Transactions of the Illinois Academy of Science
(1986), Volume 79, 1 and 2, pp. 53-58

BLUFF CITY FEN: COMMUNITIES, VEGETATION HISTORY, AND MANAGEMENT

Nick A. Stoynoff[1,2] and William J. Hess[1]

[1]The Morton Arboretum
Lisle, Illinois 60532

[2]Glenbard East High School
Lombard, Illinois 60148

ABSTRACT

Bluff City Fen in Cook County, Illinois is composed of eight communities including shrub fen, graminoid fen, wet — mesic prairie, calcareous seep, sedge meadow, dry gravel prairie, *Typha-Carex* community, and shrub community. Maps derived from aerial photographs illustrate existing communities and trace the historical vegetational changes from 1938 to the present. Considerable succession of herbaceous communities to shrub community has occured.

INTRODUCTION

Examination of a wetland is of value, because at least 88 percent of Illinois' wetlands have been destroyed in the last 135 years (Shaw & Fredine, 1956). The unique calcareous nature, high quality communities, and management efforts to control shrub invasion make this study area of particular interest.

METHODS

Plants were collected on field trips to the site throughout the growing season and over a period of several years. They are vouchered in the herbarium at The Morton Arboretum (MOR). Vegetation mapping was completed following procedures outlined by Kuchler (1967). Aerial photographs dated 1938, 1976, and 1981 were used to map the historical vegetational changes. Extant vegetation was surveyed during the summer of 1984 and communities classified following White (1978). Determination of dominant species was based upon personal observation.

RESULTS AND DISCUSSION

Location and Physical Features

Bluff City Fen is an area of approximately 40 hectares (100 acres) located in Hanover Township, Cook County, Illinois just southeast of Elgin (T41N, R9W, N1/2, Sec. 30; Fig. 1). The surficial geology of the area is sand and gravel outwash (Willman & Lineback, 1970) and lies west of the West Chicago moraine (Willman, 1971). The well drained soil of the two kames (Fig. 2) is black gravelly loam underlain by calcareous gravel and sand. The soil of the adjoining wetland is a combination of silty clay loam and muck (Mapes, 1979).

Water, issuing from several surface springs, is highly calcareous as evidenced by the marly precipitate in low, slow moving spring flows and the considerable build-up of tufa in some areas. Drainage is generally westward into Poplar Creek and eventually into the Fox River.

Vegetation

Management areas and eight communities are distinguishable within the study area: graminoid fen, shrub fen, calcareous seep, wet — mesic prairie, sedge meadow, *Typha-Carex* community, dry gravel prairie, and shrub community.

The unique fen community is divided into two subgroups. The graminoid fen is characterized by dominant species such as *Andropogon gerardii*, *Carex stricta*, and *Sorghastrum nutans* and subdominants are *Lysimachia quadriflora*, *Liatris pycnostachya*, *Solidago ohioensis*, and *Valeriana ciliata*. The dominants of the low shrub fen are *Andropogon gerardii*, *Carex stricta*, *Scirpus acutus*, and *Potentilla fruticosa*, with *Lysimachia quadriflora* and *Solidago ohioensis* also present.

Adjacent to the fen lies the calcareous seep community with many springs and flows that keep the soil saturated. *Eleocharis rostellata*, *Potentilla fruticosa*, and *Silphium terebinthinaceum* are the dominant taxa and *Deschampsia caespitosa*, *Rhynchospora capillacea*, *Lobelia kalmii*, and *Solidago uliginosa* are subdominants.

Wet-mesic prairie is scattered throughout higher, better drained soils and intergrades almost imperceptably with portions of the graminoid fen. Dominant species include *Andropogon gerardii*, *Sorghastrum nutans*, and *Silphium integrifolium* in association with *Calamagrostis canadensis*, *Carex stricta*, *Spartina pectinata*, *Apocynum sibiricum*, *Liatris pycnostachya*, and *Pycnanthemum virginianum*.

