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Vegetation of Natural Plant Communities of the Kankakee Sand Area

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CHAPTER 1. -- **Prairie and Savanna Vegetation of Braidwood Dunes and Savanna Nature Preserve, Will County, Illinois**

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ABSTRACT -- Vegetation of the Braidwood Dunes and Savanna Nature Preserve in Will County, Illinois, was studied during the growing seasons of 2004 to 2007. Located in the northeastern part of the Kankakee sand deposits, this site is a small remnant of sand prairie and sand savanna vegetation that once contained extensive marsh, wet, mesic, and dry sand prairie communities. The dry sand prairie was dominated by *Schizachyrium scoparium* (little bluestem) with an Importance Value (I.V.) of 33.3 (200 possible) followed by *Opuntia humifusa* (common prickly pear) and *Dichanthelium villosissimum* hairy panic grass) with I.V.'s of 23.9 and 20.3, respectively. In the dry-mesic sand prairie *Solidago nemoralis* (gray goldenrod) with an I.V. of 24.7 and *Schizachyrium scoparium* (I.V. of 23.8) were co-dominant. Two distinct ground layer communities were encountered in the dry-mesic sand savanna, one dominated by *Pteridium aquilinum* (bracken fern), and one where this species was absent. The dominant overstory species was *Quercus velutina* (black oak) along with a few individuals of *Q. alba* (white oak). Woody overstory averaged 188.1 stems/ha, with a basal area of 15.57 m^2/ha. A few small sedge meadows occurred in the Preserve. *Carex stricta* (tussock sedge) dominated these sedge meadows with an I.V. of 44.5, with *Helianthus grosseserratus* (sawtooth sunflower), *Thelypteris palustris* (marsh fern), and *Galium obtusum* (wild madder) also common. A total of 448 vascular plant taxa were found on the Preserve, 13 fern and fern-allies, one gymnosperm, 120 monocots, and 314 dicots. Fifty-four exotic taxa were encountered, representing about 13% of the species found.

Key Words: Kankakee sand deposits, Illinois, dry and dry-mesic sand prairie, sand savanna, sedge meadow.

INTRODUCTION

Wind blown sand deposits from glacial outwash, common in the northern half of Illinois, are the result of erosion events associated with Wisconsian glaciation (Willman and Frye 1970, Schwegman 1973, King 1981). These sand deposits account for nearly 5% of the land surface of Illinois. The most extensive sand regions in Illinois are the Kankakee sand deposits of northeastern Illinois, and the Illinois River sand deposits in the central part of the state (Gleason 1910, Schwegman 1973). The Kankakee sand deposits were formed when glacial lakes drained about 14,500 years ago after glacial moraines were breached, resulting in the Kankakee Torrent (Willman 1973). The Illinois River sand deposits were formed when these waters of the Kankakee Torrent slowed as they entered the broad lowlands of the Illinois River below present day Hennepin. Numerous smaller sand deposits also occur, including the glacial outwash sands along the upper Mississippi River and its tributaries and the Green River Lowlands of Lee and Henry Counties, both in northwestern Illinois. Gleason (1910) describes many of these sand areas in his extensive studies of the vegetation of the inland sand deposits of Illinois.

Plant communities of sand deposits are extremely diverse and include sand ponds (McClain et al. 1997), marshes and sedge meadows (Handel et al. 2003), prairies (Handel et al. 2003; McClain et al. 2003; Phillippe et al. 2004), savannas and woodlands (Johnson and Ebinger 1992, 1995; McClain et al. 2002; McDowell et al. 1983), and closed forests (Coates et al. 1992; Jenkins et al. 1991). Presently, most of these sand areas are under cultivation and only small remnants have been preserved. One of these remnants is the Braidwood Dunes and Savanna Nature Preserve. This unique area contains some of the best quality dry sand prairie remnants and sand savanna communities in this part of

Illinois. The present study was undertaken to determine vascular plant species composition, vegetation structure, and floristic quality of the major natural plant communities of this Preserve.

DESCRIPTION OF THE STUDY AREA

The 168 ha Braidwood Dunes and Savanna Nature Preserve is located in the southwestern corner of Will County, about 1 km east of Braidwood, and 30 km south-southwest of Joliet (central half of S16, T32N, R9E). Presently owned by the Forest Preserve District of Will County, the Preserve is located in the Kankakee Sand Area Section of the Grand Prairie Natural Division (Schwegman 1973). The Preserve, dedicated in 1981, contains remnants of dry to dry-mesic sand savanna, dry, mesic, and wet mesic sand prairie, sedge meadow, and marsh communities. Before being purchased most of the Preserve had been grazed and some areas had been used for agriculture. Also, much of the land directly to the north of the Preserve had been strip-mined. The Natural Areas Inventory found areas of "grade A" mesic sand prairie along with "grade B" dry-mesic sand savanna, sedge meadows, and marsh communities (White 1978). Much of the area was designated "grade C'' or lower due to past disturbances.

The Preserve is situated near the edge of former glacial Lake Wauponsee that drained about 14,500 years ago during the Kankakee Torrent leaving sandy beaches and near shore sand deposits (Willman and Frye 1970). These sands were reworked by wind to create the present dune and swale topography. Characteristic sand savanna and sand prairie vegetation became established during the Hypsithermal period about 8,000 years ago (King 1981). The soils of the low areas between the dunes are Watseka loamy fine

sands and Granby fine sandy loams that are relatively high in organic material, while the low dune soils are Oakville fine sands that developed from windblown sediments and are well drained with a dark grayish brown surface horizon (Hanson 2004).

Climate of northeastern Illinois is continental with warm summers and cold winters. Based on weather data from Kankakee, 40 km to the southeast, mean annual precipitation is 98.0 cm, with May having the highest rainfall (11.5 cm). Mean annual temperature is 9.9°C with the hottest month being July (average of 23.6°C), and the coldest being January (average of -5.7°C). Frost-free days range from 141 to 206, with the average being 174 days per year (Midwestern Regional Climate Center 2005).

METHODS

Floristic Composition. Braidwood Dunes and Savanna Nature Preserve was visited six to ten times each year throughout the growing seasons of 2004 and 2005. During these visits voucher specimens of each plant species encountered were collected, identified, and deposited in the Stover-Ebinger Herbarium of Eastern Illinois University, Charleston, Illinois (EIU) or the herbarium of the Illinois Natural History Survey, Champaign, Illinois (ILLS). The designation of exotic species followed Gleason and Cronquist (1991), Mohlenbrock (2002), and Taft et al. (1997). Nomenclature followed Mohlenbrock (2002).

Ground Layer Sampling. In late summer of 2005 transects were located randomly along cardinal compass directions within the dry sand prairie, dry-mesic sand prairie, sedge meadow, and dry-mesic sand savanna. Within each of these four communities, two to four transects were located (n = 50 or 100 plots). Along each transect, $1m^2$ quadrats were

located alternately along each transect. A random numbers table was used to determine the distance (0 to 9 m) a quadrat was located from the transect line. Species cover was determined using the Daubenmire (1959) cover class system as modified by Bailey and Poulton (1968). The modified Daubenmire cover scale is as follows: class 1 = 0 to 1%; class 2 = >1 to 5%; class 3 = >5 to 25%; class 4 = >25 to 50%; class 5 = >50 to 75%; class 6 = >75 to 95%; class 7 = >95 to 100%. Only ground layer species rooted within the quadrat frame were recorded. Mean cover was determined for each taxon using the mid-point values for each cover class, while Importance Value (I.V.) was calculated by summing relative cover and relative frequency.

Overstory Sampling. The savanna community was surveyed in the fall of 2005 by dividing a portion of the area into contiguous quadrats 25 m on a side. All living and dead-standing woody individuals ≥ 10.0 cm dbh were identified and their diameters recorded. From these data, living-stem density (stems/ha), basal area (m^2/ha), relative density, relative dominance (basal area), importance value (I.V.), and average diameter (cm) were calculated for each species. Importance Values are calculated as the sum of the relative density and relative dominance (McIntosh 1957). Dead-standing density (stem/ha) and basal area (m^2/ha) were also calculated.

Woody understory composition and density (stems/ha) were determined using nested circular plots 0.0001, 0.001, and 0.01 ha in size with the centers located at 15 m intervals along randomly located east-west transects. Four additional 0.0001 ha circular plots were located 6 m from the center point of each plot center along cardinal compass directions. In the 0.0001 ha plots, woody seedlings (≤50 cm tall) were counted; in the

0.001 ha circular plots small saplings (>50 cm tall and <2.5 cm dbh) were recorded; and in the 0.01 ha circular plots large saplings (2.5-9.9 cm dbh) were tallied.

Floristic Quality Index (FQI). The FQI for the Preserve flora was calculated using the coefficient of conservatism (CC) assigned to each taxon based on a species' tolerance to disturbance and its fidelity to habitat integrity (Taft et al. 1997). The FQI, therefore, is a weighted index of species richness (N = number of species present on a site), and is the arithmetic product of the average coefficient of conservatism (C-Value = the average of all species CC's) multiplied by the square root of the species richness ($\sqrt{N}$) of an inventory site: FQI = C-Value ($\sqrt{N}$). For relatively small areas that are intensively studied, the FQI gives a rapid means of comparison and an indication of the floristic integrity of the site. Using the FQI along with other floristic measures, such as quadrat-based sampling methods, provides an easy way to compare sites. Prairies with an FQI of 35 or higher are considered good quality natural areas (Taft et al. 1997).

RESULTS

A total of 448 taxa in 261 genera and 90 families were documented to occur on the Preserve (Appendix I). Fern and fern-allies were represented by 13 species, while gymnosperms accounted for one. Of the remaining taxa, 120 were monocots in 13 families and 61 genera, and 314 were dicots in 68 families and 190 genera. Non-native (exotic) species accounted for 57 taxa, about 13% of the species collected. The predominant plant families were Asteraceae with 61 species and Poaceae with 47 species, followed by the Cyperaceae with 37 species. The State endangered *Calopogon oklahomensis* (Oklahoma grass pink orchid), *Dichanthelium boreale* (northern panic

grass), *Mirabilis hirsuta* (hairy umbrella-wort), and *Scleria pauciflora* (Carolina whipgrass) were found on the Preserve along with the State threatened *Drosera intermedia* (narrow-leaved sundew), *Platanthera flava* var. *herbiola* (tubercled orchid), *Rubus schneideri* (bristly blackberry), and *Utricularia intermedia* (flat-leaved bladderwort) (Herkert and Ebinger 2002). The FQI for the Preserve, when exotic species were included, was 86.38 with a mean C-value of 4.08. When exotic species were excluded from the calculations, the FQI was 98.85 with a mean C-value of 4.67.

