A Floristic Survey of a Limestone Glade in Versailles State Park, Ripley County, Indiana

Michael A. Homoya
Division of Nature Preserves
Department of Natural Resources
Indianapolis, Indiana 46204

Introduction

A glade is currently defined as a natural opening in the forest caused (in part) by bedrock at or near the surface (14). Glades are normally dry to xeric environments, typically on steep south to west-facing hillsides, and are characterized by a dominance of herbaceous vegetation that often has a scattering of scrubby woody species. In Indiana, they occur on a variety of bedrock types, including limestone (2, 3, 9), sandstone (3), and siltstone (4). Previously, Indiana glades were thought to be restricted to the south-central part of the state, predominantly in the unglaciated portions of the Shawnee Hills and Highland Rim Natural Regions (7). This report apparently provides the first published report of limestone glades in southeastern Indiana, as well as the first for the Switzerland Hills Section of the Bluegrass Natural Region.

Methods

An inspection of aerial photos of Versailles State Park and the immediate surroundings revealed the presence of four glade sites, but only the one on Falling Timber Creek, the largest and most diverse of the four, is discussed here. The glade was visited briefly for an initial ground survey on 10 June 1986, followed by more thorough floristic surveys on 7 August and 7 October. Those taxa in the open part of the glade, as well as in the scattered patches of scrubby woody growth, were recorded. For the most part, the present list represents a visual documentation of taxa in the field; the few vouchers taken are to be deposited in the Deam Herbarium of Indiana University (IND).

The Study Area

The glade is located at Versailles State Park in Ripley County, Indiana, and is part of the Switzerland Hills Section of the Bluegrass Natural Region (7). The glade is situated on a steep south-facing hillside adjacent to a bend of Falling Timber Creek, occupying an area approximately 225 feet in length and 50 feet in height. It is comprised of a sparsely vegetated, rocky slope with large patches of herbaceous vegetation interspersed with stunted trees (primarily *Quercus muhlenbergii*), and shrubs (see Figure 1). The substrate of the glade consists primarily of thin, neutral to alkaline Eden flaggy silty clay loam (10) and Ordovician limestone and shale of the Dillsboro and Whitewater Formations (12).

Results and Discussion

Although there are several reports on vegetation studies conducted at Versailles State Park (8, 11, 13), none indicate the presence of glade communities. As well, there are no known reports of glade communities in any portion of extreme southeastern Indiana. The absence of reports is not surprising, however, given the apparent rarity and small-sized examples of the type. Glades were expected in this region though, considering reports of glade occurrences in the similar Eden shale belt of the Bluegrass region in Kentucky (5).

Little is known concerning the past character of the Falling Timber Creek glade. It doubtless was always small, being restricted to the steep rocky slopes next to the creek. This is inferred from reports of the presettlement land survey (6), that state that the landscape of the park was (in 1806) predominantly forested, with no reference to glades.