The *Typha-Carex* community lies adjacent to and/or within the creeks flowing through the area. *Typha latifolia* and *Carex stricta* are codominants and *Nasturtium officinale* is an associate that chokes the creeks. Other species found within this zone are *Sagittaria latifolia*, *Caltha palustris*, *Eupatorium maculatum*, and *Solidago patula*.

In areas of elevation slightly lower than the wet-mesic prairie the sedge meadow community is found. This community is distinguished by the dominance of *Carex stricta* and the presence of other common species such as *Scirpus acutus*, *Typha latifolia*, *T. angustifolia*, *Eupatorium maculatum*, *Liatris pycnostachya*, and *Pycanthemum virginianum*.

Dry gravel prairie is located on the two kames and is in contrast to the lower wetland areas (Fig. 2), because it has poorer soil development and sparcer vegetation. Dominant species include *Andropogon gerardii*, *Schizachyrium scoparium*, and *Sporobolus heterolepis*. Other common species found here include *Bouteloua curtipendula*, *Panicum oligosanthes* var. *scribnerianum*, *Asclepias verticillata*, and *Petalostemum purpureum*.

The shrub community is extensive and has successfully invaded all but the wettest of soils. It is characterized by woody plants two to three meters in height. Dominant species are *Acer negundo*, *Cornus racemosa*, *Corylus americana*, *Populus deltoides*, *Rhamnus cathartica*, *R. frangula*, *Rubus occidentalis*, and *Viburnum lentago*. Very little herbaceous plant cover is present in these areas.

Cutting and burning of the shrub community have created extensive disturbed areas. These areas are typically dominated by weedy species, such as *Arctium minus*, *Circaea lutetiana* ssp. *canadensis*, *Rubus occidentalis*, and *Soligado altissima*. More desirable native species, which are either reinvading or have always been present include *Apocynum sibiricum*, *Aster umbellatus*, *Heuchera richardsonii*, *Liatris pycnostachya*, *Silphium integrifolium*, and *S. perfoliatum*.

Vegetational History

The change in vegetation over time is illustrated by the vegetation maps (Figs. 3-5). Comparison of maps from 1938 and the present illustrate a considerable increase in coverage by woody species. Succession of wetland herbaceous cover to woody species is common and well known (Curtis, 1959; Sytsma & Pippen, 1982), but why does a shrubby community that was formerly restricted now invade the herbaceous communities?

The increased importance of woody species may be attributed to several factors. 1) The area surrounding the wetland was extensively farmed in the past (Packard, pers. comm.) and grazing may have prevented woody plant invasion. 2) Periodic fires may have slowed or prevented invasion by woody species (Barbour et al., 1980; Kohring, 1982). 3) In time, a build-up of soil isolates the ground water and woody species invade drier sites (Sytsma & Pippen, 1982). 4) Lastly the area surrounding the study site has been extensively mined for gravel. Chronological examination of the series of aerial photographs shows the progressive increase in the number of ponds in the region contiguous with Bluff City Fen. Such activity could alter the water table by isolating it from the soil surface and woody species would invade. At present, none of these factors individually can be shown as the cause for woody plant invasion and future work could indicate that all have contributed.

Management

Burning and cutting projects have dramatically reduced the populations of woody species throughout and improved the quality of Bluff City Fen in general. Native herbaceous vegetation is reinvading managed areas (Fig. 5), however recovery is slow and continued attention by management teams is required.

Bluff City Fen is an area that provides many unique opportunities for continued managerial success and scientific research. Quantitative ecological studies will document the current importance of various taxa for future comparisons and composition studies conducted "before and after" management efforts can provide evidence of change. Analysis of tree ring cores may indicate past hydrologic change. Each of these and other studies may help explain past changes and monitor future development of Bluff City Fen.

LITERATURE CITED

Barbour, M.G., J. H. Burk, & W.D. Pitts. 1980. Terrestrial plant ecology. The Benjamin/Cummings Publishing Co., Inc., Reading, Massachusetts. 604 pp.

Curtis, J.T. 1959. The vegetation of Wisconsin. University of Wisconsin Press, Madison, Wisconsin. 657 pp.

