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A Floristic Inventory of Three Bogs on Crowley's Ridge in Northeast Arkansas

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Abstract

A floristic inventory of vascular plant taxa of three wetlands known locally as bogs on Crowley's Ridge in Greene and Clay counties was conducted from August 1979 to July 1981. Total combined area of the three sites was 9.2 ha with a range from 2.3 ha to 4.3 ha. Overall 360 taxa representing 227 genera and 92 families were collected from the bogs and surrounding upland forest and identified. Plant taxa from bog sites ranged from 81 to 89 species with 35 species collected from all 3 bogs and 26 found in 2 of the 3 sites. Among the taxa identified, twelve are of concern in Arkansas and their occurrence is being tracked by the Arkansas Natural Heritage Program. Those include *Carex bromoides* (S2), *C. gracillima* (S1), *C. hystericina* (S4), *C. normalis* (S?), *C. scoparia* (S1), *C. stricta* (S1,S3), *C. swanii* (S3), *Dulichium arundinaceum* (S2,S3), *Chelone glabra* (S1), *Gentiana saponaria* (S2), *Ilex verticillata* (S2), and *Magnolia macrophylla* (S1).

Introduction

Crowley's Ridge is classified as one of the six natural divisions of Arkansas (Pell, 1983). The unconsolidated Coastal Plain sediments that form the core of Crowley's Ridge have been subsequently capped by loess, a buff to gray fine-grained silt or clay deposited by wind. West et al. (1980) reported three separate loess deposits from the Lower Mississippi Alluvial Plain on both the east and west sides of Crowley's Ridge. General vegetation of Crowley's Ridge consists of a mixed mesophytic forest type closely related to forests of the western Appalachian Mountain region and similar to the Loess Hills east of the Mississippi (Braun, 1964). The scattered distribution of wetlands characterized by *Sphagnum* mosses, shallow, acidic standing water and related plants had been noted previously on Crowley's Ridge (E. L. Richards, pers. comm.), but had not been investigated systematically prior to the work of Farris (1981) and Vanderpool (1984). All of these wetlands are non-glaciated with acid soil and water.

Similar wetland sites investigated in Kentucky and West Virginia (Gibson, 1970; Funk and Fuller, 1978; and Meijer et al., 1981) shared vegetative and abiotic characteristics with sites studied on Crowley's Ridge in Arkansas. Considerable overlap in species composition also characterizes sites in Arkansas and in adjacent states. Sites fitting the parameters described in these studies were identified as seeps (Funk and Fuller, 1978), bogs (Gibson, 1970), and swamp forests (Meijer et al., 1981). The term bog has been used in a number of different contexts with the most stringent usage cor-

responding to that by Schwintzer (1981) who characterized bogs as shallow glaciated basin peatlands with a surface carpet of mosses, chiefly *Sphagnum* species, and other acidophilous species and an aquatic environment that is ombrotrophic or very weakly minerotrophic. Given the uncertainty surrounding use of the term 'bog', an alternate wetlands classification system developed by Cowardin et al. (1979) could be used. In general the 'bogs' on Crowley's Ridge can be classified as belonging to the Palustrine system. Clay County and Glory Hole Bogs are of the Forested Wetlands Class, and Pine Hill Bog belongs to the Emergent Wetlands Class. The Palustrine system includes all vegetated wetlands traditionally identified as marsh, swamp, bog, fen and wet prairie (Cowardin et al., 1979).

Study Sites.--The three sites selected for this study are located on Crowley's Ridge in Clay and Greene counties in northeast Arkansas (Fig. 1). Clay County Bog (T20N,R6E,S12,C) (Fig. 2A) is located in a narrow, wooded valley with three wetland areas connected by a small intermittent stream. Three distinct associations, bog, OakHickory Forest, and sand deposit, are represented at the site which comprises 2.3 ha. Glory Hole Bog (T17N,R4E,S23,NW1/4) (Fig. 2B) consists of a southern forested wetland and a northern flooded section and comprises 4.3 ha. This site contains several small springs and seeps which flow through the bog and into Sugar Creek. A large sand deposit flanks the site on the west. Pine Hill Bog (T18N,R5E,S21, NW1/4) (Fig. 2C) consists of two separate areas, quite different in character, separated by a strip of White Oak-Beech Forest. Total area of the Pine Hill Bog is approximately 2.6 ha. On the west side, the

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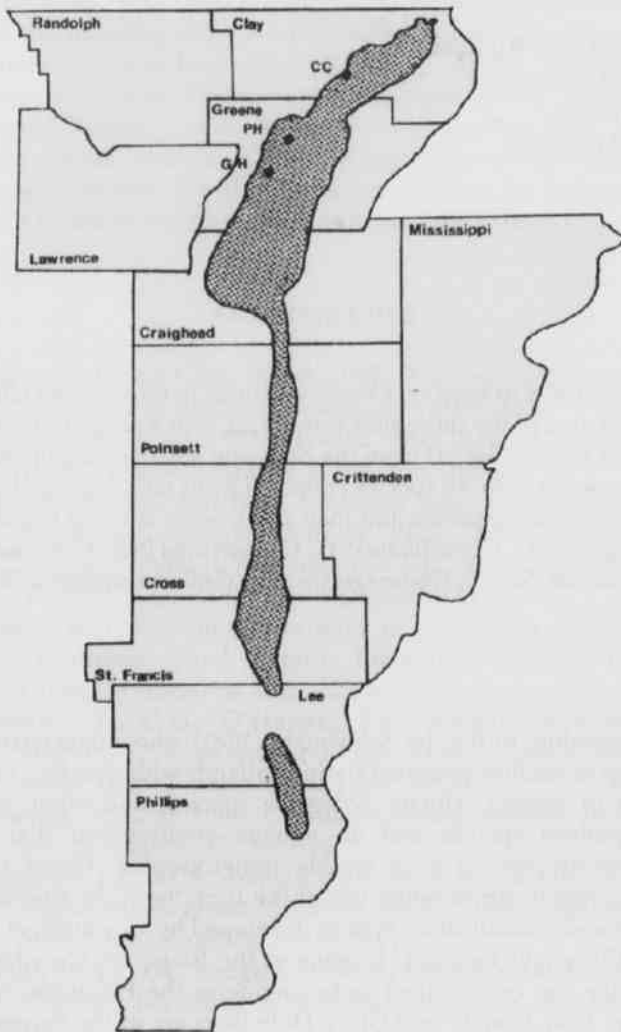