Dry sand prairie. Scattered small areas of dry sand prairie were found in the Preserve. Most were very small and degraded, probably due to past grazing. Blowouts were stabilized, but blowing sand was common when the vegetation was sparse. The dry sand prairie communities were less than 0.25 ha, but contained many of the species typically associated with this community type (Gleason 1910; White and Madany 1978). *Schizachyrium scoparium* (little bluestem), the leading dominant with an I.V. of 33.3, had a mean cover of 8.0% (Table 1). *Opuntia humifusa* (common prickly pear) was second with an I.V. of 23.9, *Dichanthelium villosissimum* (hairy panic grass) was third (I.V. of 20.3), followed by *Chamaecrista nictitans* (sensitive pea) (I.V. of 14.9). Each of these species had frequencies of 78-98% and a mean cover higher than 2.0%. Of the remaining 29 species encountered in the plots, most had frequencies of less than 50% and I.V.'s lower than 10.3. The cool-season, exotic grass *Poa pratensis* (Kentucky blue grass) was the only exotic species found in the plots (Table 1). Bare ground and litter mean cover was 63.6% in this bunch grass community (Gleason 1910). Other grasses, grass-like plants, and forbs grew in the openings between the clumps of *S. scoparium* and *D. villosissimum* that rarely exceeded 25 cm across.

Dry-mesic sand prairie. Throughout the northern part of the Preserve are scattered remnants of dry-mesic sand prairies recovering from past disturbances. Many of these sites had high species diversity, but varied in the abundance, distribution, and composition of the dominant species. On the 2 ha site studied, 49 species were found in the plots. *Solidago nemoralis* (gray goldenrod) with an I.V. of 24.7 and *Schizachyrium scoparium* (I.V. of 23.8) were co-dominant, accounting for nearly a quarter of the I.V. (Table 1). Other important native species were *Antennaria plantaginifolia* (pussy-toes), *Euthamia gymnospermoides* (viscid grass-leaved goldenrod), *Sorghastrum nutans* (Indian grass), and *Rubus flagellaris* (common dewberry), all with I.V.'s exceeding 12.0 and mean covers greater than 4.90%. The State endangered *Scleria pauciflora* var. *caroliniana* was rarely found, having a frequency of 6%. The exotic, cool-season grass *Poa pratensis* ranked seventh in I.V. (10.4) and was scattered throughout the prairie. Other exotic species encountered in the plots were *Rumex acetosella* (sour dock) and *Achillea millefolium* (common yarrow) with an I.V. of 3.7 and 0.7, respectively. Bare ground and litter mean cover was 25.9%.

Dry-mesic sand savanna. Along the southern part of the Preserve is a sand savanna that has been managed by occasional fires since the Preserve was dedicated (Table 2). Two distinct ground layer zones occurred under the savanna canopy depending on the presence or absence of *Pteridium aquilinum* (bracken fern). Near the center of the study area, covering nearly 0.75 ha, was an area dominated by this fern, which had a mean cover of 42.9% and an I.V. of 52.8 (Table 2). Second in importance in this zone were seedlings and small multiple-stemmed grubs (created by repeated fires) of *Quercus velutina* (black oak), which accounted for an I.V. of 27.7. Important herbaceous species

included *Helianthus divaricatus* (woodland sunflower), *Amphicarpaea bracteata* (hog peanut), and *Carex pensylvanica* (Pennsylvania sedge) with I.V.'s between 10.2 and 19.8. In the zone lacking *Pteridium aquilinum*, the small shrub *Rosa carolina* (Carolina rose) ranked first in I.V. (24.1) and mean cover (9.2%). In this zone *Helianthus divaricatus* (I.V. of 22.7), *Amphicarpaea bracteata* (I.V. of 16.2) and *Carex pensylvanica* (I.V. of 16.0) were again the most important herbaceous species (Table 2). In both zones *Poa pratensis* was the common exotic species with I.V.'s of 2.5 and 4.2 (Table 2).

The overstory of the dry-mesic savanna averaged 188.1 stems/ha with a basal area of 15.6 m^2/ha and was dominated by *Quercus velutina* with a few scattered individuals of *Q. alba* (white oak). Most trees were in the 20-39 cm diameter classes, with the average diameter of *Q. velutina* 31.8 cm dbh, and *Q. alba* 26.6 cm dbh (Table 3). The small number of trees in the 10-19 cm diameter classes was probably the result of management fires, as fire scars were common at the base of many of the trees. Numerous seedlings and small saplings were found in the understory, but large saplings (individuals >1 cm dbh) were not encountered (Table 4). *Quercus velutina* dominated the seedling layer (11167 stems/ha) and was third in small saplings (708 stems/ha). The remaining understory species were mostly shrubs with *Rubus* spp. (blackberries and raspberries) and *Cornus racemosa* (gray dogwood) the most important.

Sedge meadow. Near the southern edge of the Preserve is a small sedge meadow about 0.75 ha in size. Dominated by *Carex stricta* (tussock sedge), with an I.V. of 44.5 and a mean cover of 37.6%, this species forms low hummocks on which many of the other species grow. All other species found in the plots had I.V.'s lower than 15.0 with *Helianthus grosseserratus, Thelypteris palustris, Galium obtusum, Euthamia*

gymnospermoides, *Osmunda regalis* (royal fern), and *Calamagrostis canadensis* (bluejoint grass) being the most common (Table 5). All of the 36 species encountered in the plots were native wet prairie or sedge meadow species.

DISCUSSION

Gleason (1910) made extensive observations of the vegetation many of the sand deposits of northern and central Illinois, but gave little attention to those of Will County, Illinois. A few studies of the vegetation of the Kankakee sands deposits have been undertaken. Hedborn (1984) studied the pre-settlement vegetation of Iroquois County, located in the southeastern corner of the Kankakee sand deposits. McDowell et al. (1983) described the composition and structure of the savanna communities of the Iroquois County Conservation Area, while more recently Johnson and Ebinger (1992, 1995) studied the effects of fire on the vegetation of the sand savannas at Hooper Branch Nature Preserve located in the northeast corner of Iroquois County. In these studies the overstory and ground layer vegetation of dry and dry-mesic sand savanna communities was examined.

The overstory of the dry-mesic sand savanna community at Braidwood Nature Preserve is nearly identical with that encountered by McDowell et al. (1983) in the southern part of the Kankakee sand deposits. Also, in the savanna communities where fire had been used as a management tool, the woody understory was very similar, with few large saplings present, and *Q. velutina* seedlings, grubs, and small saplings common along with a few species of shrubs, particularly *Rosa carolina*, *Rubus* spp. and *Cornus* spp. Many of the ground layer sand savanna species found during the present study were encountered by Johnson and Ebinger (1992, 1995) at Hooper Branch Nature Preserve. In

particular, the two dominant ground layer species found at Hooper Branch Nature Preserve, *Carex pensylvanica* and *Rosa carolina*, were in the top four species found during the present study (Table 2).

No detailed studies of the ground layer vegetation of the Kankakee sand deposits have previously been published. The dry sand prairies examined at Braidwood Nature Preserve, however, are very similar to the dry sand prairies at Henry Allan Gleason Nature Preserve (McClain et al. 2005) and at Long Branch Nature Preserve (Phillippe et al. 2004). These sand prairies are both in Mason County in the Illinois River Section of the Illinois River and Mississippi River Sand Areas Natural Division (Schwegman 1973). Both of these Mason County prairies were dominated by *Schizachyrium scoparium* while *Opuntia humifusa* and *Dichanthelium villosissimum* were among the top six species in I.V. Many subordinate species of these three dry sand prairies were also identical. The vegetation of the dry-mesic sand prairie at Braidwood Nature Preserve contained a mixture of species, some typical of dry sand prairies as well as those associated with mesic sand prairies (White and Madany 1978). Some of the taller prairie grasses were found, such as *Sorghastrum nutans, Andropogon gerardii,* and *Panicum virgatum* (switch grass), and the shorter grasses *Schizachyrium scoparium, Dichanthelium villosissimum,* and *Leptoloma cognatum* (fall witch grass) were common. Also, more than 30 species of perennial forbs were associated with this community, many more than in most dry sand prairies (Table 1).

Although 57 exotic species were encountered at Braidwood Nature Preserve, most were restricted to roadsides, paths, and fencerows at the Preserve edge, or in successional fields that were cultivated before the Preserve was dedicated. The few exotic species

found in the study plots generally had low frequencies and I.V.'s. The exotic species most commonly found in the study plots was the cool-season grass *Poa pratensis*. Other exotic herbaceous species found in the plots were *Achillea millefolium*, *Lactuca serriola* (prickly lettuce), *Rumex acetosella*, and *Taraxacum officinale* (common dandelion). Several exotic shrubs were also encountered in the plots, including *Elaeagnus umbellata* (autumn olive), *Frangula alnus* (glossy buckthorn), and *Lonicera tatarica* (Tatarian honeysuckle).

Few high quality sand prairie and sand savanna communities are in public ownership in the Kankakee sand deposits of Illinois. The majority of these occur in the Hooper Branch Nature Preserve and the associated Iroquois County Conservation Area in the southeastern part of these deposits. Braidwood Nature Preserve, in the northwestern corner of these sand deposits, contains many of the sand communities present in pre-settlement times in that part of the state. Management of this complex to maximize species diversity and community integrity is important. The present study gives baseline information on the species composition and community structure that can be used to determine the way management practices are influencing these communities.

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LITERATURE CITED

Bailey, A.W., and C.E. Poulton. 1968. Plant communities and environmental relationships in a portion of the Tillamook burn, northwestern Oregon. Ecology 49:1-13.

Coates, D.T., S.E. Jenkins, and J.E. Ebinger. 1992. Woody vegetation survey of Barkhausen Woods, a closed canopy sand forest in Mason County, Illinois. Erigenia 12:1-6.

Daubenmire, R. 1959. A canopy coverage method of vegetation analysis. Northwest Science 33:43-64.

Gleason, H.A. 1910. The vegetation of the inland sand deposits of Illinois. Bulletin of the Illinois State Laboratory of Natural History 9:21-174.

Gleason, H.A. and A. Cronquist. 1991. Manual of vascular plants of northeastern North America and adjacent Canada, 2nd ed. New York Botanical Garden, Bronx, New York.

Handel, W.C., L.R. Phillippe, and J.E. Ebinger. 2003. Floristic assessment of sand prairies and sedge meadows, Lee County, Illinois. The Prairie Naturalist 35:33-46.

Hanson, K.D. 2004. Soil survey of Will County, Illinois. United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Illinois Agricultural Experiment Station, Champaign, Illinois. 537 pp.