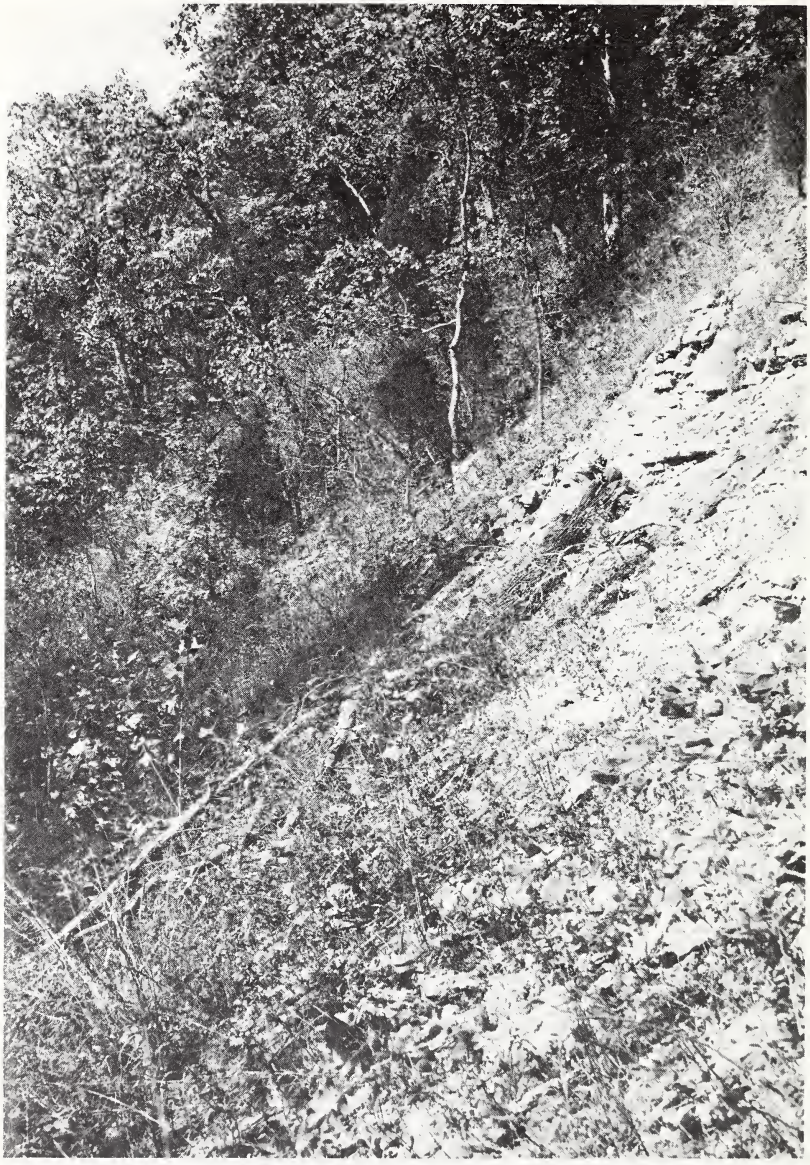

FIGURE 1. Photo of the limestone glade along Falling Timber Creek, Versailles State Park, Indiana.

Natural forest openings that may have been glades were in the area though, for on the west-facing slopes above Laughery Creek (just south of the park) there was, as described by the early land surveyors, a "cedar grove" of several acres in size. Given the aspect and geology of the site, and the presence of cedars (limestone glades are often called

cedar glades), it's possible that the "cedar grove" was a limestone glade. The site today is a cattle pasture.

Even with the extensive degree of development in the area of the park since settlement, the glade has apparently avoided major disturbances, as evidenced the relative lack of exotic species (those few present are very rare). Exotics are notorious for displacing indigenous species on heavily disturbed sites. Openings downstream of the glade on hillsides with less steep slopes (where livestock formerly grazed) are dominated by exotics.

Eighty-four taxa were identified as occurring on the glade (Table 1). Of these, *Andropogon gerardii, Aster sagittifolius, Silphium trifoliatum, Physostegia virginiana, Lithospermum canescens, Kuhnia eupatoriodes, Helianthus hirsutus*, and *Euphorbia corollata* are the herbaceous species with the highest estimated importance values. Important woody species include *Quercus muhlenbergii, Viburnum rufidulum, Celastris scandens, Cercis canadensis, Ceanothus americanus*, and *Juniperus virginiana.* Although

TABLE 1. Vascular Flora of a Limestone Glade in Versailles State Park.

Taxa
Aceraceae
Acer saccharum Marsh.
Anacardiaceae
Rhus glabra L.
Rhus radicans L.
Apocynaceae
Apocynum cannabinum L.
Asclepiadaceae
Asclepius tuberosa L.
Betulaceae
Ostrya virginiana (Mill.) K. Koch
Bignoniaceae
Campsis radicans (L.) Seem.
Boraginaceae
Lithospermum canescens (Michx.) Lehm.
Caprifoliaceae
Viburnum rufidulum Raf.
Celastraceae
Celastrus scandens L.
Euonymus atropurpureus Jacq.
Compositae
Ambrosia artemisiifolia L.
Antennaria plantaginifolia (L.) Hook.
Aster sagittifolius Willd.
Aster undulatus L.
Helianthus hirsutus Raf.
Kuhnia eupatorioides L.
Senecio obovatus Muhl.
Silphium trifoliatum L.
Convolvulaceae
Convolvulus spithameus L.
Ipomoea pandurata (L.) G.F.W. Mey.
Cornaceae
Cornus racemosa Lam.
Cupressaceae
Juniperus virginiana L.
Cyperaceae
Carex sp.
Dioscoreaceae
Dioscorea quaternata (Walt.) Gmel.
Equisetaceae
Equisetum arvense L.

TABLE 1.—Continued

Euphorbiaceae
Acalypha rhomboidea Raf.
Euphorbia corollata L.
Fagaceae
Quercus alba L.
Quercus muhlenbergii Engelm.
Quercus velutina Lam.
Gentianaceae
Frasera caroliniensis Walt.
Gentiana quinquefolia L.
Gramineae
Angdropogon gerardii Vitman
Andropogon scoparius Michx.
Bromus purgans L.
Danthonia spicata (L.) Beauv.
Muhlenbergia sp.
Panicum dichotomum L.
Panicum sp.
Poa compressa L.
Sorghastrum nutans (L.) Nash
Sphenopholis intermedia Rydb.
Sporobolus vaginiflorus (Torr.) Wood
Hamamelidaceae
Hamamelis virginiana L.
Iridaceae
Sisyrinchium albidum Raf.
Labiatae
Monarda fistulosa L.
Physotegia virginiana L.
Leguminosae
Amphicarpa bracteata (L.) Fern.
Cercis canadensis L.
Desmodium bracteosum (Michx.) DC.
Desmodium rotundifolium DC.
Lespedeza intermedia (S. Wats.) Britt.
Melilotus alba Desr.
Liliaceae
Polygonatum canaliculatum (Muhl.) Pursh
Oleaceae
Fraxinus americana L.
Fraxinus quadrangulata Michx.
Oxalidaceae
Oxalis grandis Small.
Oxalis sp.
Passifloraceae
Passiflora lutea L.
Platanaceae
Platanus occidentalis L.
Polygalaceae
Polygala senega L.
Polypodiaceae
Asplenium platyneuron (L.) Oakes
Primulaceae
Dodecatheon media L.
Ranunculaceae
Anemone virginiana L.
Clematis viorna L.
Rhamnaceae
Ceanothus americanus L.