Fig. 1. Map of northeastern Arkansas showing the extent of Crowley's Ridge (shaded) and the location of study sites in Greene and Clay counties. Approximate locations of the three sites are indicated by labeled dots (CC = Clay County Bog, PH = Pine Hill Bog, and GH = Glory Hole Bog).

bog abutts on a steep sandy slope with mixed oak and pine trees in an open grassy area. The northern portion of the bog is an open sedge and rush-dominated site. The southern section is similar to the forested sections of the Clay County and Glory Hole Bogs (Vanderpool, 1984). Each of the three sites has extensive to limited mats of *Sphagnum* spp. mosses. Glory Hole Bog has extensive development of *Sphagnum* hummocks (Vanderpool, 1984).

Materials and Methods

Each study site was visited at bimonthly intervals during the growing season from August 1979 to July 1981. A complete survey of each site and the bordering upland forest was conducted with each visit. Voucher specimens were collected, pressed, dried and housed in the Arkansas State University Herbarium (STAR). Identifications were completed using taxonomic keys and/or diagnostic plates in Mackenzie (1940), Fernald (1950), Steyermark (1963), Gould (1968, 1975), and Luer (1975). Taxonomic nomenclature was updated through the use of Kartesz (1994), and Flora North America (1993, 1997).

Each study site was perimeter mapped using a Silva system type 7NL compass and a 30.5 m chain tape. An estimation of the area of each site was then made using a Lasico planimeter, #702M.

Results

A total of 360 taxa representing 352 species, 227 genera, and 92 families was collected from the bogs and surrounding upland forest and identified. Plant community of origin was noted for each specimen, and is indicated in Table 1 as bog (B), forest (F), or sand pit (S). The complete annotated checklist is included in Table 1 with the order of families arranged phylogenetically (Reveal, 1993). Genera and species within each family are arranged alphabetically.

Plant taxa from bog sites ranged from 81 to 89 species with 35 species collected from all 3 bogs (Table 1) and 26 found in 2 of the 3 sites (Table 1). A total of 155 taxa was collected from all three bogs, 155 from adjoining forested areas and 50 species from adjacent sand deposits. Clay County Bog was the most diverse with 259 taxa in 180 genera and 79 families. Of the total number of taxa collected, 89 were bog taxa, 130 were from the forest, and 42 were from the sand deposit. Glory Hole Bog had the second highest number with a total of 155 taxa representing 122 genera in 68 families. Species collected from the bog comprised 84 taxa with 55 collected from the forest and 16 from the adjoining sand hill. Pine Hill Bog yielded a total of 122 taxa representing 89 genera in 45 families. This total was comprised of 81 bog taxa, 37 forest taxa, and 4 sand taxa. The second largest family overall was Cyperaceae with 30 taxa in 6 genera. All 30 taxa in Cyperaceae were collected from bogs. Asteraceae was the largest family with 41 species in 28 genera with taxa occurring almost equally in forested and bog areas. Other families with strong representation included Poaceae (18 taxa), Fabaceae (15 taxa), and Orchidaceae (8 taxa).