Hedborn, E.A. 1984. The vascular flora of Iroquois County, Illinois. M.S. thesis, Northeastern Illinois University, Chicago, Illinois.

Herkert, J.R. and J.E. Ebinger. (eds). 2002. Endangered and Threatened Species of Illinois: Status and Distribution. Volume 1: Plants. Endangered Species Protection Board, Springfield, Illinois.

Jenkins, S.E., J.E. Ebinger, and W.E. McClain. 1991. Woody vegetation survey of Bishop's Woods, a sand forest in Mason County, Illinois. Transactions of the Illinois State Academy of Science 84:20-27.

Johnson, K.C. and J.E. Ebinger. 1992. Effects of prescribed burns on the woody vegetation of a dry sand savanna, Hooper Branch Nature Preserve, Iroquois County, Illinois. Transactions of the Illinois State Academy of Science 85:105-111.

Johnson, K.C. and J.E. Ebinger. 1995. Effects of different fire regimes on the ground layer vegetation of a dry sand savanna, Hooper Branch Nature Preserve, Iroquois County, Illinois. Erigenia 14:37-40.

King, J.E. 1981. Late Quaternary vegetational history of Illinois. Ecological Monographs 51:43-62.

McClain, W.E., L.R. Phillippe, and J.E. Ebinger. 2003. Floristic assessment of Foley Sand Prairie Nature Preserve, Lee County, Illinois. Transactions of the Illinois State Academy of Science 96:255-263.

McClain, W.E., L.R. Phillippe, and J.E. Ebinger. 2005. Floristic assessment of the Henry Allan Gleason Nature Preserve, Mason County, Illinois. Castanea 70:146-154.

McClain, W.E., R.D. McClain, and J.E. Ebinger. 1997. Flora of temporary sand ponds in Cass and Mason Counties, Illinois. Castanea 62:65-73.

McClain, W.E., S.D. Turner, and J.E. Ebinger. 2002. Vegetation of forest communities at

the Sand prairie-Scrub Oak Nature Preserve, Mason County, Illinois. Transactions of the Illinois State Academy of Science 95:37-46.

McDowell, B., J. Newman, and J. Ebinger. 1983. Survey of the woody vegetation of the Kankakee Sand Area Section of Indiana and Illinois. Proceedings of the Indiana Academy of Science 93:187-193.

McIntosh, R.P. 1957. The York Woods. A case history of forest succession in southern Wisconsin. Ecology 38:29-37.

Midwestern Regional Climate Center. 2005. http://mcc.sws.uiuc.edu

Mohlenbrock, R.H. 2002. Vascular flora of Illinois. Southern Illinois University Press, Carbondale, Illinois.

Phillippe, L.R., M.A. Feist, and J.E. Ebinger. 2004. Vascular flora of Long Branch Nature Preserve, Mason County, Illinois. Transaction of the Illinois State Academy of Science 97:197-208.

Schwegman, J.E. 1973. Comprehensive plan for the Illinois nature preserves system. Part 2. The natural divisions of Illinois. Illinois Nature Preserves Commission, Rockford, Illinois. 32 pp. + map.

Taft, J.B., G.S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. Floristic quality assessment for vegetation in Illinois, a method for assessing vegetation integrity. Erigenia 15:1-95.

White, J. 1978. Illinois Natural Areas Inventory. Technical report. Volume I. Survey methods and results. Illinois Natural Areas Inventory, Urbana. Xix+426 pp.

White, J., and M.H. Madany. 1978. Classification of natural communities in Illinois. p. 310-405. In White, J. (ed.). Illinois natural areas inventory. Technical report. Illinois Natural Areas Inventory, Urbana, Illinois.

Willman, H.B. and J.C. Frye. 1970. Pleistocene stratigraphy of Illinois. Illinois State Geological Survey Bulletin 94:1-204.

Table 1. Frequency (%), mean cover (% of total area), and importance value (I.V.) of the ground layer species encountered in the fall of 2005 in a dry sand prairie and a dry-mesic sand prairie at Braidwood Dunes and Savanna Nature Preserve, Will County, Illinois. (*exotic species)

Species	Dry Sand Prairie			Dry-mesic Sand Prairie		
	Freq.	Mean Cover	I.V	Freq.	Mean Cover	I.V.
Schizachyrium scoparium	98	7.98	33.3	92	11.88	23.8
Opunta humifusa	78	5.49	23.9	8	0.09	0.7
Dichanthelium villosissimum	90	4.02	20.3	60	0.90	5.8
Chamaecrista nictitans	92	2.24	14.9	--	--	--
Leptoloma cognatum	42	2.11	10.2	28	1.91	4.8
Lespedeza capitata	68	1.38	10.2	40	0.30	3.4
Cyperus lupulinus	92	0.66	10.0	44	0.22	3.6
Liatris aspera	54	1.50	9.4	32	0.60	3.3
Croton glandulosus	78	0.74	9.1	--	--	--
Crotalaria sagittalis	44	0.72	6.1	--	--	--
Asclepias verticillata	48	0.29	5.1	--	--	--
Solanum carolinense	40	0.45	4.9	--	--	--
Conyza canadensis	32	0.55	4.5	--	--	--
Dichanthelium oligosanthes	24	0.51	3.7	28	0.29	2.5
Quercus velutina	22	0.56	3.6	8	0.14	0.8
Triplasis purpurea	32	0.21	3.5	--	--	--
Cyperus schweinitzii	32	0.16	3.3	--	--	--
Populus tremuloides	22	0.46	3.3	--	--	--
Ambrosia artemisiifolia	30	0.20	3.2	--	--	--
Lithospermum croceum	20	0.49	3.2	2	0.30	0.5
**Poa pratensis*	18	0.39	2.8	82	3.10	10.4
Aristida purpurascens	16	0.42	2.7	66	1.80	7.5
Desmodium sessilifolium	20	0.10	2.0	26	0.28	2.3
Oenothera clelandii	16	0.08	1.6	2	0.01	0.1
Agrostis hyemalis	14	0.07	1.4	--	--	--
Chamaecrista fasciculata	8	0.09	1.0	74	0.72	6.5
Solidago nemoralis	--	--	--	90	12.52	24.7
Antennaria plantaginifolia	--	--	--	74	8.12	17.2
Euthania gymnospermoides	--	--	--	96	6.17	16.0
Sorghastrum nutans	--	--	--	88	4.92	13.6
Rubus flagellaris	--	--	--	54	5.65	12.1
Euphorbia corollata	4	0.02	0.4	80	1.45	8.0
Carex pensylvanica	--	--	--	14	2.55	4.8
Viola sagittata	--	--	--	52	0.46	4.6
**Rumex acetosella*	--	--	--	40	0.50	3.7
Panicum virgatum	--	--	--	20	0.25	1.9
Scleria pauciflora	--	--	--	6	0.90	1.8
Solidago speciosa	--	--	--	4	1.05	1.8

Andropogon gerardii	--	--	--	14	0.37	1.6
Hieracium longipilum	--	--	--	20	0.10	1.6
Parthenium integrifolium	--	--	--	12	0.45	1.5
Potentilla simplex	--	--	--	14	0.22	1.4
Linum medium	--	--	--	14	0.17	1.3
Others (6 taxa & 17 taxa)	--	0.20	2.4	--	1.35	6.4
Totals		32.09	200.0		69.74	200.0
Bare ground and litter		63.55			25.90	

Table 2. Frequency (%), mean cover (% of total area), and importance value (I.V.) of the ground layer species encountered in the fall of 2005 in a zone where *Pteridium aquilinum* was present, and a zone where *Pteridium aquilinum* was absent in a dry sand savanna community at Braidwood Dunes and Savanna Nature Preserve, Will County, Illinois. All species with an importance value of 1.0 and above are included. (*exotic species)

	Pteridium aquilinum Present			*Pteridium aquilinum* Absent		
Species	Freq.	Mean Cover	I.V.	Freq.	Mean Cover	I.V.
Pteridium aquilinum	100	42.90	52.8	--	--	--
Quercus velutina	84	18.90	27.7	52	2.32	8.2
Helianthus divaricatus	96	9.50	19.8	96	8.64	22.7
Amphicarpaea bracteata	92	3.90	13.9	88	5.22	16.2
Cornus racemosa	40	6.42	10.6	4	0.12	0.5
Carex pensylvanica	64	3.14	10.2	100	4.52	16.0
Rubus flagellaris	52	3.66	9.3	24	1.68	4.9
Smilacina stellata	36	1.64	5.6	40	3.02	8.4
Smilacina racemosa	36	1.56	5.5	16	1.44	3.8
Rosa carolina	32	1.82	5.3	100	9.24	24.1
Ceanothus americanus	20	2.52	4.7	4	0.60	1.3
Phlox pilose	28	0.44	3.5	88	3.28	13.2
Solidago altissima	16	1.44	3.2	4	0.12	0.5
Comandra umbellata	24	0.52	3.1	80	3.44	12.6
Fragaria virginiana	20	0.50	2.7	8	0.24	1.1
**Poa pratensis*	20	0.30	2.5	44	0.32	4.2
Eupatorium serotinum	16	0.48	2.3	--	--	--
Paronychia canadensis	16	0.08	1.9	--	--	--
Aster oolentangiensis	12	0.26	1.6	32	0.96	4.3
Monarda fistulosa	12	0.26	1.6	12	0.36	1.6
Vitis riparia	8	0.72	1.6	--	--	--
Chenopodium album	12	0.06	1.4	--	--	--
Scrophularia lanceolata	12	0.16	1.4	--	--	--
Agrostis hyemalis	8	0.14	1.0	--	--	--
**Lonicera tatarica*	4	0.60	1.0	--	--	--
Coreopsis palmata	--	--	--	64	3.54	11.3
Solidago speciosa	--	--	--	36	2.52	7.3
Schizachyrium scoparium	--	--	--	40	1.38	5.7
Heterostipa spartea	--	--	--	40	0.20	3.6
Euphorbia corollata	--	--	--	32	0.36	3.3
Chamaecrista nictitans	--	--	--	28	0.34	3.0
Scrophularia lanceolata	--	--	--	16	0.96	2.9
Tephrosia virginiana	--	--	--	8	1.20	2.7
Sorghastrum nutans	--	--	--	20	0.50	2.6
Solidago nemoralis	--	--	--	16	0.38	1.9
Andropogon gerardii	--	--	--	12	0.36	1.6
Lithospermum croceum	--	--	--	12	0.26	1.4

Prunus serotina	4	0.02	0.4	12	0.16	1.3
Lupulinus perennis	--	--	--	8	0.24	1.1
Others (12 taxa & 13 taxa)	--	0.84	5.4	--	0.84	6.7
Totals		102.78	200.0		58.76	200.0
Bare ground and litter		23.08			44.80	

Table 3. Densities by diameter classes (stems/ha), total density (stems/ha), basal areas (m^2/ha), relative values, importance values, and average diameters of the woody overstory species in the savanna community at Braidwood Dunes and Savanna Nature Preserve, Will County, Illinois.