Kohring, M.A. 1982. Ecological and floristic analysis of Bakertown Fen. M.S. Thesis, Michigan State Univ. 72 pp.

Kuchler, A.W. 1967. Vegetation mapping. The Ronald Press Co., New York City. 472 pp.

Mapes, D.R. 1979. Soil survey of DuPage and part of Cook Counties, Illinois. U.S.D.A., Soil Conservation Service. 217 pp., 126 maps.

Shaw, S.P. & G.C. Fredine. 1956. Wetlands of the United States. U.S. Fish & Wildlife Serv. Circ. 39. 67 pp.

Sytsma, K J. & R.W. Pippen. 1982. The Hampton Creek wetland complex in southwestern Michigan. IV. Fen succession. Michigan Bot. 21:105-115.

White, J. 1978. Illinois natural areas inventory technical report: Volume I, Survey methods and results. Illinois Natural Areas Inventory, Urbana, Illinois. 426 pp.

Willman, H.B. 1971. Summary of the geology of the Chicago area. Ill. State Geol. Survey Circ. 460. 77 pp.

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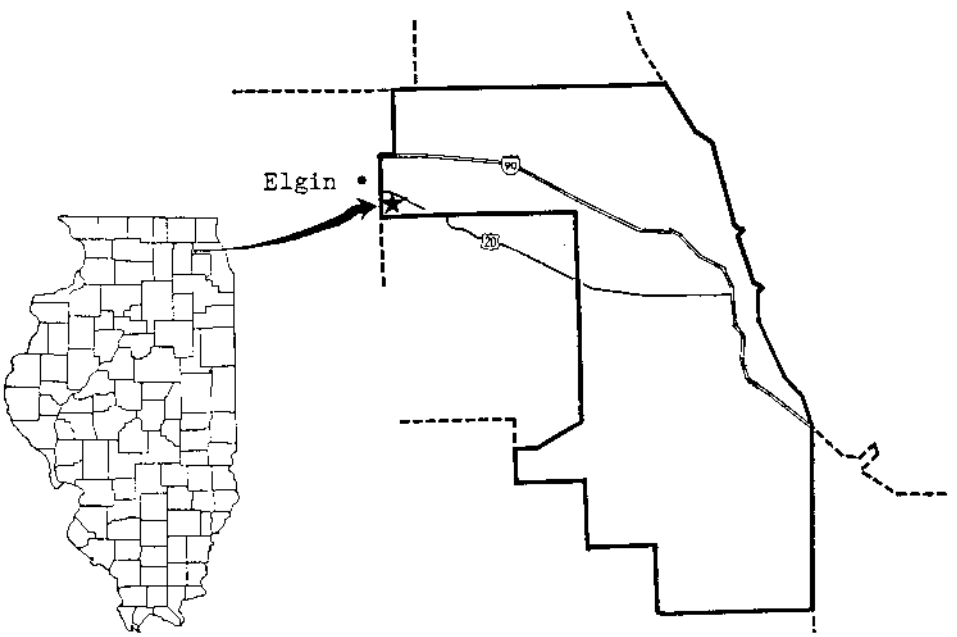