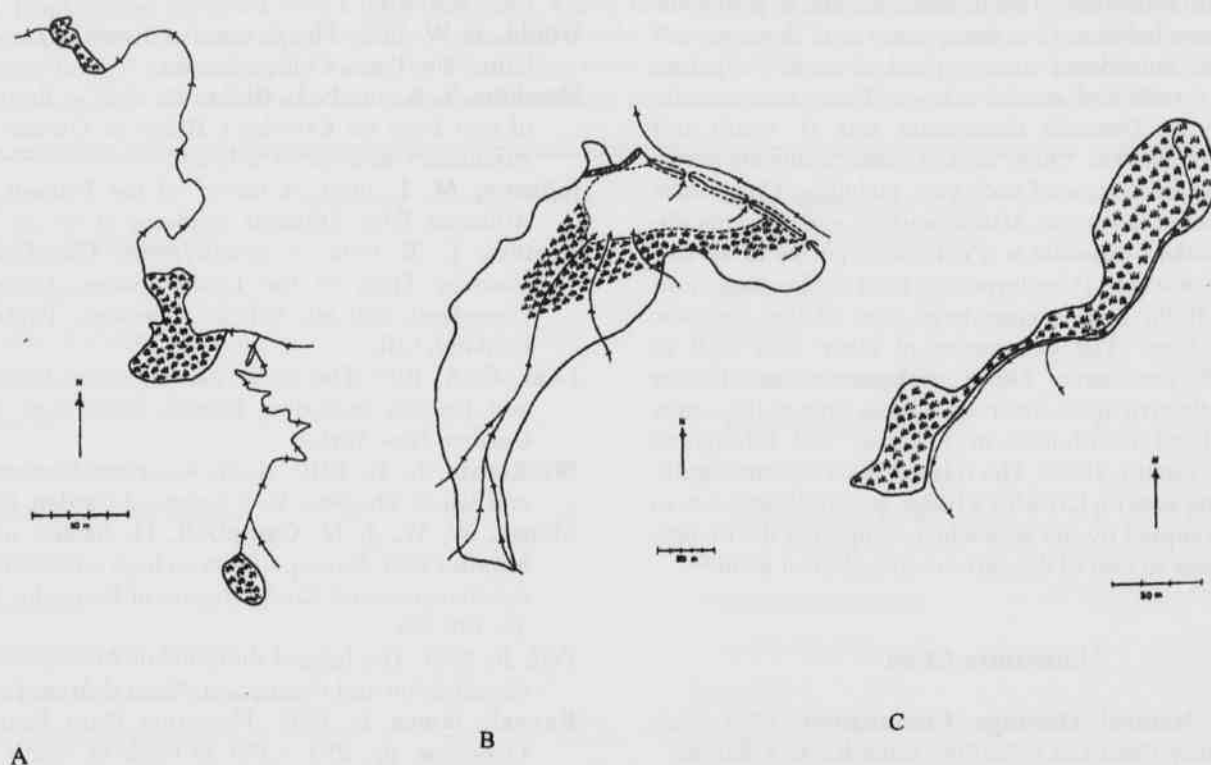


Fig. 2. Site maps of bogs investigated on Crowley's Ridge. Arrows on maps indicate direction of water flow; shaded areas represent regions with standing water and *Sphagnum* spp. mosses. A) Clay County Bog. B) Glory Hole Bog. C) Pine Hill Bog.

Discussion

All three sites studied include areas of forested bog with an overstory of *Acer rubrum*, *Liquidambar styraciflua*, and *Liriodendron tulipifera* (Table 1). Common understory woody plants include *Alnus serrulata*, *Cornus foemina*, *Corylus americana*, and *Lindera benzoin*. The substrate is densely to sporadically covered with *Sphagnum* mosses (*S. palustre*, *S. magellanicum*), ferns, sedges, and rushes. Large populations of *Triadenum walteri* and *Impatiens capensis* are also common in the ground layer.

Significance of Bogs in Northeast Arkansas.—Many of the plants collected during this study have limited distribution in Arkansas (Smith, 1988). Twelve taxa are listed presently on the Arkansas Natural Heritage Commission's State Inventory Plant List (1996). These species include eight in the sedge family [*Carex bromoides* (S2), *C. gracillima* (S1), *C. hystericina* (S4), *C. normalis* (S?), *C. scoparia* (S1), *C. stricta* (S1,S3), *C. swanii* (S3), and *Dulichium arundinaceum* (S2,S3)]. Two herbaceous perennial species [*Chelone glabra*

(S1) and *Gentiana saponaria* (S2)], and two woody species were also collected in this study [*Ilex verticillata* (S2), and *Magnolia macrophylla* (S1)]. The latter was known to be the last remaining native population in Arkansas and now is considered to be extirpated at this site.

The diversity of vascular plant species at these sites on Crowley's Ridge (Vanderpool, 1984; Hawkins and Richards, 1995) is underscored when total diversity of the 9.2 ha area investigated is compared to taxa collected from counties in the surrounding alluvial plain. Wyatt (1972) completed a floristic study of Mississippi County and identified 302 vascular plant species from the entire county. In Poinsett County, which includes a segment of Crowley's Ridge (Fig. 1), Johnson (1969) found a total of 363 vascular plant species. In this study we identified 360 taxa. Hawkins and Richards (1995) collected 262 taxa from two bogs with a total combined area of 3.6 ha.

In northeast Arkansas intense agricultural activity and development is responsible for the loss or disturbance of the native vegetation. Bog sites on Crowley's Ridge serve as a

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refugium and a favorable habitat for many plants which cannot be found elsewhere. Two different groups of plants are found in these habitats. One group consists of those species that may be considered more typical of north temperate deciduous forests and northern bogs. These taxa include those such as *Osmunda cinnamomea* and *O. regalis* and *Dulichium arundinacea*. Other taxa of concern include several orchids characteristic of such sites, including *Cypripedium pubescens*, *Isotria verticillata*, *Malaxis unifolia*, and *Tipularia discolor*. *Platanthera clavellata* is a common species in all five bogs inventoried (Vanderpool, 1984; Hawkins and Richards, 1995) and is considered one of the indicator species of bogs. The occurrence of other taxa such as *Hymenocallis caroliniana*, *Lilium michiganense*, and *Chelone glabra* is indicative of the diversity of these sites, as these taxa have restricted distribution in Arkansas and throughout their range (Smith, 1988). The relative diversity and significance of bog sites on Crowley's Ridge is disproportionate to the area occupied by the sites when comparing the diversity of the bogs to that of the surrounding alluvial plain.

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Table 1. Plant species collected from Clay County Bog, Glory Hole Bog, and Pine Hill Bog, listed phylogenetically by family, with genera and species listed alphabetically within each family. The source of each species within a site is indicated by B (collected from bog), F (collected from forest), or S (collected from sandhill). The absence of any letter under a site indicates that the species was not collected at that site. An asterisk indicates taxa collected by Hawkins and Richards (1995).