	Diameter Classes (cm)				Total stems/	Basal	Rel.	Rel.		Av. Diam.
Species	10-19	20-29	30-39	40+	ha	Area	Den.	Dom.	I.V.	(cm)
Quercus velutina	4.7	72.0	84.0	23.3	184.0	15.34	97.9	98.5	196.4	31.8
Quercus alba	0.7	2.7	0.7	--	4.1	0.23	2.1	1.5	3.6	26.6
Totals	5.4	74.7	84.7	23.3	188.1	15.57	100.0	100.0	200.0	

Table 4. Density (stems/ha) of woody seedlings, small saplings, and large saplings encountered in the savanna community at Braidwood Dunes and Savanna Nature Preserve, Will County, Illinois. (*exotic species)

Species	Seedlings	Small Saplings	Large Saplings
Quercus velutina	11167	708	--
Prunus serotina	1000	442	--
Quercus alba	167	83	--
Rubus allegheniensis	5917	2608	--
Cornus racemosa	1917	25	--
Ceanothus americanus	1167	--	--
Rubus occidentalis	667	767	--
**Frangula alnus*	83	--	--
Salix humilis	--	183	--
**Elaeagnus umbellata*	--	17	--
Rhus glabra	--	8	--
Totals	22085	4841	--

Table 5. Frequency (%), mean cover (% of total area), and importance value (I.V.) of the ground layer species encountered in the fall of 2005 in a sedge meadow at Braidwood Dunes and Savanna Nature Preserve, Will County, Illinois. (*exotic species)

Species	Freq.	Mean Cover	I. V.
Carex stricta	100	37.62	44.5
Helianthus grosseserratus	68	8.98	14.8
Thelypteris palustris	64	9.12	14.5
Galium obtusum	84	6.18	13.7
Euthamia gymnospermoides	72	4.92	11.4
Osmunda regalis	36	8.24	11.1
Calamagrostis canadensis	68	4.90	11.0
Spiraea alba	48	5.02	9.2
Solidago altissima	36	4.38	7.5
Lycopus americanus	60	1.48	7.0
Salix discolor	28	2.76	5.2
Pycnanthemum virginianum	32	2.20	5.1
Lycopus uniflorus	40	0.80	4.5
Iris shrevei	28	1.80	4.3
Agalinus purpurea	40	0.50	4.2
Solidago gigantea	28	1.70	4.2
Stachys hispida	32	0.66	3.6
Juncus dudleyi	28	0.14	2.7
Aster dumosus	24	0.32	2.5
Phlox glaberrima	24	0.22	2.4
Spartina pectinata	16	0.86	2.3
Helianthus mollis	12	0.84	2.0
Lathyrus palustris	16	0.38	1.9
Vernonia missurica	16	0.38	1.9
Lythrum alatum	12	0.26	1.3
Muhlenbergia mexicana	12	0.06	1.2
Agrimonia parviflora	4	0.60	1.0
Andropogon gerardii	4	0.60	1.0
Campanula uliginosa	8	0.04	0.7
Aster novae-angliae	4	0.12	0.5
Cicuta maculata	4	0.12	0.5
Coreopsis tripteris	4	0.12	0.5
Liparis loeselii	4	0.12	0.5
Saxifraga pensylvanica	4	0.12	0.5
Carex scoparia	4	0.02	0.4
Lysimachia thyrsiflora	4	0.02	0.4
Totals		106.60	200.0
Bare ground and litter		1.98	

APPENDIX 1. Vascular plant species encountered at Braidwood Dunes and Savanna Nature Preserve, Will County, Illinois, are listed alphabetically by family under major plant groups. Collecting numbers preceded by an E were collected by John E. Ebinger and are deposited in the Stover-Ebinger Herbarium, Eastern Illinois University, Charleston, Illinois (EIU). Collecting numbers preceded by an M, P, or R were collected by Paul B. Marcum, Loy R. Phillippe, or Kenneth R. Robertson and are deposited in the Illinois Natural History Survey Herbarium, Champaign, Illinois (ILLS). A herbarium search revealed several additional collections that are listed with the collectors name and number and deposited in ILLS. (*exotic species)

FERN AND FERN-ALLIES

Aspleniaceae
Asplenium platyneuron (L.) Oakes: P37577

Dennstaediaceae
Pteridium aquilinum (L.) Kuhn: E31724

Dryopteridaceae
Dryopteris carthusiana (Villars) H.P. Fuchs: P37580

Equisetaceae
Equisetum arvense L.: P37482
Equisetum hyemale L.: P38408
Equisetum laevigatum A. Br.: P38410

Onocleaceae
Onoclea sensibilis L.: P37485

Ophioglossaceae
Botrychium dissectum Spreng.: P38419
Ophioglossum pusillum Raf.: C.J. Sheviak 449

Osmundaceae
Osmunda cinnamomea L.: P37606
Osmunda claytoniana L.: P37502
Osmunda regalis L.: P37488

Thelypteridaceae
Thelypteris palustris Schott: M3405

GYMNOSPERMS

Cupressaceae
Juniperus virginiana L.: P38472

MONOCOTS

Alismataceae
Alisma subcordatum Raf.: P37841
Sagittaria graminea Michx.: M3411

Amaryllidaceae
Hypoxis hirsuta (L.) Coville: R2055.2

Commelinaceae
Tradescantia ohiensis Raf.: E31785

Cyperaceae
Bolboschoenus fluviatilis (Torr.) Sojak.: P38028
Carex albicans Willd.: P37569
Carex albolutescens Schwein.: E31805
Carex bicknellii Britt.: P37614.4
Carex brachyglossa Mack.: E31806
Carex buxbaumii Wahlenb.: P37589
Carex cephalophora Muhl.: P37568
Carex conoidea Schk.: P37497
Carex crawei Dewey: E31591
Carex cristatella Britt.: P37633
Carex foenea Willd.: P37492
Carex gravida L.H. Bailey: P37480
Carex haydenii Dewey: P37499
Carex lasiocarpa Ehrh.: P37612
Carex mesochorea Mack.: E31807
Carex muhlenbergii Schk.: P37663
Carex pellita Willd.: P37486
Carex pensylvanica Lam.: P37493
Carex sartwellii Dewey: P37613
Carex scoparia Schk.: P37590
Carex swanii (Fern.) Mack.: P37658
Carex vulpinoidea Michx.: E31809
Cyperus lupulinus (Spreng.) Marcks: E31802
Cyperus x mesochorus Geise: E31801
Cyperus schweinitzii Torr.: E31803
Cyperus strigosus L.: P37827
Eleocharis ovata (Roth) Roem. & Schultes var. *obtusa* (Willd.) Kukenth: P37638
Eleocharis palustris (L.) Roem. & Schultes: P37600
Eleocharis verrucosa (Svenson) Harms.: P37491
Fimbristylis autumnalis (L.) Roem. & Schultes: P38003
Fimbristylis puberula (Michx.) Vahl: M3425
Rhynchospora capitellata (Michx.) Vahl: E31804
Scirpus atrovirens Willd.: P37848

Scirpus cyperinus (L.) Kunth: P37831
Scirpus pendulus Muhl.: P37646
Scleria pauciflora Muhl. var. *caroliniana* (Willd.) Wood: P37642
Scleria triglomerata Michx.: M3421

Iridaceae
Iris shrevei Small: P37588
Sisyrinchium albidum Raf.: P37498
Sisyrinchium campestre Bickn.: E31594

Juncaceae
Juncus acuminatus Michx.: P37637
Juncus anthelatus (Wieg.) R.E. Brooks: M3387
Juncus brachycarpus Engelm.: E31787
Juncus canadensis J. Gay: P38017
Juncus dudleyi Wieg.: P38186
Juncus greenei Oakes & Tuckerm.: E31883
Juncus interior Wieg.: E31788
Juncus marginatus Rostk.: E31789
Juncus tenuis Willd.: M3389
Luzula bulbosa (A.W. Wood) Smyth: P37593
Luzula multiflora (Retz.) Lejeune: E31595

Liliaceae
Aletris farinosa L.: M3418
Allium canadense L.: P37652
Allium cernuum Roth.: E31884
**Asparagus officinalis* L.: P37990
Polygonatum commutatum (Schult.) A. Dietr.: P37596
Smilacina racemosa (L.) Desf.: E31870
Smilacina stellata (L.) Desf.: E31871

Orchidaceae
Calopogon oklahomensis D.H. Goldman: R2233
Liparis liliifolia (L.) Rich.: P37575
Liparis loeselii (L.) Rich.: P37630
Platantherta flava (L.) Lindl. var. *herbiola* (R. Br.) Luer: M3419
Platanthera lacera (Michx.) G. Don: P37631
Spiranthes cernua (L.) Rich.: C.J. Sheviak 256a
Spiranthes lacera (Raf.) Raf.: P38176

Poaceae
Agrostis gigantea Roth.: E31791
Agrostis hyemalis (Walt.) BSP.: E31792
Alopecurus carolinianus Walt.: R2505
Andropogon gerardii Vitman: E31885

Andropogon virginicus L.: P38417
Aristida intermedia Scribn. & Ball: P37986
Aristida purpurascens Poir.: P37985
**Bromus inermis* Leyss.: E31794
**Bromus racemosus* L.: E31793
**Bromus tectorum* L.: P37571
Calamagrostis canadensis (Michx.) P. Beauv.: P37591
Cenchrus longispinus (Hack.) Fern.: P38030
**Dactylis glomerata* L.: P37833
Dichanthelium acuminatum (Sw.) Gould & Clark: E31815
Dichanthelium boreale (Nash) Freckm.: P37592
Dichanthelium clandestinum (L.) Gould: E31810
Dichanthelium depauperatum (Muhl.) Gould: P37671
Dichanthelium oligosanthes (Schult.) Gould: E31813
Dichanthelium villosissimum (Nash) Freckm.: E31814
**Elytrigia repens* (L.) Desv.: E31795
Eragrostis spectabilis (Pursh) Steud.: E31886
Festuca subverticillata (Pers.) E.B. Alexeev: P37579
Glyceria striata (Lam.) Hitchc.: E31796
Heterostipa spartea (Trin.) Barkworth: E31797
Koeleria macrantha (Ledeb.) Spreng.: P37670
Leersia oryzoides (L.) Swartz: P39014
Leptoloma cognatum (Schult.) Chase: E31887
Muhlenbergia mexicana (L.) Trin. f.: P38007
Panicum capillare L.: P38020
Panicum rigidulum Bosc: P37832
Panicum virgatum L.: E31888
Paspalum bushii Nash: E31798
**Phalaris arundinacea* L.: E31811
**Phleum pratense* L.: E31812
**Phragmites australis* (Cav.) Trin.: P38019
**Poa annua* L.: E31596
**Poa compressa* L.: E31799
**Poa pratensis* L.: E31800
Schizachyrium scoparium (Michx.) Nash: E31889
**Setaria faberi* R.A.W. Herrm.: P38021
Sorghastrum nutans (L.) Nash: P37987
Spartina pectinata Link: P37860
Sporobolus cryptandrus (Torr.) Gray: P37993
Sporobolus vaginiflorus (Torr.) A. Wood: P38004
Tridens flavus (L.) Hitchc.: P37994
Triplasis purpurea (Walt.) Chapm.: P37980
Vulpia octoflora (Walt.) Rydb.: P37478