Fig. 1 Location of Bluff City Fen in Cook County, Illinois

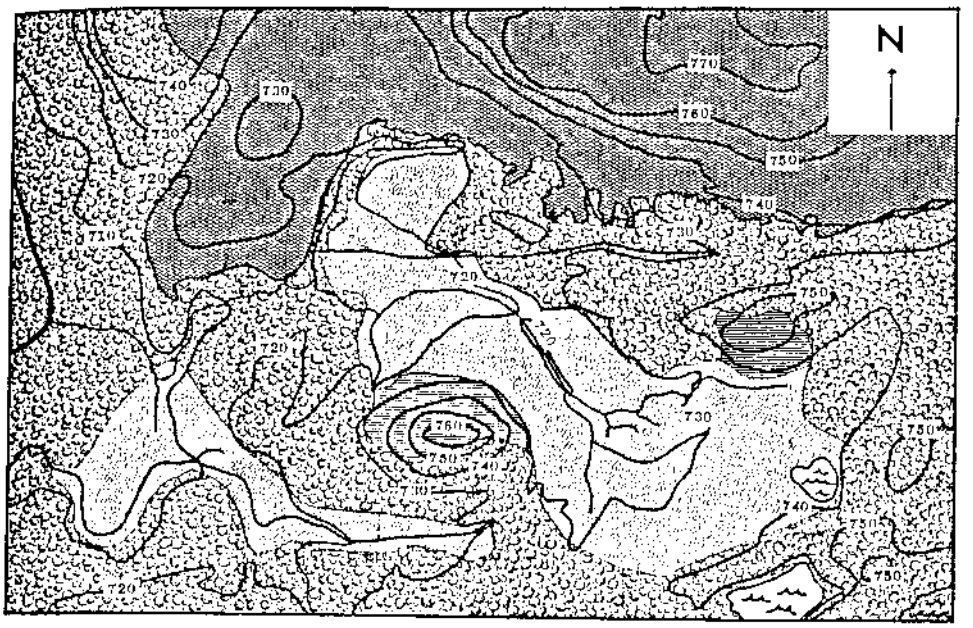


Fig. 2 Vegetation map showing elevations and locations of major vegetation regions in Bluff City Fen.

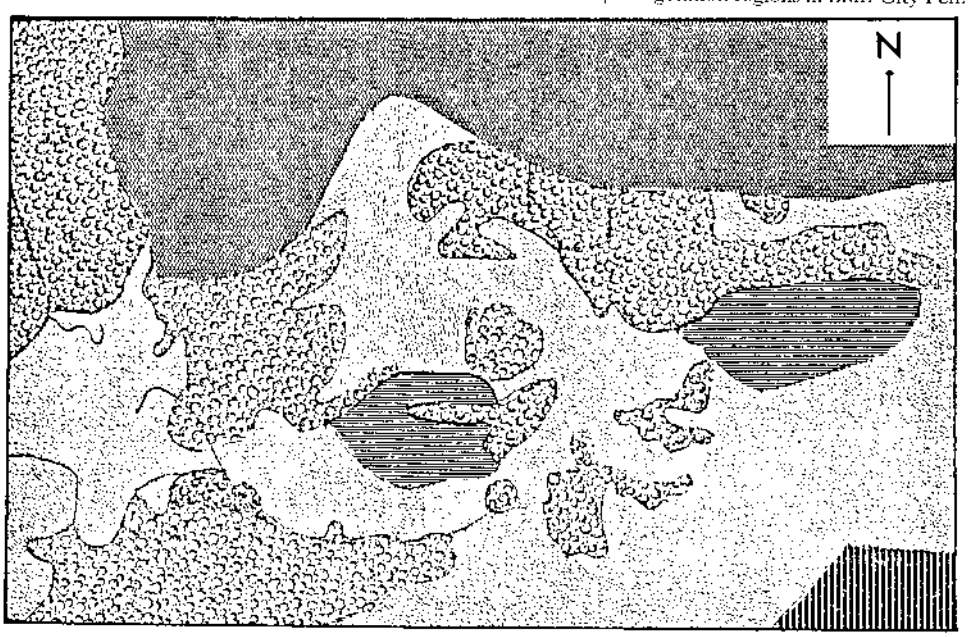
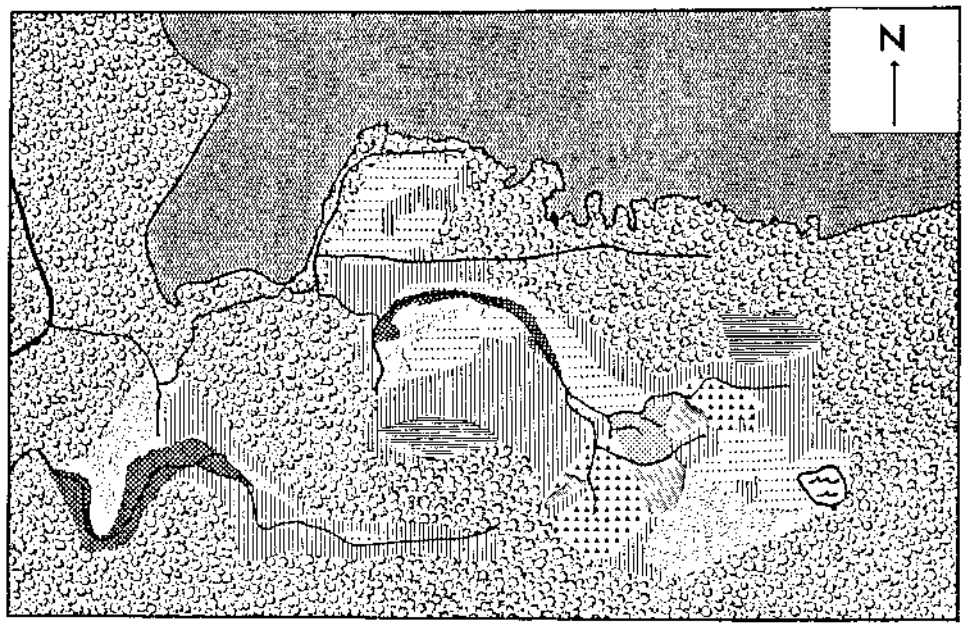