TAXON	Clay County	Glory Hole	Pine Hill				
				<i>Taxodium distichum</i> (L.) L. C. Rich.	—	B	—
DIVISION - POLYPODIOPHYTA				DIVISION - MAGNOLIOPHYTA			
Ophioglossaceae				CLASS - MAGNOLIOPSIDA			
<i>Botrychium dissectum</i> Spreng.	—	B	—	Magnoliaceae			
<i>Botrychium virginianum</i> (L.) Sw.	B	—	—	* <i>Liriodendron tulipifera</i> L.	B	B	B
Osmundaceae				<i>Magnolia macrophylla</i> Michx.	F	—	—
<i>Osmunda cinnamomea</i> L.	—	B	B	Annonaceae			
* <i>Osmunda regalis</i> L. var. <i>spectabilis</i> (Willd.) Gray	B	B	B	* <i>Asimina triloba</i> (L.) Dunal	B	B	—
Dennstaedtiaceae				Lauraceae			
<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>latiusculum</i> (Desv.) Underwood ex Heller	F	—	F	<i>Lindera benzoin</i> (L.) Blume	B	B	B
<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>pseudocaudatum</i> (Clute) Heller	F	F	—	<i>Sassafras albidum</i> (Nutt.) Nees	F	B	F
Thelypteridaceae				Saururaceae			
<i>Phegopteris hexagonoptera</i> (Michx.) Fee	F	—	—	* <i>Saururus cernuus</i> L.	B	B	B
Blechnaceae				Ranunculaceae			
<i>Woodwardia areolata</i> (L.) T. Moore	—	B	—	<i>Anemone virginiana</i> L.	F	—	—
Aspleniaceae				<i>Myosurus minimum</i> L.	S	—	—
<i>Asplenium platyneuron</i> (L.) B. S. P.	F	F	—	<i>Ranunculus fascicularis</i> Muhl. ex Bigel.	F	—	—
Dryopteridaceae				<i>Ranunculus pusillus</i> Poir.	F	B	—
* <i>Athyrium filix-femina</i> (L.) Roth var. <i>angustum</i> (Willd.) G. Lawson	B	B	B	<i>Thalictrum dasycarpum</i> Fisch. & Ave-Lall.	F	—	—
<i>Athyrium filix-femina</i> (L.) Roth var. <i>asplenioides</i> (Michx.) Farwell	B	B	—	Berberidaceae			
<i>Onoclea sensibilis</i> L.	B	—	—	* <i>Podophyllum peltatum</i> L.	B	B	—
<i>Polystichum acrostichoides</i> (Michx.) Schott	B	B	B	Platanaceae			
<i>Woodsia obtusa</i> (Spreng.) Torr.	F	—	—	<i>Platanus occidentalis</i> L.	S	—	—
DIVISION - CONIFEROPHYTA				Hamamelidaceae			
Pinaceae				* <i>Liquidambar styraciflua</i> L.	B	B	B
<i>Pinus echinata</i> P. Mill.	—	S	S	Ulmaceae			
Cupressaceae				<i>Planera aquatica</i> J. F. Gmel.	—	B	—
<i>Juniperus virginiana</i> L.	S	S	—	<i>Ulmus alata</i> Michx.	F	—	—
				Moraceae			
				<i>Maclura pomifera</i> (Raf.) Schneid.	—	S	—
				<i>Morus rubra</i> L.	F	B	—
				Urticaceae			
				* <i>Boehmeria cylindrica</i> (L.) Sw.	B	B	B

Juglandaceae				<i>Polygonum sagittatum</i> L.	—	—	B
<i>Carya illinoensis</i> (Wang.) K. Koch	—	F	—	* <i>Polygonum virginianum</i> L.	B	—	B
<i>Carya ovalis</i> (Wang.) Sarg.	F	F	F	<i>Rumex acetosella</i> L.	S	S	—
<i>Juglans nigra</i> L.	—	B	—	Clusiaceae			
Fagaceae				<i>Hypericum drummondii</i> (Grev. & Hook.)	S	—	—
<i>Fagus grandifolia</i> Ehrh.	B	—	F	Torr. & Gray			
<i>Quercus alba</i> L.	F	F	F	* <i>Hypericum hypericoides</i> (L.) Crantz	—	F	—
<i>Quercus falcata</i> Michx.	F	F	—	ssp. <i>hypericoides</i>			
<i>Quercus marilandica</i> Muenchh.	—	—	F	<i>Hypericum hypericoides</i> (L.) Crantz	F	—	F
<i>Quercus michauxii</i> Nutt.	—	B	—	ssp. <i>multicaule</i> (Michx. ex Willd.) Robson			
<i>Quercus nigra</i> L.	F	—	—	<i>Hypericum lobocarpum</i> Gattinger	F	—	F
<i>Quercus pagoda</i> Raf.	—	F	—	<i>Hypericum mutilum</i> L.	F	F	—
<i>Quercus palustris</i> Muenchh.	F	—	—	<i>Hypericum prolificum</i> L.	—	—	B
<i>Quercus phellos</i> L.	B	B	B	<i>Hypericum punctatum</i> Lam.	F	—	—
<i>Quercus stellata</i> Wang.	F	—	—	<i>Triadenum walteri</i> (Gmel.) Gl.	B	B	B
<i>Quercus velutina</i> Lam.	F	—	—	Malvaceae			
Betulaceae				<i>Hibiscus moscheutos</i> L. ssp.	B	—	—
<i>Alnus serrulata</i> (Ait.) Willd.	—	B	—	<i>lasiocarpus</i> (Cav.) O. J. Blanch.			
<i>Betula nigra</i> L.	—	—	B	Cistaceae			
<i>Carpinus caroliniana</i> Walt. ssp. <i>caroliniana</i>	—	B	—	<i>Lechea tenuifolia</i> Michx.	S	—	—
<i>Carpinus caroliniana</i> Walt. ssp.	—	—	B	Violaceae			
<i>virginiana</i> (Marsh.) Furlow				<i>Viola missouriensis</i> Greene	F	B	—
<i>Corylus americana</i> Walt.	B	B	F	<i>Viola palmata</i> L. var. <i>dilatata</i> Ell.	F	—	—
<i>Ostrya virginiana</i> (Mill.) K. Koch	B	—	—	<i>Viola sororia</i> Willd.	F	—	—
Phytolaccaceae				<i>Viola viarum</i> Pollard	F	—	—
<i>Phytolacca americana</i> L.	—	F	—	Passifloraceae			
Cactaceae				<i>Passiflora incarnata</i> L.	F	—	—
<i>Opuntia humifusa</i> (Raf.) Raf.	—	S	—	<i>Passiflora lutea</i> L.	B	—	—
Portulacaceae				Salicaceae			
<i>Claytonia virginica</i> L.	F	—	F	<i>Salix nigra</i> Marsh.	S	B	—
Cryophyllaceae				Brassicaceae			
<i>Minuartia patula</i> (Michx.) Matt.	S	—	—	<i>Arabidopsis thaliana</i> (L.) Heyn.	F	—	—
<i>Paronychia fastigiata</i> (Raf.) Fern.	S	—	—	<i>Arabis lyrata</i> L.	—	F	—
<i>Silene stellata</i> (L.) Ait. f.	F	F	F	<i>Cardamine bulbosa</i> (Schreb. ex	B	F	—
Polygonaceae				Muhl.) B.S.P.			
<i>Polygonum hydropiperoides</i> Michx.	B	B	B	<i>Cardamine pensylvanica</i> Muhl. ex Willd.	—	B	—
<i>Polygonum pensylvanicum</i> L.	B	B	—	<i>Lepidium densiflorum</i> Schrad.	F	—	—
<i>Polygonum punctatum</i> Ell.	—	—	—	<i>Lepidium virginicum</i> L.	S	S	—