TABLE 1.—Continued

Rosaceae
Amelanchier arborea (Michx. f.) Fern.
Fragaria virginiana Duchesne
Potentilla simplex Michx.
Rosa carolina L.
Rosa multiflora Thunb.
Rosa setigera Michx.
Rubus occidentalis L.
Rubus sp.
Rubiaceae
Galium circaezans Michx.
Santalaceae
Comandra umbellata (L.) Nutt.
Saxifragaceae
Hydrangea arborescens L.
Solanaceae
Physalis sp.
Ulmaceae
Ulmus rubra Muhl.
Umbelliferae
Thaspium barbinode (Michx.) Nutt.
Thaspium trifoliatum (L.) Gray
Violaceae
Viola sororia Willd.
Vitaceae
Parthenocissus quinquefolia (L.) Planch.

the glade lacks the glade endemic species such as are found on the limestone glades in south-central Indiana, e.g. *Hypericum dolabriforme*, *Viola egglestonii*, and *Leavenworthia uniflora*, the glade nevertheless supports several species that are quite local in southeastern Indiana, namely *Andropogon gerardii*, *Ceanothus americanus*, *Lithospermum canescens*, *Kuhnia eupatorioides*, *Convolvulus spithamaeus*, *Physostegia virginiana*, *Sorghastrum nutans*, and *Sisyrinchium albidum*. One species, *Aster undulatus*, is listed on the state list of rare, threatened, and endangered species (1). In the other glades in the park and immediate area, other locally rare species occur, e.g. *Bouteloua curtipendula* (Michx.) Torr., *Liatris aspera* Michx., and *Gentiana alba* Muhl. (=*G. flavida* Gray).

Additional field work will likely reveal the occurrence of other glades in southeastern Indiana. Discovery of any glade should be reported, incorporating location information and a species list, to the Division of Nature Preserves, Department of Natural Resources.

Acknowledgments

The author would like to express his gratitude to John Bacone, Lee Casebere, Barbara Homoya, and Jerrie Worthy, for their contributions to this paper. The support of the Department of Natural Resources is also appreciated.

Literature Cited

1. Aldrich, J.R., J.A. Bacone, and M.A. Homoya. 1986. List of extirpated, endangered, threatened, and rare vascular plants of Indiana: an update. Proc. Indiana Acad. Sci. 95: 413-419.
2. _____, J.A. Bacone, and M.D. Hutchison. 1982. Limestone glades of Harrison County, Indiana. Proc. Indiana Acad. Sci. 91: 480-485.

3. Bacone, J.A., L.A. Casebere, and M.D. Hutchison. 1983. Glades and barrens of Crawford and Perry Counties, Indiana. Proc. Indiana Acad. Sci. 92: 367-373.
4. _____, L.A. Casebere, and M.D. Hutchison. 1984. Glades of the Knobstone Escarpment in Indiana. Proc. Indiana Acad. Sci. 93: 303-307.
5. Baskin, J.M. and C.C. Baskin. 1985. A floristic study of a cedar glade in Blue Licks Battlefield State Park, Kentucky. Castanea 50: 19-25.
6. General Land Office survey records for Indiana. 1799-1834 Vol. 1-8. Archives, Indiana State Library, Indianapolis.
7. Homoya, M.A., D.B. Abrell, J.R. Aldrich, and T.W. Post. 1985. The natural regions of Indiana. Proc. Indiana Acad. Sci. 94: 245-268.
8. Jackson, M.T. and P.R. Allen. 1969. Detailed studies of old-growth forests in Versailles State Park, Indiana. Proc. Indiana Acad. Sci. 78: 210-230.
9. Maxwell, R.H. 1986. Natural area remnants within the Indiana Army Ammunition Plant, Charlestown, Indiana. Proc. Indiana Acad. Sci. 95: (abstract).
10. McWilliams, K.M. 1985. Soil Survey of Ripley County and Part of Jennings County, Indiana. U.S.D.A. Soil Conservation Service, Washington, D.C. 125 p.
11. Potzger, J.E. 1950. Forest types in the Versailles State Park area, Indiana. Amer. Midland Nat. 43: 729-741.
12. Rexroad, C.B. 1975. Versailles Park — where history, geology, and nature meet. Outdoor Indiana 40: (October) 4-12.
13. Stearns, F. 1956. Forest communities in Versailles State Park, Indiana. Butler Univ. Bot. Stud. 13: 85-94.
14. White, J. and M.H. Madany. 1978. Classification of natural communities in Illinois, pp. 309-405 *in* John White, Illinois Natural Areas Inventory Technical Report. Ill. Nat. Areas Inventory. Urbana, Illinois.