Potamogetonaceae
Potamogeton epihydrus Raf.: P37610

Smilacaceae
Smilax lasioneuron Hook.: P37867
Smilax tamnoides L.: observed

Typhaceae
Typha latifolia L.: P38016

Xyridaceae
Xyris torta Sm.: P38000

DICOTS

Aceraceae
Acer saccharinum L.: E31891

Amaranthaceae
Froelichia gracilis (Hook.) Moq.: observed

Anacardiaceae
Rhus glabra L.: E31873
Toxicodendron radicans (L.) Kuntze: P37582

Apiaceae
Cicuta maculata L.: M3386
Eryngium yuccifolium Michx.: E31892
Oxypolis rigidior (L.) Raf.: P37864
Sanicula canadensis L.: P37639
Sanicula odorata (Raf.) Pryer & Phillippe: P37573
Sium suave Walt.: P37828
Zizia aurea (L.) Koch: P37567

Apocynaceae
Apocynum androsaemifolium L.: P37665
Apocynum canabinum L.: P37661

Aquifoliaceae
Ilex verticillata (L.) Gray: P37647

Asclepiadaceae
Asclepias amplexicaulis Small: M3434
Asclepias hirtella (Pennell) Woodson: E31893
Asclepias incarnata L.: M3410
Asclepias syriaca L.: P37995
Asclepias tuberosa L.: P38173
Asclepias verticillata L.: E31728

Asteraceae
**Achillea millefolium* L.: E31730
Ageratina altissima (L.) R.M. King & H. Rob.: P37821
Ambrosia artemisiifolia L.: E31894
Ambrosia trifida L.: P38411
Antennaria neglecta Greene: P37594
Antennaria plantaginifolia (L.) Hook.: R2061
Arnoglossum plantagineum Raf.: P37834
Artemisia campestris L.: E31874
Aster dumosus L.: P38184
Aster ericoides L.: observed
Aster novae-angliae L.: P38187
Aster oolentangiensis Riddell: P38174
Aster pilosus Willd.: P38401
Aster puniceus L.: P38179
Aster sericeus Vent.: P38425
Bidens aristosa (Michx.) Britt.: P38002
Bidens vulgata Greene: P38008
Chrysopsis villosa (Pursh) Nutt.: P38005
**Cirsium arvense* (L.) Scop.: P37866
Cirsium discolor (Muhl.) Spreng.: P38032
Cirsium muticum Michx.: P38024
Conyza canadensis (L.) Cronq.: E31896
Coreopsis palmata Nutt.: M3398
Coreopsis tripteris L.: E31895
Doellingeria umbellata (Mill.) Nees: P38023
Erechtites hieracifolia (L.) Raf.: P37863
Erigeron annuus (L.) Pers.: E31732
Erigeron philadelphicus L.: M3424
Erigeron strigosus Muhl.: E31733
Eupatorium altissimum L.: P38188
Eupatorium perfoliatum L.: P37830
Eupatorium serotinum Michx.: E31897
Euthamia gymnospermoides Greene: P37992
Helianthus divaricatus L.: E31875
Helianthus grosseserratus Martens: P38181
Helianthus hirsutus Raf.: R2695
Helianthus mollis Lam.: E31898
Helianthus occidentalis Riddell: E31899
Hieracium canadense Michx.: P37997
Hieracium gronovii L.: P37988
Hieracium longipilum Torr.: observed
Hieracium scabrum Michx.: R2697
Ionactis linariifolius (L.) Greene: P38175
Krigia biflora (Walt.) Blake: P37482

Krigia virginica (L.) Willd.: E31734
Lactuca canadensis L.: E31901
**Lactuca serriola* L.: observed
Liatris aspera Michx.: P37983
Liatris spicata (L.) Willd.: P38178
Parthenium integrifolium L.: P37651
Pseudognaphalium obtusifolium (L.) Hilliard & Burtt: E31903
Rudbeckia hirta L.: P37659
Rudbeckia sullivantii Boynt. & Beadle: R2229
Senecio pauperculus Michx.: P37503
Senecio plattensis Nutt.: E31598
Solidago altissima L.: P38404
Solidago gigantea Ait.: P37991
Solidago missouriensis Nutt.: E31904
Solidago nemoralis Ait.: P37989
Solidago speciosa Nutt.: P38172
**Taraxacum officinale* Weber: P37370
**Tragapogon dubius* Scop.: E31737
Vernonia gigantea (Walt.) Trel.: E31906
Vernonia missurica Raf.: P37838

Balsaminaceae
Impatiens capensis Meerb.: P37851

Berberidaceae
Podophyllum peltatum L.: P37607

Betulaceae
Betula nigra L.: P37655

Bignoniaceae
**Catalpa speciosa* Warder: P38405

Boraginaceae
Hackelia virginiana (L.) I.M. Johnston: P37825
Lithospermum croceum Fern.: E31601

Brassicaceae
**Alliaria petiolata* (Bieb.) Cavara & Grande: E31599
**Capsella bursa-pastoris* (L.) Medic.: P37371
Cardamine bulbosa (Muhl.) BSP.: E31600
Cardamine parviflora L.: P37595
**Lepidium densiflorum* Schrad.: R2070
Lepidium virginicum L.: E31738

Cactaceae

Opuntia humifusa (Raf.) Raf.: E31739

Caesalpiniaceae
Chamaecrista fasciculata (Michx.) Greene: E31740
Chamaecrista nictitans (L.) Moench.: P37984

Callitrichaceae
Callitriche heterophylla Pursh: P37614.2

Campanulaceae
Campanula uliginosa Rydb.: M3431
Lobelia cardinalis L.: P38413
Lobelia siphilitica L.: R2684
Lobelia spicata Lam. var. *hirtella* Gray: P37653
Triodanis perfoliata (L.) Nieuwl.: P37586

Caprifoliaceae
**Lonicera x bella* Zabel: R2498
**Lonicera x muendeniensis* Rehder: R2501
**Lonicera tatarica* L.: E31909
Sambucus canadensis L.: E31910
Viburnum lentango L.: P37495

Caryophyllaceae
**Arenaria serpyllifolia* L.: E31741
**Cerastium fontanum* Baum.: E31602
**Cerastium glomeratum* Thuill.: E31603
**Dianthus armeria* L.: E31742
**Holosteum umbellatum* L.: E31604
Paronychia canadensis (L.) Wood: E31743
**Saponaria officinalis* L.: E31744
Silene antirrhina L.: E31745
**Silene pratensis* (Spreng.) Godron & Gren: P38406
Silene stellata (L.) Ait. f.: E31876
**Stellaria media* (L.) Cyrillo: P37372

Celastraceae
Celastrus scandens L.: P38402

Chenopodiaceae
Chenopodium album L.: observed
Chenopodium pallescens Standl.: E31911
Chenopodium pratericola Rydb.: P38403
Cycloloma atriplicifolia (Spreng.) Coult.: E31912

Cistaceae

Helianthemum bicknellii Fern.: E31746
Helianthemum canadense (L.) Michx.: R2678
Lechea mucronata Raf.: E31879
Lechea stricta Leggett.: E31878

Cornaceae
Cornus obliqua Raf.: E31908
Cornus racemosa Lam.: E31747

Corylaceae
Corylus americana Walt.: P38424

Droseraceae
Drosera intermedia Hayne: P38001

Elaeagnaceae
**Elaeagnus umbellata* Thunb.: E31605

Ericaceae
Gaylussacia baccata (Wang.) K. Koch: P37614
Vaccinium angustifolium Ait.: R2081
Vaccinium macrocarpon Ait.: R.A. Schneider 1151

Euphorbiaceae
Acalypha gracilens Gray: P38011
Croton glandulosus L.: P37982
Euphorbia corollata L.: M3396

Fabaceae
Amorpha canescens Pursh: E31749
Amphicarpaea bracteata (L.) Fern.: P37869
Apios americana Medic.: E31914
Baptisia alba (L.) Vent.: M3417
Baptisia bracteata Ell.: R2499
Crotalaria sagittalis L.: P37981
Desmodium illinoense Gray: E31916
Desmodium sessilifolium (Torr.) Torr. & Gray: E31915
Lathyrus palustris L. var. *myrtifolius* (Muhl.) Gray: P37676
Lespedeza capitata Michx.: E31880
Lupinus perennis L.: E31606
**Robinia pseudoacacia* L.: P38428
Strophostyles helvula (L.) Ell.: P37855
Tephrosia virginiana (L.) Pers.: E31753
**Trifolium pratense* L.: E31751
**Trifolium repens* L.: E31752
**Vicia villosa* Roth: P37662

Fagaceae
Quercus alba L.: P37840
Quercus velutina Lam.: E31607

Gentianaceae
Bartonia virginica (L.) BSP.: M3406
Gentiana puberulenta J. Pringle: P38416
Gentiana saponaria L.: P38182

Grossulariaceae
Ribes americanum Mill.: P37574

Haloragidaceae
Proserpinaca palustris L.: M3426

Hypericaceae
Hypericum canadense L.: M3420
Hypericum gentianoides (L.) BSP.: P37861
Hypericum majus (Gray) Britt.: R2826
Hypericum mutilum L.: P37839
**Hypericum perforatum* L.: P37826
Triadenum fraseri (Spach) Gl.: P37859

Lamiaceae
Lycopus americanus Muhl.: P38018
Lycopus uiniflorus Michx.: P38185
**Mentha arvensis* L.: P37820
Monarda fistulosa L.: E31755
**Nepeta cataria* L.: E31756
Physostegia virginiana (L.) Benth.: E31918
**Prunella vulgaris* L.: E31757
Pycnanthemum virginianum (L.) Dur. & B.D. Jacks.: P38180
Scutellaria galericulata L.: M3415
Scutellaria lateriflora L.: P37822
Scutellaria leonardii Epling: P37664
Stachys hispida Pursh: P37854
Stachys pilosa Nutt. var. *homotricha* (Fern.) Mohlenbr.: M3408
Teucrium canadense L.: P38407