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Ericaceae				<i>Clitoria mariana</i> L.	F	F	—
<i>Vaccinium arboreum</i> Marsh.	F	—	—	<i>Desmodium laevigatum</i> (Nutt.) DC.	—	F	—
<i>Vaccinium pallidum</i> Ait.	B	—	—	<i>Desmodium nudiflorum</i> (L.) DC.	F	—	F
Monotropaceae				<i>Desmodium pauciflorum</i> (Nutt.) DC.	F	—	—
<i>Monotropa hypopithys</i> L.	F	—	—	<i>Desmodium rotundifolium</i> DC.	F	—	F
<i>Monotropa uniflora</i> L.	F	F	—	<i>Gleditsia triacanthos</i> L.	—	B	—
Ebenaceae				<i>Lespedeza cuneata</i> (Dum.-Cours.) G. Don	S	—	—
<i>Diospyros virginiana</i> L.	F	F	—	<i>Lespedeza virginica</i> (L.) Britt.	S	—	—
Primulaceae				<i>Orbexilum pedunculatum</i> (P. Mill.) Rydb.	—	—	F
<i>Hottonia inflata</i> Ell.	B	—	—	<i>Pueraria montana</i> (Lour.) Merr.	—	S	—
<i>Lysimachia lanceolata</i> Walt.	F	—	F	<i>Stylosanthes biflora</i> (L.) B. S. P.	S	—	S
<i>Lysimachia radicans</i> Hook.	F	—	—	<i>Tephrosia virginiana</i> (L.) Pers.	S	—	—
Hydrangeaceae				Onagraceae			
<i>Hydrangea arborescens</i> L.	B	—	B	<i>Ludwigia alternifolia</i> L.	—	B	B
Crassulaceae				<i>Oenothera laciniata</i> Hill	S	S	—
<i>Penthorum sedoides</i> L.	B	B	—	<i>Oenothera linifolia</i> Nutt.	S	—	—
Saxifragaceae				Melastomataceae			
<i>Heuchera americana</i> L. var. <i>hirsuticaulis</i> (Wheelock) Rosend., Butt. & Lak.	F	—	—	<i>Rhexia virginica</i> L.	—	—	B
Rosaceae				Cornaceae			
<i>Agrimonia rostellata</i> Wallr.	F	—	—	<i>Cornus florida</i> L.	F	F	F
<i>Amelanchier arborea</i> (Michx. f.) Fern.	F	—	—	<i>Cornus foemina</i> P. Mill.	B	B	B
<i>Crataegus marshallii</i> Egglest.	B	B	B	<i>Nyssa aquatica</i> L.	—	B	—
<i>Malus angustifolia</i> (Ait.) Michx. var. <i>puberula</i> Rehd.	S	—	—	<i>Nyssa biflora</i> Walt.	B	—	—
<i>Potentilla canadensis</i> L.	F	—	—	* <i>Nyssa sylvatica</i> Marsh.	B	B	B
<i>Potentilla simplex</i> Michx.	F	B	—	Santalaceae			
<i>Prunus americana</i> Marsh.	F	—	—	<i>Comandra umbellata</i> (L.) Nutt.	S	—	—
<i>Prunus serotina</i> Ehrh.	F	B	—	Celastraceae			
<i>Rosa palustris</i> Marsh.	B	—	—	<i>Celastrus scandens</i> L.	B	—	—
<i>Rosa setigera</i> Michx.	F	—	—	<i>Euonymus americana</i> L.	B	—	B
<i>Rubus argutus</i> Link.	F	B	B	Aquifoliaceae			
<i>Rubus trivialis</i> Michx.	B	—	—	<i>Ilex decidua</i> Walt.	B	B	B
Fabaceae				<i>Ilex opaca</i> Ait.	F	—	—
<i>Apios americana</i> Medik.	B	B	B	<i>Ilex verticillata</i> (L.) Gray	—	B	—
<i>Baptisia alba</i> (L.) Vent. var. <i>macrophylla</i> (Larisey) Isely	S	—	—	Euphorbiaceae			
<i>Cercis canadensis</i> L.	F	—	—	<i>Croton glandulosus</i> L. var. <i>septentrionalis</i> Muell.-Arg.	S	—	—
				<i>Crotonopsis willdenowii</i> G. L. Webster	S	—	—
				<i>Euphorbia corollata</i> L.	—	S	—

