VEGETATIONAL COMPOSITION OF THE NATURAL FOREST OPENINGS IN SOUTHERN ILLINOIS

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by

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Introduction

During the 1800's, the barrens were one of the three major community types, along with prairie and forest, recognized in Illinois by the Public Land Survey surveyors. Typically, the term "barrens" was used to refer to open areas in forested regions which supported prairie vegetation, but lacked the deep, fertile prairie soils. Fire is frequently believed to be the major cause of barrens vegetation, along with edaphic and climatic factors.

Presently, the Nature Conservancy considers the barrens plant community to be the most endangered terrestrial habitat in the Midwest. Barrens are presently represented by small isolated remnants wich are rapidly degrading due primarily to forest encroachment and agricultural practices.

Methods

Vegetation was sampled by using a modified Daubenmire canopy coverage estimate in 30 0.005ha circular plots. Vegetational sampling was conducted during the summer of 1988. Study areas are listed below.

Gyp Williams Barrens - Pope County
Gibbons Creek Barrens - Pope County
Wolf Creek Barrens - Alexander County
Brown (Tripp) Barrens - Union County
Cedar Bluff Sandstone Glade - Johnson County
Pounds Hollow Sandstone Glade - Gallatin County
Stone Face Sandstone Glade - Saline County
Round Bluff Sandstone Glade - Johnson County
Bell Smith Springs Sandstone Glade - Pope County
Gyp Williams Xeric Forest - Pope County
Berryville Shale Glade - Union County
McClure Shale Glade - Union County
Dennison Hollow Shale Glade - Saline County
Wolf Creek Xeric Forest - Alexander County
Fults Hill Prairie - Monroe County
Chalfin Bridge Hill Prairie - Monroe County
Monroe City Hill Prairie - Monroe County
Fults Limestone Glade - Monroe County
Collier Limestone Glade - Hardin County
Whoopie Cat Limestone Glade - Hardin County
Wildcat Bluff Limestone Glade - Johnson County
Cave Creek Limestone Glade - Johnson County

Results and Discussion

Based on quantitative vegetation data, the following groups were identified by multivariate classification techniques:

group 1 - Gyp Williams Barrens, Gibbons Creek, Wolf Creek Barrens, Brown Barrens
group 2 - Cedar Bluff, Pounds Hollow, Stone Face, Round Bluff, Bell Smith Springs
group 3 - Gyp Williams Forest, Berryville, McClure, Dennison Hollow, Wolf Creek Xeric Forest
group 4 - Fults hill prairie, Chalfin Bridge, Monroe City, Fults glade
group 5 - Collier, Whoopie Cat, Wildcat Bluff, Cave Creek

This classification is based solely on vegetation. Therefore, differences due to soil depth, amount of exposed rock, soil nutrients and other environmental factors are not expressed unless they result in floristic differences at the sites. This explains Fults glade grouping with the loess hill prairies. Floristically, Fults glade is more similar to hill prairies due to the presence of species such as Aster azureus, Dalea purpurea, Gerardia sp., Rudbeckia missourensis and Solidago speciosa which are found on the hill prairies, and the absence of limestone glade species such as Juniperus virginiana, Lithospermum canescens, Physostegia virginiana, Silphium integrifolium and Silphium terebinthinaceum. The three shale glades grouped with Gyp Williams forest and Wolf Creek forest due to the extensive tree coverage and the low grass coverage at these sites.

One must decide whether to base classification upon present vegetation, potential vegetation or presettlement vegetation. I have chosen to base classification upon present vegetation since this is from what the data are derived and, therefore, are the only results that can be substanciated from this work. Presettlement and potential vegetation will be addressed in my subsequent dissertation.

The preliminary recommended nomenclature is to maintain a similar nomenclature of plant communities as used in the Illinois Natural Areas Inventory; i.e. group 1 is barrens, group 2 is sandstone glades, group 3 is xeric upland forests, group 4 is loess hill prairies, group 5 is limestone glades. Several of these groups can be subdivided based on substate, i.e. group 1 consists of sandstone barrens - Gyp Williams and Gibbons Creek, shale barrens - Brown, and chert barrens - Wolf Creek. Also, group 3 consists of chert xeric forest - Wolf Creek, sandstone xeric forest - Gyp Williams, and shale xeric forests - Berryville, McClure and Dennison Hollow.

These groups can be distinquished vegetationally, however, a quantitative defintion of these plant communities is needed and will be presented in my dissertation. (See appendix 1 for the summary of dominant vegetation data by site.)