Lauraceae
Sassafras albidum (Nutt.) Nees: E31919

Lentibulariaceae
Utricularia intermedia Hayne: P37667

Linaceae
Linum medium (Planch.) Britt.: P37640

Lythraceae
Lythrum alatum Pursh: M3391

Melastromaceae
Rhexia virginica L.: E31920

Menispermaceae
Menispermum canadense L.: P37868

Molluginaceae
**Mollugo verticillata* L.: E31921

Nyctaginaceae
Mirabilis hirsuta (Pursh) MacM.: P37870
**Mirabilis nyctaginea* (Michx.) MacM.: P38409

Oleaceae
Fraxinus americana L.: P37369
**Syringa vulgaris* L.: P38422

Onagraceae
Circaea lutetiana L.: E31760
Epilobium coloratum Biehler: P38025
Epilobium leptophyllum Raf.: P37858
Ludwigia alternifolia L.: P37836
Ludwigia palustris (L.) Ell. var. *americana* (DC.) Fern. & Grisc.: M3429
Ludwigia polycarpa Short & Peter: M3428
Oenothera biennis L.: E31922
Oenothera clelandii W. Dietr.: E31762
Oenothera laciniata Hill: E31761
Oenothera pilosella Raf.: P37634

Oxalidaceae
**Oxalis corniculata* L.: R2064
Oxalis stricta L.: P37570
Oxalis violacea L.: P37598

Phytolacaceae
Phytolacca americana L.: E31923

Plantaginaceae
**Plantago lanceolata* L.: E31763
Plantago patagonica Jacq.: M3400

Plantago rugelii Decne.: E31764
Plantago virginica L.: P37481

Polemoniaceae
Phlox bifida Beck: E31608
Phlox glaberrima L.: E31765
Phlox pilosa L.: E31766

Polygalaceae
Polygala cruciata L.: M3404
Polygala polygama Walt.: P37641
Polygala sanguinea L.: P37643

Polygonaceae
**Fallopia convolvulus* (L.) A. Love: E31924
Fallopia scandens (L.) Holub.: P38009
Persicaria coccinea (Muhl.) Greene: P37849
Persicaria hydropiperoides (Michx.) Small: P38015
Persicaria opelousana (Riddell) Small: P38013
Persicaria pensylvanica (L.) Small var. *laevigata* (Fern.) Mohlenbr.: P38022
Persicaria punctata (Ell.) Small: P37852
Persicaria setacea (Baldw.) Small: P37845
Polygonum tenue Michx.: E31881
**Rumex acetosella* L.: E31769
**Rumex crispus* L.: E31770

Portulacaceae
Claytonia virginica L.: P37367
**Portulaca oleracea* L.: P37818

Primulaceae
Lysimachia lanceolata Walt.: M3388
Lysimachia terrestris (L.) BSP.: M3409
Lysimachia thyrsiflora L.: M3432

Ranunculaceae
Anemone cylindrica Gray: E31882
Anemone quinquefolia L.: P37374
Anemone virginiana L.: P37829
Aquilegia canadensis L.: R2515
Caltha palustris L.: R2510
Ranunculus abortivus L.: P37576
Ranunculus flabellaris Raf.: P37500
Ranunculus pensylvanicus L. f.: P37846
Ranunculus recurvatus Poir.: P37578
Thalictrum revolutum DC.: M3423

Rhamnaceae
Ceanothus americanus L.: M3402
**Frangula alnus* Mill.: M3394
**Rhamnus cathartica* L.: P37817

Rosaceae
Agrimonia parviflora Sol.: E31925
Aronia melanocarpa (Michx.) Ell.: E31610
Aronia prunifolia (Marsh.) Rehd.: R2193
Fragaria virginiana Duchesne: E31611
Geum canadense Jacq.: P37632
Geum laciniatum Murr.: P37654
Malus ioensis (Wood) Britt.: R2519
Potentilla simplex Michx.: E31624
Prunus angustifolia Marsh.: P38171
Prunus serotina Ehrh.: E31774
Prunus susquehanae Willd.: R2241
Rosa carolina L.: M3390
**Rosa multiflora* Thunb.: P37581
Rosa palustris Marsh.: M3413
Rubus allegheniensis Porter: E31776
Rubus flagellaris Willd.: E31777
Rubus occidentalis L.: E31778
Rubus schneideri Bailey: M3414
Spiraea alba DuRoi: M3407

Rubiaceae
Cephalanthus occidentalis L.: P37824
Galium aparine L.: P37489
Galium obtusum Bigel.: P37587
Galium triflorum Michx.: E31779

Rutaceae
Ptelea trifoliata L.: P38418

Salicaceae
Populus deltoides Marsh.: P37368
Populus grandidentata Michx.: R2199
Populus tremuloides Michx.: E31926
Salix amygdaloides Anderss.: P38423
Salix discolor Muhl.: E31613
Salix eriocephala Michx.: E31612
Salix humilis Marsh.: P37483
Salix interior Rowlee: P37602
Salix myricoides Muhl.: E31780

Salix nigra Marsh.: P37484

Santalaceae
Comandra umbellata (L.) Nutt.: E31614

Saxifragaceae
Penthorum sedoides L.: M3433
Saxifraga pensylvanica L.: P37496

Scrophulariaceae
Agalinis purpurea (L.) Pennell: P37999
Agalinis tenuifolia (Vahl) Raf.: E31927
Aureolaria grandiflora (Benth.) Pennell: P38031
Aureolaria pedicularia L.: P37996
Castilleja coccinea (L.) Spreng. f. *lutescens* Farw.: P37477
Chelone glabra L.: P38027
Gratiola neglecta Torr.: P37614.3
Gratiola virginiana L.: M3416
Lindernia anagallidea (Michx.) Pennell: M3430
Mimulus ringens L.: M3427
Nuttallanthus canadensis (L.) D. Sutton: P37479
Pedicularis canadensis L.: P37599
Pedicularis lanceolata Michx.: P38426
Penstemon digitalis Nutt.: E31781
Scrophularia lanceolata Pursh: M3399
**Veronica arvensis* L.: E31617
Veronica peregrina L.: E31618
**Veronica serpyllifolia* L.: E31619
Veronicastrum virginicum (L.) Farw.: P38010

Solanaceae
Physalis virginiana Mill.: P37585
Solanum carolinense L.: E31783
**Solanum dulcamara* L.: P37603

Ulmaceae
Celtis occidentalis L.: P38421
Ulmus rubra Muhl.: P38420

Urticaceae
Boehmeria cylindrica (L.) Sw.: P37819

Verbenaceae
Phyla lanceolata (Michx.) Greene: P37843
Verbena hastata L.: P37835
Verbena stricta Vent.: E31784

Violaceae
Viola lanceolata L.: E31620
Viola pedata L.: E31622
**Viola rafinesguii* Greene: E31623
Viola sagittata Ait.: E31621

Vitaceae
Parthenocissus inserta (Kern.) K. Fritsch: P37856
Parthenocissus quinquefolia (L.) Planch.: P37823
Vitis riparia Michx.: P37837

CHAPTER 2. -- **Vegetation of Hitts Siding Prairie Nature Preserve, Will County, Illinois.**

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ABSTRACT--Hitts Siding Prairie Nature Preserve, 3 km northeast of Braidwood, Will County, Illinois, is dominated by an extensive dry-mesic to mesic prairie on sandy loam soil. The dominant grasses of this prairie were *Schizachyrium scoparium* (little bluestem) with a mean cover of 12.69 and an Importance Value (I.V.) of 11.2 (possible of 200), followed by *Sorghastrum nutans* (Indian grass) with an I.V. of 9.2, and *Andropogon gerardii* (big bluestem) with an I.V. of 6.8. Dominant forbs included *Euthamia gymnospermoides* (viscid grass-leaved goldenrod) with a mean cover of 11.76 and an I.V. of 10.8, *Helianthus mollis* (downy sunflower) with an I.V. of 10.7, *Solidago missouriensis* (Missouri goldenrod) with an I.V. of 8.6, and *Coreopsis tripteris* (tall coreopsis) with an I.V. of 7.6. The trailing shrub *Rubus flagellaris* (common dewberry) was the dominant species recorded with a mean cover of 14.18 and an I.V. of 11.9. Overall, these eight species dominate the prairie, having the highest importance, though 106 species were recorded for the 50 plots surveyed. Of the species recorded in the plots 66 had an I.V. of 1.1 or less while only six exotic species we.e recorded, *Poa pratensis* (Kentucky blue grass) and *Rumex acetosella* (sour dock) being the most common. The common sedges associated with the sedge meadow were *Carex stricta* (tussock sedge) with an I.V. of 29.9 and *C. lacustris* (lake sedge) with an I.V. of 18.5. *Carex stricta* formed low tussocks on which many of the other species were growing. The sensitive fern *Onoclea sensibilis*, however, was the dominate species encountered in the plots with and I.V. of 43.3 followed by *Thelypteris palustris* (marsh fern) with an I.V. of 30.9. Of the 37 species encountered in the plots nearly half had I.V.'s lower than 1.0. Of the 326 vascular plant taxa found on the Preserve 42 were exotic taxa.

Key Words: Kankakee sand deposits, Illinois, sedge meadow, dry-mesic to mesic prairie, mesic to wet-mesic sand prairie.

INTRODUCTION

Sand deposits account for nearly 5% of the land surface of Illinois. Common in the northern half of Illinois these deposits are the result of erosional events associated with Wisconsin glaciation (King 1981; Schwegman 1973; Willman and Frye 1970). The sand deposits remained after glacial lakes were drained about 14,500 years ago as glacial moraines and ice dams were breached resulting in the Kankakee Torrent (Willman 1973). The Kankakee sand deposits in northeastern Illinois are the most extensive in the state, extending from Newton County, Indiana west through large parts of Iroquois, Kankakee, Will, and Grundy counties, Illinois.

Dry habitats are characteristic of sand deposits, and the commonly associated species are those usually adapted to xeric conditions (White and Madany 1978). However, plant communities of sand deposits are extremely diverse and include marshes and sedge meadows, and wet to mesic sand prairies. These communities are commonly associated with lower dune slopes and swales between the dunes, and on the extensive outwash plains and old lake beds of Wisconsian glaciation. In these communities the soil had a high organic content resulting in a dark A horizon, while some of the dominant grass species (Poaceae) are replaced by sedges and rushes (Cyperaceae).