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<i>Euphorbia pubentissima</i> Michx.	S	—	—	<i>Bartonia paniculata</i> (Michx.) Muhl.	B	B	—
Vitaceae				<i>Gentiana saponaria</i> L.	B	—	—
<i>Parthenocissus quinquefolia</i> (L.) Planch.	B	B	—	Apocynaceae			
<i>Vitis aestivalis</i> Michx.	—	—	F	<i>Apocynum cannabinum</i> L.	S	—	—
<i>Vitis cinerea</i> (Engelm.) Millard	F	F	—	<i>Trachelospermum difforme</i> (Walt.) Gray	—	F	—
<i>Vitis rotundifolia</i> Michx.	F	B	—	Asclepiadaceae			
Linaceae				<i>Cynanchum laeve</i> (Michx.) Pers.	—	B	—
<i>Linum striatum</i> Walt.	S	—	B	<i>Asclepias variegata</i> L.	F	—	F
Hippocastanaceae				Solanaceae			
<i>Aesculus pavia</i> L.	F	—	—	<i>Physalis virginiana</i> P. Mill.	F	—	—
Aceraceae				<i>Solanum carolinense</i> L.	S	—	—
<i>Acer rubrum</i> L. var. <i>drummondii</i>	—	B	—	Cuscutaceae			
(Hook. & Arn. ex Nutt.) Sarg.				<i>Cuscuta compacta</i> Juss. ex Choisy	—	B	B
* <i>Acer rubrum</i> L. var. <i>rubrum</i>	B	—	B	<i>Cuscuta cuspidata</i> Engelm.	B	—	—
<i>Acer rubrum</i> L. var. <i>trilobum</i> Torr & Gray	—	—	B	Polemoniaceae			
ex K. Koch				<i>Phlox divaricata</i> L.	—	F	—
Anacardiaceae				<i>Phlox glaberrima</i> L.	F	—	—
<i>Rhus copallina</i> L. var. <i>latifolia</i> Engl.	S	S	—	<i>Phlox pilosa</i> L.	F	F	—
<i>Rhus glabra</i> L.	S	—	—	Boraginaceae			
* <i>Toxicodendron radicans</i> (L.) Kuntze	F	B	B	<i>Cynoglossum virginianum</i> L.	F	—	—
Oxalidaceae				<i>Myosotis macrosperma</i> Engelm.	—	F	—
<i>Oxalis dillenii</i> Jacq.	F	—	—	<i>Myosotis verna</i> Nutt.	F	—	—
<i>Oxalis stricta</i> L.	F	—	—	Verbenaceae			
<i>Oxalis violacea</i> L.	F	—	—	<i>Phyrma leptostachya</i> L.	F	—	—
Geraniaceae				Lamiaceae			
<i>Geranium carolinianum</i> L.	F	F	—	<i>Cunila origanoides</i> (L.) Britt.	F	—	F
<i>Geranium maculatum</i> L.	F	—	—	<i>Lycopus virginicus</i> L.	B	—	—
Balsaminaceae				<i>Mondarda fistulosa</i> L. var.	F	—	—
* <i>Impatiens capensis</i> Meerb.	B	B	B	<i>mollis</i> (L.) Benth.			
Araliaceae				<i>Prunella vulgaris</i> L.	—	S	F
<i>Aralia racemosa</i> L.	B	—	—	<i>Pycnanthemum albescens</i> Torr. & Gray	—	F	F
* <i>Aralia spinosa</i> L.	B	B	F	<i>Pycnanthemum muticum</i> (Michx.) Pers.	F	—	—
Apiaceae				<i>Pycnanthemum tenuifolium</i> Schrad.	F	—	F
<i>Cicuta maculata</i> L.	B	—	—	<i>Salvia lyrata</i> L.	F	—	—
<i>Oxypolis rigidior</i> (L.) Raf.	—	—	B	<i>Scutellaria lateriflora</i> L.	B	B	—
<i>Sanicula canadensis</i> L.	F	F	F	<i>Teucrium canadense</i> L.	—	—	F
<i>Thaspium trifoliatum</i> (L.) Gray	—	—	F	<i>Trichostema dichotomum</i> L.	—	S	—
Gentianaceae				Callitrichaceae			