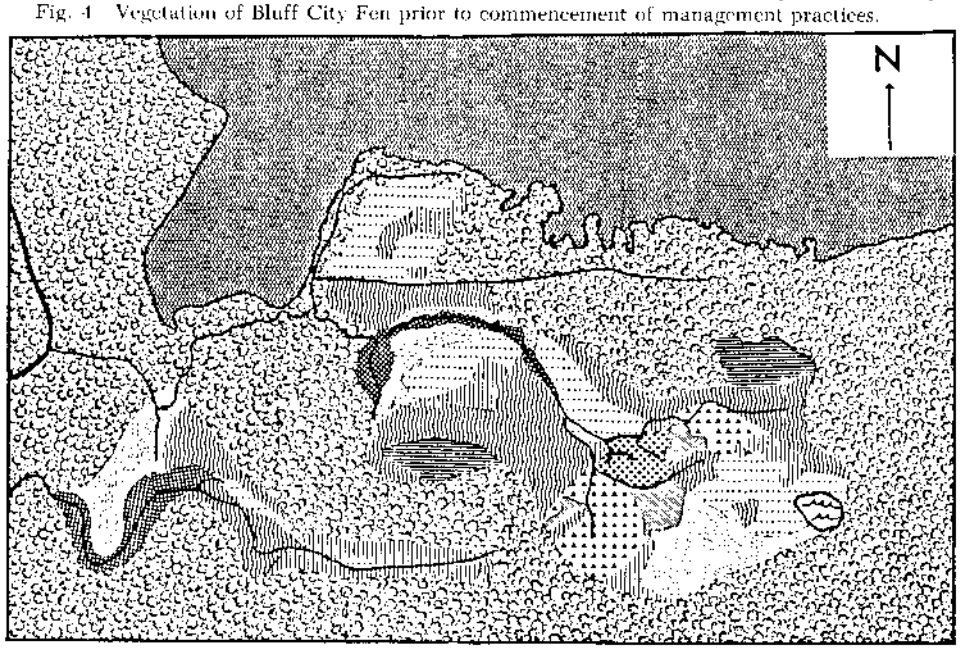
Fig. 3 Map showing the distribution of vegetation in Bluff City Fen during 1938.



1 cm = 50 m

Calcareous seep
Sedge meadow
Shrub community
Low shrub fen
Graminoid fen
Wet - mesic prairie
Dry gravel prairie
Typha - Carex community
Disturbed woodland
Bluff City Cemetery

Fig. 4 Vegetation of Bluff City Fen prior to commencement of management practices.



1 cm = 50 m

Calcareous seep
Sedge meadow
Shrub community
Low shrub fen
Graminoid fen
Wet - mesic prairie
Dry gravel prairie
Typha - Carex community
Disturbed woodland
Management area
Bluff City Cemetery

Fig. 5 Vegetation of Bluff City Fen following commencement of management practices.