These wetland communities are found in some of the nature preserves in Will County where sand areas are interspersed with black soil prairies in some preserves and the dunes that are commonly associated with sand deposits are uncommon. One of these preserves, Hitts Sidling Prairie Nature Preserve contains plant communities on both sand and sandy loam soils. The present study was undertaken to determine vascular plant

species composition, vegetation structure, and floristic quality of the major natural plant communities of this Preserve.

DESCRIPTION OF THE STUDY AREA

The 140 ha Hitts Siding Prairie Nature Preserve is located in the southwestern corner of Will County about 3 km northeast of Braidwood, and 20 km south of Joliet (E½ S34 NW1/4 S35 T33N R9E; 41.29689°N, -88.17267°W). Presently owned by the Illinois Department of Natural Resources, the Preserve is located in the Kankakee Sand Area Section of the Grand Prairie Natural Division (Schwegman 1973). The Preserve, dedicated in 1998, contains remnants of dry-mesic to mesic prairie, mesic to wet-mesic sand prairie, and sedge meadow (McFall and Karnes 1995). Extensive areas of the preserve have been degraded by past grazing and other disturbances before the land was purchased by the Illinois Department of Natural Resources. It also appears that much of the northern quarter of the preserve had been farmed, or otherwise disturbed in the past. Some areas of the preserve still contain native vegetation of high natural quality, including sedge meadow/marsh complex, dry-mesic to mesic prairie, and mesic to wet-mesic sand prairie.

The Preserve is situated near the edge of former glacial Lake Wauponsee that drained about 14,500 years ago during the Kankakee Torrent leaving sandy beaches and near shore sand deposits (Willman and Frye 1970). These sands were reworked by wind creating the present dune and swale topography of parts of this region. Characteristic sand savanna and sand prairie vegetation became established during the Hypsithermal period about 8,000 years ago (King 1981).

The soils of the Preserve are mostly fine sandy loam (Gilford, Grundy, and Ridgeville) that are poorly drained, and relatively high in organic material. Some Oakville fine sands are also present on slightly higher ground and are dominated by oak savanna. These fine sands developed from windblown sediments and are relatively low in organic material (Hanson 2004). The climate is continental with warm summers and cold winters. Mean annual precipitation is 98.0 cm, with May having the highest rainfall (11.5 cm). Mean annual temperature is 9.9°C with the hottest month being July (average of 23.6°C), and the coldest being January (average of -5.7°C). Frost-free days range from 141 to 206, with the average being 174 days per year (Midwestern Regional Climate Center 2009; Kankakee, Illinois).

METHODS

Floristic Composition. The Preserve was visited six to ten times each year throughout the growing seasons of 2007 to 2009. During these visits voucher specimens were collected and deposited in the herbarium of the Illinois Natural History Survey, Champaign, Illinois (ILLS). The designation of exotic species follows Gleason and Cronquist (1991), Mohlenbrock (2002), and Taft et al. (1997). Nomenclature follows Mohlenbrock (2002).

Ground Layer Sampling. In mid-summer of 2009 transects were located randomly along cardinal compass directions within each community. Within each of these communities, two transects were located (n = 50 plots). Along each transect, 1 m^2 quadrats were located alternately along each transect. A random numbers table was used to determine the distance (0 to 9 m) a quadrat was located from the transect line. Species

cover was determined using the Daubenmire (1959) cover class system as modified by Bailey and Poulton (1968). The modified Daubenmire cover scale is as follows: class 1 = 0 to 1%; class 2 = >1 to 5%; class 3 = >5 to 25%; class 4 = >25 to 50%; class 5 = >50 to 75%; class 6 = >75 to 95%; class 7 = >95 to 100%. Only ground layer species rooted within the quadrat frame were recorded. Mean cover was determined for each taxon using the mid-point values for each cover class, while Importance Value (I.V.) was calculated by summing relative cover and relative frequency.

RESULTS

Floristic Composition. The preserve supports a total of 326 vascular plant taxa in 74 families (Appendix I). Fern, fern-allies, and gymnosperms were represented by 5 taxa in 6 families. Of the remaining taxa, 94 were monocots in 12 families, and 226 were dicots in 57 families. Non-native (exotic) species accounted for 42 taxa, about 13% of the species collected. Predominant plant families were Asteraceae with 47 species, Poaceae with 42 species, and Cyperaceae with 24 taxa. The only state endangered species found was *Dichanthelium boreale* (northern panic grass), while two state threatened species were encountered: *Rubus schneideri* (bristly blackberry) and *Tomanthera auriculata* (auriculate false foxglove) (Illinois Endangered Species Protection Board 2005).

Dry-mesic to mesic prairie. This prairie extended through much of the southern half of the Preserve containing Ridgeville and Gilford fine sand loam soils relatively high in organic material. The dominant grasses were *Schizachyrium scoparium* (little bluestem) with a mean cover of 12.69 and an I.V. of 11.2, followed by *Sorghastrum nutans* (Indian grass) with an I.V. of 9.2, and *Andropogon gerardii* (big bluestem) with an I.V. of 6.8,

and ranked second, fifth, and eighth in I.V., respectively (Table 1). *Schizachyrium scoparium* was distributed throughout the prairie as indicated by its high frequency, the other two species being less common with frequencies close to 60%. Dominant forbs included *Euthamia gymnospermoides* (viscid grass-leaved goldenrod) with a mean cover of 11.76 and an I.V. of 10.8, *Helianthus mollis* (downy sunflower) with an I.V. of 10.7, *Solidago missouriensis* (Missouri goldenrod) with an I.V. of 8.6, and *Coreopsis tripteris* (tall coreopsis) with an I.V. of 7.6, and ranked third, forth, sixth, and seventh, in I.V. respecively. The trailing shrub *Rubus flagellaris* (common dewberry) was the dominant species recorded with a mean cover of 14.18 and an I.V. of 11.9. Overall, these eight species dominate the prairie, having the highest importance, though 106 species were recorded for the 50 plots surveyed. Of the species recorded in the plots 66 had an I.V. of 1.1 or less while eight exotic species were found in the plots, *Poa pratensis* (Kentucky blue grass) and *Rumex acetosella* (sour dock) being the most common. Overall, the species encountered were typical prairie species, most of which are commonly associated with mesic "black soil" prairie habitat.

Sedge meadow. Along the northeastern edge of the Preserve are a few small depressions about 1-2 ha in size that contain sedge meadow/marsh vegetation (Table 2). The sensitive fern *Onoclea sensibilis* was the dominant species encountered in the plots with a mean cover of 43.51% and an I.V. of 43.3 followed by *Thelypteris palustris* (marsh fern) with an I.V. of 30.9. The common sedges associated with the sedge meadow were *Carex stricta* (tussock sedge) with an I.V. of 29.9 and *C. lacustris* (lake sedge) with an I.V. of 18.5. Throughout the depression Carex stricta formed tussocks on which many of the other species were growing. *Boehmeria cylindrica* (false nettle) and *Scutellaria*

galericulata (marsh skullcap) were the only other species present with an I.V. greater than 7.0 (Table 2). Of the 37 species encountered in the plots all were native wet prairie and sedge meadow species.

DISCUSSION

According the White and Madany (1978) dry-mesic to mesic prairie are relatively common in Illinois. The dry-mesic community, as described by White and Madany (1978), is dominated by *Schizachyrium scoparium* along with *Sorghastrum nutans* and *Heterostipa spartea* (Porcupine grass), a species not observed in our plots. In contrast, White and Madany (1978) mentions that mesic prairies are dominated by *Andropogon gerardii* and *Sorghastrum nutans*. All three grasses were scattered throughout the prairie, not being clumped and restricted to certain areas, an indication that the community was drier than typical mesic prairie. The forbs, in contrast, were typical of those associated with mesic prairies, and the number of species encountered in the plots was typical of mesic sites. The few exotic species present, and the general lack of woody species indicates that the prairie is of good quality. Management should consist of occasional burns and the removal of trees and forest shrubs by cutting and the use of herbicides.

Sedge meadows are relatively rare communities. We have occasionally encountered and studied sedge meadows at Braidwood Dunes and Savanna Nature Preserve in the Kankakee sand deposits (Chapter 1), the Richards Wildlife Foundation in the Green River lowlands sand deposits of Lee County (Handle et al. 2003), and Matanzas Nature Preserve in the Illinois River sand deposits of Mason County (Feist et al. 2007). In all of these sedge meadows the species composition and vegetation structure

was similar with the *Carex haydenii/stricta* complex dominating and forming hummocks on which many other species grow. The sedge meadow at the Hitts Siding, however, was not as well developed as in the other studies. At Hitts Siding this community is more of a sedge meadow/marsh complex. The *Carex* species (*stricta* and *lacustris*) were third and forth in I.V. and the tussocks that were present were not well developed. Past disturbances are probably responsible for the differences, but we have no information concerning the past history of this Preserve. Variations in the water table, attempts at draining the depressions, or past grazing, could all be responsible.

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LITERATURE CITED

Bailey, A.W., and C.E. Poulton. 1968. Plant communities and environmental relationships in a portion of the Tillamook burn, northwestern Oregon. Ecology 49:1-13.

Daubenmire, R. 1959. A canopy coverage method of vegetation analysis. Northwest Science 33:43-64.

Feist, M.A, M.J. Morris, M., L.R. Phillippe, J.E. Ebinger, and W.E. McClain. 2008. Sand prairie communities of Matanzas Nature Preserve, Mason County, Illinois. Castanea 73:177-187.

Gleason, H. A., and A. Cronquist. 1991. Manual of the vascular flora of northeastern United States and adjacent Canada. Second Edition. The New York Botanical Garden, Bronx, New York.

Handel, W.C., L.R. Phillippe, and J.E. Ebinger. 2003. Floristic assessment of sand prairies and sedge meadows, Lee County, Illinois. The Prairie Naturalist 35:33-46.

Hanson, K.D. 2004. Soil survey of Will County, Illinois. United States Department of

Agriculture, Natural Resources Conservation Service, in cooperation with the Illinois Agricultural Experiment Station, Champaign, Illinois. 537 pp.

Illinois Endangered Species Protection Board. 2005. Checklist of Endangered and Threatened Animals and Plants of Illinois. Endangered Species protection Board, Springfield, Illinois. 16 pp.

King, J.E. 1981. Late Quaternary vegetational history of Illinois. Ecological Monographs 51:43-62.

McFall, D. and J. Karnes. 1995. (editors). A directory of Illinois Nature Preserves. Volume 2. Northwestern, Central and Southern Illinois. Illinois Department of Natural Resources, Springfield, Illinois.