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<i>Callitriche heterophylla</i> Pursh	B	—	—	<i>Galium aparine</i> L.	—	F	—
Plantaginaceae				<i>Galium circaeazans</i> Michx.	F	—	—
<i>Plantago aristata</i> Michx.	S	—	—	<i>Galium obtusum</i> Bigel.	F	—	F
<i>Plantago elongata</i> Pursh	S	—	—	<i>Galium pilosum</i> Ait.	F	—	—
<i>Plantago pusilla</i> Nutt.	S	—	—	<i>Houstonia caerulea</i> L.	F	—	—
<i>Plantago virginica</i> L.	S	—	—	<i>Houstonia longifolia</i> Gaertn.	F	—	—
Oleaceae				<i>Houstonia pusilla</i> Schoepf.	F	—	—
<i>Fraxinus americana</i> L.	F	B	—	* <i>Mitchella repens</i> L.	B	B	B
<i>Fraxinus profunda</i> (Bush.) Bush	—	F	—	Caprifoliaceae			
Scrophulariaceae				<i>Lonicera japonica</i> Thunb.	B	B	—
<i>Aureolaria grandiflora</i> (Benth.)	F	—	—	<i>Sambucus canadensis</i> L.	B	B	—
Pennell var. <i>cinerea</i> Pennell				Asteraceae			
* <i>Chelone glabra</i> L.	—	B	B	<i>Ageratina altissima</i> (L.) King & H. E. Robins.	B	—	B
<i>Gratiola virginiana</i> L.	B	B	—	<i>Antennaria plantaginifolia</i> (L.) Richards	S	—	—
* <i>Mimulus alatus</i> Ait.	B	—	B	<i>Aster ontarionis</i> Wieg.	—	F	—
<i>Nuttallanthus canadensis</i> (L.) D. A. Sutton	S	S	—	<i>Aster patens</i> Ait. var. <i>gracilis</i> Hook.	—	F	—
<i>Pedicularis canadensis</i> L.	F	—	F	<i>Aster pilosus</i> Willd.	—	F	—
<i>Penstemon arkansanus</i> Pennell	F	—	—	<i>Bidens aristosa</i> (Michx.) Britt.	S	—	—
<i>Penstemon pallidus</i> Small	F	—	—	<i>Brickellia eupatorioides</i> (L.) Shinnors	—	F	—
<i>Penstemon tubiflorus</i> Nutt.	F	—	—	<i>Coreopsis tripteris</i> L.	—	—	B
<i>Veronicastrum virginicum</i> (L.) Farw.	—	F	—	<i>Eclipta prostrata</i> (L.) L.	F	—	—
Acanthaceae				<i>Elephantopus carolinianus</i> Raeusch.	F	F	—
<i>Ruellia pedunculata</i> Torr. ex Gray	F	F	—	<i>Erigeron annuus</i> (L.) Pers.	B	—	—
Bignoniaceae				<i>Erigeron strigosus</i> Muhl. ex Willd. var.	B	—	—
<i>Bignonia capreolata</i> L.	F	—	—	<i>beyrichii</i> (Fisch. & C. A. Mey.) Torr. & Gray			
<i>Campsis radicans</i> (L.) Seem. ex Bureau	F	—	—	<i>Eupatorium coelestinum</i> L.	—	—	B
Campanulaceae				<i>Eupatorium fistulosum</i> Barratt	B	B	B
<i>Lobelia cardinalis</i> L.	B	—	B	<i>Eupatorium perfoliatum</i> L.	F	B	B
<i>Lobelia inflata</i> L.	—	B	B	<i>Eupatorium serotinum</i> Michx.	F	—	—
<i>Lobelia puberula</i> Michx. var.	B	B	B	<i>Euthamia gymnospermoides</i> Greene	B	B	—
<i>mineolana</i> Wimm.				<i>Gnaphalium obtusifolium</i> L.	F	F	—
<i>Lobelia siphilitica</i> L.	F	F	—	<i>Helenium amarum</i> (Raf.) H. Rock	S	F	—
<i>Lobelia spicata</i> Lam.	F	—	—	<i>Helianthus angustifolius</i> L.	—	—	S
<i>Triodanis perfoliata</i> (L.) Nieuwl.	S	S	—	<i>Helianthus divaricatus</i> L.	F	—	—
Rubiaceae				<i>Helianthus microcephalus</i> Torr. & Gray	F	—	—
<i>Cephalanthus occidentalis</i> L.	B	B	B	<i>Helianthus silphoides</i> Nutt.	—	F	—
<i>Diodia teres</i> Walt.	S	S	—	<i>Heterotheca subaxillaris</i> (Lam.)	F	—	—
<i>Diodia virginiana</i> L.	—	—	B	Britt. & Rusby			

