrum displayed a segregated clonal pattern. Tripsacum dactyloides and Panicum virgatum were observed in the microrelief depressions, termed gilgai. Coit Meadow is located in the northern extent of this Houston Black association type. Climax grasses characteristic of Houston Black soils north of the Sabin River were also common in Coit Meadow. Sporobolus asper and Elymus canadensis formed scattered colonies on the Houston Black soils of Coit Meadow. Poea arachnifera formed infrequent colonies. Stipa leucotricha and Bouteloua curtipendula increased with disturbance.

DISCUSSION

Since 1978 Coit Meadow has not been mowed. This unmanaged prairie has developed into a semi-woodland in just eight years. Prunus rivularis (Hog Plum) is the dominant species of the wooded area. The Prunus thickets observed in the 1978 study have encroached rapidly into the area once dominated by native grasses.
In order to assess the development of the tree cover aerial photographs were compared from May 1979 and May 1986. The black and white photographs were video digitized into an 8-bit image, then enhanced by pseudo color techniques to highlight the tree canopy. Figures 4 (May 1979) and 5 (May 1986) are copies of the pseudo color images. In the undisturbed eastern section of the prairie approximately 40 per cent of the native grass cover was lost to the Prunus encroachment. This attrition was much greater than the attrition of climax grass dominance due to encroachment of Johnson grass along the perimeter of the prairie.

It is difficult to predict the future of this relict prairie, many factors will influence its eventual fate. Perhaps one can speculate a scenario similar to Stults Meadow, another small relict tract of Blackland Prairie located in Dallas. From 1957 to 1961 the soils and vegetation of Stults Meadow were studied by the Texas Research Foundation (Correll, 1972). Observations were continued at Stults Meadow until the site became overly contaminated with weed species. A shopping center now occupies the site of this once native prairie.

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REFERENCES


Lundell, C.L. 1972. A project to reestablish and conserve a relict area of the Blackland Prairie. Press release, Plant Sciences Laboratory, University of Texas at Dallas, Richardson, Texas. 4 p.


Figure 4. Video digitized image of Coit Meadow produced from an aerial photograph taken May 1979.

Figure 5. Video digitized image of Coit Meadow produced from an aerial photograph taken May 1986.