Management Recommendations

Recommendations vary according to the degree of forest encroachment and other natural or anthropogenic factors. In severe cases of forest encroachment it is necessary to mechanically remove some of the trees in order to re-open the canopy and allow light to reach the herbaceous layer to help maintain this component of the vegetation (barrens herbs). Otherwise, succession to a woodland composition will occur. Once the canopy has been re-opened, periodic fires should be used to maintain the open condition and the herbaceous vegetation. If the woody encroachment is less severe, fire alone may be used to maintain these areas.

Appendix 1. Summary of the dominant vegetation of the natural forest openings in southern Illinois by site. Data is given as the average coverage of each species per plot.

GYP WILLIAMS BARRENS	
Quercus stellata	27.33
Ulmus alata	16.63
Quercus marilandica	13.37
Schizachyrium scoparium	4.27
Fraxinus americana	4.07
Carya texana	2.15
Vaccinium arboreum	1.75
Juniperus virginiana	1.28
Helianthus divaricatus	0.50
Lespedeza virginiana	0.45
GIBBONS CREEK BARRENS	
Quercus stellata	9.90
Ulmus alata	6.87
Danthonia spicata	4.90
Rhus copallina	4.67
Carya texana	3.13
Schizachryium scoparium	3.07
Fraxinus americana	1.37
Panicum laxiflorum	0.73
Helianthus divaricatus	0.70
Bouteloua curtipendula	0.67
WOLF CREEK BARRENS	
Quercus stellata	25.73
Ulmus alata	12.95
Fraxinus americana	9.20
Vaccinium arboreum	5.45
Carya ovata	4.45
Carya glabra	3.48
Chasmanthium latifolium	2.61
Helianthus microcephalus	2.28
Parthenocissus quinquefolium	1.20
Quercus alba	1.18
BROWN BARRENS	
Quercus stellata	16.63
Schizachyrium scoparium	14.28
Ulmus alata	6.05
Helianthus divaricatus	4.35
Danthonia spicata	3.72
Vaccinium arboreum	3.57
Fraxinus americana	1.57
Muhlenbergia capillaris	1.23
Carya texana	0.73
Panicum spp.	0.62

CEDAR BLUFF SANDSTONE GLADE

Juniperus virginiana	16.27
Quercus stellata	14.82
Quercus marilandica	10.08
Vaccinium arboreum	4.38
Polytrichum spp.	3.83
Danthonia spicata	1.83
Cladonia spp.	1.50
Leucobrynum spp.	1.50
Ulmus alata	1.25
Amelanchier arboreum	0.83

POUNDS HOLLOW SANDSTONE GLADE

Juniperus virginiana	8.62
Vaccinium arboreum	3.68
Ulmus alata	3.48
Quercus stellata	2.93
Schizachyrium scoparium	1.95
Quercus marilandica	1.37
Rhus copallina	0.88
Chasmanthium latifolium	0.80
Amelanchier arborea	0.67
Danthonia spicata	0.57
Leucobrynum spp.	0.57

STONE FACE SANDSTONE GLADE

Juniperus virginiana	16.50
Quercus marilandica	5.75
Vaccinium arboreum	4.17
Ulmus alata	2.60
Quercus stellata	2.33
Carya texana	1.98
Schizachyrium scoparium	1.19
Mosses	1.06
Amelanchier arborea	0.81
Crotonopsis elliptica	0.50

ROUND BLUFF SANDSTONE GLADE

Juniperus virginiana	20.24
Mosses	8.13
Quercus marilandica	7.02
Quercus stellata	6.15
Vaccinium arboreum	4.83
Schizachyrium scoparium	1.75
Ulmus alata	1.20
Crotonopsis elliptica	1.15
Danthonia spicata	1.04
Diospyros virginiana	0.89

BELL SMITH SPRINGS SANDSTONE GLADE

Juniperus virginiana	27.41
Polytrichum spp.	19.83
Ostrya virginiana	9.76
Amelanchier arborea	8.63
Cladonia spp.	5.17
Carya texana	4.37
Carpinus carolinana	4.33
Leucobrynum spp.	3.65
Ulmus alata	3.52
Vaccinium arboreum	3.35

GYP WILLIAMS XERIC FOREST

Quercus stellata	24.87
Quercus rubra	18.57
Quercus alba	13.93
Vaccinium arboreum	8.27
Carya texana	7.53
Quercus marilandica	6.57
Mosses	4.43
Amelanchier arborea	2.93
Ulmus alata	2.80
Cladonia spp.	1.60

BERRYVILLE SHALE GLADE

Quercus stellata	27.72
Quercus marilandica	17.04
Vaccinium arboreum	16.41
Ulmus alata	6.52
Quercus rubra	3.93
Amelanchier arborea	3.30
Carya texana	2.17
Rhus aromatica	1.76
Mosses	1.61
Diospyros virginiana	0.87