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<i>Hieracium gronovii</i> L.	F	—	—	<i>Carex debilis</i> Michx. var. <i>rudgei</i> Bailey	B	—	—
<i>Krigia biflora</i> (Walt.) Blake	F	B	B	<i>Carex festucacea</i> Schkuhr. ex Willd.	—	B	—
<i>Krigia cespitosa</i> (Raf.) Chambers	F	F	—	<i>Carex flaccosperma</i> Dew. var. <i>flaccosperma</i>	B	—	B
<i>Lactuca canadensis</i> L. var. <i>latifolia</i> Ktze.	—	S	—	<i>Carex flaccosperma</i> Dew. var. <i>glaucodea</i>	B	—	—
<i>Lactuca floridana</i> (L.) Gaertn.	B	—	—	(Tuckerman ex Olney Kükenth.			
<i>Leucanthemum vulgare</i> Lam.	—	—	S	<i>Carex gracillima</i> Schwein.	B	—	—
<i>Mikania scandens</i> (L.) Willd.	—	B	—	<i>Carex hystericina</i> Muhl. ex Willd.	—	—	B
<i>Parthenium integrifolium</i> L.	—	—	F	<i>Carex louisianica</i> Bailey	B	—	—
<i>Pluchea camphorata</i> (L.) DC.	B	—	—	<i>Carex lupulina</i> Muhl. ex Willd.	—	B	—
<i>Pyrrhoppappus carolinianus</i> (Walt.) DC.	S	—	—	<i>Carex lurida</i> Wahlenb.	B	B	B
<i>Rudbeckia hirta</i> L.	F	F	—	<i>Carex normalis</i> Mackenz.	B	—	B
<i>Solidago caesta</i> L.	F	—	F	<i>Carex rosea</i> Schkuhr. ex Willd.	B	—	—
<i>Solidago nemoralis</i> Ait.	S	F	F	<i>Carex scoparia</i> Schkuhr. ex Willd.	B	—	—
<i>Solidago odora</i> Ait.	F	—	—	<i>Carex stipata</i> Muhl. ex Willd.	—	B	B
<i>Solidago petiolaris</i> Ait.	—	—	F	<i>Carex stricta</i> Lam.	—	—	B
<i>Vernonia gigantea</i> (Walt.) Trel.	B	—	—	<i>Carex swanii</i> (Fern.) Mackenz.	B	—	B
<i>Vernonia missurica</i> Raf.	F	—	B	<i>Carex vulpinoidea</i> Michx.	—	B	B
CLASS - LILIOPSIDA				<i>Cyperus retrofractus</i> (L.) Torr.	—	B	—
Araceae				<i>Cyperus strigosus</i> L.	—	—	B
<i>Arisaema dracontium</i> (L.) Schott	F	F	B	<i>Dulichium arundinaceum</i> (L.) Britt	—	—	B
Xyridaceae				<i>Eleocharis acicularis</i> (L.) R. & S.	B	—	—
<i>Xyris jupicai</i> L. C. Rich	—	—	B	<i>Eleocharis tenuis</i> (Willd.) Schultes	—	—	B
Commelinaceae				var. <i>verrucosa</i> (Svens.) Svens			
<i>Commelina virginica</i> L.	B	—	B	<i>Rhynchospora inexpansa</i> (Michx.) Vahl	—	—	B
Juncaceae				<i>Scirpus cyperinus</i> (L.) Kunth	—	—	B
<i>Juncus acuminatus</i> Michx.	—	—	B	<i>Scirpus georgianus</i> Harper	B	—	B
<i>Juncus brachycarpus</i> Engelm.	—	—	B	<i>Scirpus polyphyllus</i> Vahl	—	—	B
<i>Juncus diffusissimus</i> Buckl.	—	B	B	Poaceae			
<i>Juncus effusus</i> L.	—	B	B	<i>Alopecurus carolinianus</i> Walt.	B	—	—
<i>Juncus marginatus</i> Rostk.	—	—	B	<i>Andropogon virginicus</i> L.	—	F	—
<i>Luzula bulbosa</i> (Wood) Smyth & Smyth	F	F	F	<i>Aristida lanosa</i> Ell.	—	F	—
Cyperaceae				<i>Brachiaria platyphylla</i> (Munro ex	—	F	—
<i>Carex albicans</i> Willd. ex Spreng.	B	—	—	Wright) Nash			
<i>Carex bromoides</i> Schkuhr. ex Willd.	—	B	—	<i>Chasmanthium latifolium</i> (Michx.) Yates	B	—	—
<i>Carex complanata</i> Torr. & Hook. var.	—	—	B	<i>Chasmanthium laxum</i> (L.) Yates. var.	B	B	B
<i>hirsuta</i> (Bailey) Gl.				<i>sessiliflorum</i> (Poir.) L. Clark			
* <i>Carex crinita</i> Lam. var. <i>brevicrinis</i> Fern.	B	B	B	<i>Cinna arundinacea</i> L.	—	F	—
<i>Carex debilis</i> Michx. var. <i>debilis</i>	B	B	—	<i>Dichantherium boscii</i> (Poir.) Gould &	F	—	B

C. A. Clark				<i>Trillium recurvatum</i> Beck	—	F	—
<i>Dichanthelium clandestinum</i> (L.) Gould	—	—	B	<i>Uvularia grandiflora</i> Sm.	F	—	—
<i>Dichanthelium dichotomum</i> (L.) Gould	B	B	B	<i>Uvularia sessilifolia</i> L.	F	F	—
<i>Dichanthelium latifolium</i> (L.) Gould &	F	—	—	Iridaceae			
C. A. Clark				<i>Sisyrinchium montanum</i> Greene	—	B	—
<i>Dichanthelium scoparium</i> (Lam.) Gould	F	—	—	Smilacaceae			
<i>Dichanthelium sphaerocarpon</i> (Ell.) Gould	F	—	—	<i>Smilax glauca</i> Walt.	B	B	—
<i>Echinochloa muricata</i> (Beauv.) Fern. var.	S	—	—	<i>Smilax rotundifolia</i> L.	B	B	B
<i>microstachya</i> Wieg.				Dioscoreaceae			
<i>Elymus virginicus</i> L. var. <i>virginicus</i>	—	F	—	<i>Dioscorea quaternata</i> J. F. Gmel.	F	—	B
<i>Panicum rigidulum</i> Bosc. ex Nees	F	—	—	<i>Dioscorea villosa</i> L.	F	—	B
<i>Saccharum giganteum</i> (Walt.) Pers.	—	F	—	Orchidaceae			
<i>Tripsacum dactyloides</i> (L.) L.	S	—	—	<i>Corallorrhiza odontorhiza</i> (Willd.) Nutt.	F	—	—
Sparganiaceae				<i>Corallorrhiza wisteriana</i> Conrad	F	—	—
<i>Sparganium americanum</i> Nutt.	—	B	—	<i>Cypripedium pubescens</i> Willd.	F	—	—
Liliaceae				<i>Isotria verticillata</i> (Muhl. ex Willd.) Raf.	B	F	F
<i>Hymenocallis caroliniana</i> (L.) Herb.	F	—	F	<i>Malaxis unifolia</i> Michx.	B	—	—
<i>Lilium michiganense</i> Farw.	B	—	—	* <i>Platanthera clavellata</i> (Michx.) Luer	B	B	B
<i>Maianthemum racemosum</i> (L.) Link	B	F	—	<i>Spiranthes vernalis</i> Engelm. & Gray	F	F	—
<i>Nothoscordum bivalve</i> (L.) Britt.	S	—	—	<i>Tipularia discolor</i> (Pursh) Nutt.	F	—	—
<i>Polygonatum biflorum</i> (Walt.) Ell.	F	—	F				