WOLF CREEK XERIC FOREST

Quercus rubra	40.92
Acer saccharum	8.83
Carya glabra	8.33
Quercus alba	7.58
Cornus florida	6.92
Amelanchier arborea	6.79
Ostrya virginiana	5.67
Vaccinium arboreum	3.96
Fagus grandifolia	3.12
Mosses	2.83

MCCLURE SHALE XERIC FOREST

Quercus stellata	32.44	
Vaccinium arboreum	13.02	
Quercus marilandica	12.68	
Ulmus alata	6.67	
Amelanchier arborea	2.65	
Carya texana	2.09	
Quercus coccinea	1.50	
Polytrichum spp.	0.96	
Helianthus divaricatus	0.76	
Cunila organoides	0.63	
Schizachyrium scoparium	0.63	

DENNISON HOLLOW XERIC FOREST

Quercus marilandica	21.37	
Quercus stellata	20.23	
Quercus alba	11.13	
Polytrichum spp.	9.45	
Cladonia spp.	8.75	
Quercus coccinea	4.72	
Baptisia lactea	2.70	
Ulmus alata	1.70	
Diospyros virginiana	1.62	
Carya texana	1.58	

FULTS HILL PRAIRIE

Schizachyrium scoparium	28.82	
Solidago speciosa	2.52	
Ceanothus americana	1.08	
Aster patens	0.50	
Aster azureus	0.50	
Dalea purpurea	0.50	
Lespedeza capitata	0.50	
Euphorbia corollata	0.48	
Desmodium spp.	0.48	
Brickellia eupatorioides		0.42
Cassia fasciculata	0.42	

CHALFIN BRIDGE HILL PRAIRIE

Schizachyrium scoparium	17.43
Juniperus virginiana	1.11
Lespedeza capitata	0.73
Sorghastrum nutans	0.72
Dalea purpurea	0.50
Aster patens	0.50
Solidago nemoralis	0.50
Aster azureus	0.40
Bouteloua curtipendula	0.38
Gerardia spp.	0.33

MONROE CITY HILL PRAIRIE

Schizachyrium scoparium	20.28	
Rhus glabra	3.78	
Bouteloua curtipendula	2.24	
Ceanothus americana	1.34	
Solidago speciosa	1.31	
Andropogon gerardi	0.86	
Solidago nemoralis	0.60	
Cornus drummondii	0.57	
Aster oblonifolius	0.50	
Euphorbia corollata	0.45	

FULTS LIMESTONE GLADE

Schizachyrium scoparium	12.00	
Cornus drummmondii	0.70	
Lespedeza capitata	0.50	
Sorghastrum nutans	0.50	
Bouteloua curtipendula	0.50	
Solidago nemoralis	0.50	
Rudbeckia missourensis	0.50	
Dalea purpurea	0.50	
Brickellia eupatorioides		0.47
Croton monanthogynus	0.43	
Houstonia (Hedoytis) nigricans	0.43	
Euphorbia corollata	0.43	

COLLIER LIMESTONE GLADE

Schizachyrium scoparium	25.47	
Juniperus virginiana	5.18	
Quercus muhlenbergia	1.37	
Euphorbia corollata	0.85	
Croton monanthogynus	0.78	
Andropogon gerardi	0.72	
Quercus stellata	0.72	
Helianthus hirsutus	0.50	
Brickellia eupatorioides		0.50
Physostegia virginiana	0.50	
Manifreda virginica	0.50	

WHOOPIE CAT LIMESTONE GLADE

Schizachyrium scoparium	20.28
Quercus muhlenbergia	3.12
Juniperus virginiana	1.88
Diospyros virginiana	1.06
Silphium terebinthinaceum	0.76
Ostrya virginiana	0.70
Liriodendron tulipifera	0.66
Manifreda virginica	0.50
Physostegia virginiana	0.50
Aster patens	0.50
Euphorbia corollata	0.50

Brickellia eupatorioides	0.50

WILDCAT BLUFF LIMESTONE GLADE

Silphium terebinthinaceum	9.14
Schizachyrium scoparium	7.89
Quercus muhlenbergia	6.17
Juniperus virginiana	3.14
Quercus rubra	2.11
Sorghastrum nutans	1.39
Quercus coccinea	1.33
Smilax bona-nox	1.28
Vitis cinera	1.06
Cornus florida	0.92

CAVE CREEK LIMESTONE GLADE

Schizachyrium scoparium	15.72
Quercus muhlenbergia	10.30
Silphium terebinthinaceum	10.11
Aster oblongifolius	6.85
Echinacea pallida	4.91
Smilax bona-nox	2.91
Quercus rubra	2.15
Cornus florida	1.67
Juniperus virginiana	1.26
Aster patens	1.22