Midwestern Regional Climate Center. 2009. http:/mcc.sws.uiuc.edu

Mohlenbrock, R. H. 2002. Vascular flora of Illinois. Southern Illinois University Press, Carbondale and Edwardsville. Illinois.

Schwegman, J.E. 1973. Comprehensive plan for the Illinois nature preserves system. Part 2. The natural divisions of Illinois. Illinois Nature Preserves Commission, Rockford, Illinois.

Taft, J.B., G.S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. Floristic quality assessment for vegetation in Illinois, a method for assessing vegetation integrity. Erigenia 15:1-95.

White, J., and M.H. Madany. 1978. Classification of natural communities in Illinois. p. 310-405. In White, J. (ed.). Illinois natural areas inventory. Technical report. Illinois Natural Areas Inventory, Urbana, Illinois.

Willman, H.B. 1973. Geology along the Illinois waterway - a basis for environmental planning. Illinois State Geological Survey Circular 478. Urbana.

Willman, H.B. and J.C. Frye. 1970. Pleistocene stratigraphy of Illinois. Illinois State Geological Survey Bulletin 94:1-204.

Table 1. Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (I.V.) of the ground layer species encountered in a dry-mesic to mesic prairie at Hitts Siding Prairie Nature Preserve, Will County, Illinois. (*exotic species)

Species	Freq. %	Mean Cover	Rel. Freq.	Rel. Cover	I. V.
Rubus flagellaris	90	14.18	3.6	8.3	11.9
Schizachyrium scoparium	92	12.69	3.8	7.4	11.2
Euthamia gymnospermoides	96	11.76	3.9	6.9	10.8
Helianthus mollis	84	12.53	3.4	7.3	10.7
Sorghastrum nutans	60	11.45	2.5	6.7	9.2
Solidago missouriensis	76	9.42	3.1	5.5	8.6
Coreopsis tripteris	88	6.80	3.6	4.0	7.6
Andropogon gerardii	58	7.57	2.4	4.4	6.8
Liatris spicata	62	6.64	2.5	3.9	6.4
Aristida purpurascens	48	6.69	2.0	3.9	5.9
**Poa pratensis*	96	3.24	3.9	1.9	5.8
Pycnanthemum tenuifolium	84	3.43	3.4	2.0	5.4
Viola sagittata	96	1.97	3.9	1.2	5.1
Carex umbellata	76	3.27	3.1	1.9	5.0
Rubus hispidus	20	6.17	0.8	3.6	4.4
Scleria triglomerata	42	3.51	1.7	2.1	3.8
Dichanthelium acuminatum	78	0.79	3.2	0.5	3.7
Solidago speciosa	40	3.60	1.6	2.1	3.7
Eryngium yuccifolium	32	3.90	1.3	2.3	3.6
Agrostis gigantea	44	2.90	1.8	1.7	3.5
Juncus greenei	68	0.79	2.8	0.5	3.3
Parthenium integrifolium	34	3.34	1.4	1.9	3.3
Phlox glaberrima	70	0.70	2.9	0.4	3.3
**Rumex acetosella*	66	0.88	2.7	0.5	3.2
Lespedeza capitata	50	1.81	2.0	1.1	3.1
Potentilla simplex	52	1.74	2.1	1.0	3.1
Comandra umbellata	44	2.08	1.8	1.2	3.0
Fragaria virginiana	32	2.25	1.3	1.3	2.6
Prenanthes aspera	46	1.03	1.9	0.6	2.5
Solidago nemoralis	34	1.78	1.4	1.0	2.4
Solidago canadensis	14	3.21	0.5	1.9	2.4
Lactuca canadensis	34	0.42	1.4	0.3	1.7
Solidago gigantea	20	1.27	0.8	0.8	1.6
Calamagrostis canadensis	8	2.07	0.3	1.2	1.5
Agrimonia parviflora	16	1.05	0.7	0.6	1.3
Chamaecrista fasciculata	26	0.33	1.1	0.2	1.3
Helianthus grosseserratus	12	1.32	0.5	0.8	1.3
Hieracium scabrum	24	0.52	1.0	0.3	1.3
Cornus sericea	12	1.27	0.5	0.8	1.3

Rosa carolina	14	1.14	0.5	0.7	1.2
Acer saccharinum	22	0.11	0.9	0.1	1.0
Aster ericoides	14	0.85	0.5	0.5	1.0
Bartonia virginica	22	0.11	0.9	0.1	1.0
Oenothera biennis	22	0.16	0.9	0.1	1.0
Rudbeckia hirta	16	0.38	0.7	0.2	0.9
**Achillea millefolium*	16	0.23	0.7	0.1	0.8
Oxalis stricta	18	0.14	0.7	0.1	0.8
Panicum virgatum	14	0.46	0.5	0.3	0.8
Rubus allegheniensis	6	1.11	0.2	0.6	0.8
Hypericum punctatum	16	0.08	0.7	--	0.7
Cirsium discolor	12	0.11	0.5	0.1	0.6
Prunus serotina	14	0.17	0.5	0.1	0.6
Eragrostis spectabilis	12	0.21	0.5	0.1	0.6
Antennaria neglecta	6	0.42	0.2	0.3	0.5
Oxypolis rigidior	8	0.24	0.3	0.2	0.5
Pedicularis canadensis	10	0.25	0.4	0.1	0.5
Polygala polygama	12	0.06	0.5	--	0.5
Tephrosia virginiana	2	0.75	0.1	0.4	0.5
Antennaria plantaginifolia	10	0.10	0.4	0.1	0.5
Leptoloma cognatum	8	0.09	0.3	0.1	0.4
Viola lanceolata	4	0.31	0.2	0.2	0.4
Aronia melanocarpa	2	0.30	0.1	0.2	0.3
Asclepias hirtella	2	0.30	0.1	0.2	0.3
Aster praealtus	6	0.13	0.2	0.1	0.3
**Cerastium fontanum*	8	0.04	0.3	--	0.3
Euphorbia corollata	4	0.12	0.2	0.1	0.3
Euthamia graminifolia	6	0.13	0.2	0.1	0.3
Lathyrus palustris	4	0.12	0.2	0.1	0.3
**Frangula alnus*	2	0.30	0.1	0.2	0.3
Sassafras albidum	2	0.30	0.1	0.2	0.3
Oligoneuron rigidum	4	0.12	0.2	0.1	0.3
**Rosa multiflora*	2	0.30	0.1	0.2	0.3
Aster lanceolatus	4	0.07	0.2	--	0.2
**Elaeagnus umbellata*	4	0.07	0.2	--	0.2
Eleocharis verrucosa	4	0.02	0.2	--	0.2
Eupatorium serotinum	4	0.02	0.2	--	0.2
Hypericum sphaerocarpum	4	0.02	0.2	--	0.2
Juncus dudleyi	6	0.08	0.2	--	0.2
Linum medium	6	0.08	0.2	--	0.2
Lysimachia lanceolata	4	0.07	0.2	--	0.2
Monarda fistulosa	6	0.03	0.2	--	0.2
Oenothera pilosella	4	0.02	0.2	--	0.2
Polygala sanguinea	6	0.03	0.2	--	0.2
Anemone virginiana	2	0.01	0.1	--	0.1
Asplenium platyneuron	2	0.01	0.1	--	0.1

Conyza canadensis	2	0.01	0.1	--	0.1
Cuscuta gronovii	2	0.01	0.1	--	0.1
Dichanthelium praecocius	2	0.01	0.1	--	0.1
Equisetum arvense	2	0.01	0.1	--	0.1
Equisetum hyemale	2	0.01	0.1	--	0.1
Fraxinus pennsylvanica	2	0.01	0.1	--	0.1
Galium obtusum	2	0.01	0.1	--	0.1
Geum canadense	2	0.01	0.1	--	0.1
Hackelia virginiana	2	0.01	0.1	--	0.1
Hieracium canadense	2	0.01	0.1	--	0.1
Malus ioensis	2	0.01	0.1	--	0.1
Muhlenbergia mexicana	2	0.01	0.1	--	0.1
**Potentilla norvegica*	2	0.01	0.1	--	0.1
Pseudognaphalium obtusifolium	2	0.01	0.1	--	0.1
Sisyrinchium campestre	2	0.01	0.1	--	0.1
Spiranthes cernua	2	0.01	0.1	--	0.1
Toxicodendron radicans	2	0.01	0.1	--	0.1
Tradescantia ohiensis	2	0.01	0.1	--	0.1
Ulmus rubra	2	0.01	0.1	--	0.1
Vernonia missourica	2	0.01	0.1	--	0.1
Veronicastrum virginicum	2	0.01	0.1	--	0.1
Totals		170.75	100.0	100.0	200.0
Bare ground and litter		26.22			

Table 2. Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (I.V.) of the ground layer species encountered in a sedge meadow at Hitts Siding Prairie Nature Preserve, Will County, Illinois. (*exotic species)

Species	Freq. %	Mean Cover	Rel. Freq.	Rel. Cover	I. V.
Onoclea sensibilis	98	43.51	12.3	31.0	43.3
Thelypteris palustris	98	26.07	12.3	18.6	30.9
Carex stricta	74	28.95	9.2	20.7	29.9
Carex lacustris	64	14.62	8.0	10.5	18.5
Boehmeria cylindrica	78	8.32	9.7	5.9	15.6
Scutellaria galericulata	60	4.14	7.4	3.0	10.4
Lycopus americanus	44	2.03	5.5	1.4	6.9
Persicaria coccinea	32	2.78	4.0	2.0	6.0
Mentha arvensis	32	1.77	4.0	1.3	5.3
Campanula aparinoides	28	0.97	3.5	0.7	4.2
Lycopus uniflorus	28	0.73	3.5	0.5	4.0
Bidens polylepis	26	0.77	3.3	0.5	3.8
Galium obtusum	24	0.81	3.0	0.6	3.6
Lysimachia thyrsiflora	24	0.61	3.0	0.4	3.4
Eupatoriadelphus maculatus	12	1.56	1.5	1.1	2.6
Epilobium coloratum	18	0.14	2.3	0.1	2.4
Calamagrostis canadensis	12	0.98	1.5	0.7	2.2
Persicaria punctata	8	0.09	1.0	0.1	1.1
Eupatorium perfoliatum	4	0.07	0.5	0.1	0.6
Scutellaria lateriflora	4	0.07	0.5	0.1	0.6
Verbena hastata	4	0.12	0.5	0.1	0.6
Stachys palustris	4	0.02	0.5	--	0.5
Scirpus cyperinus	2	0.30	0.2	0.2	0.4
Mimulus ringens	2	0.30	0.2	0.2	0.4
Vitis vulpina	2	0.30	0.2	0.2	0.4
Aster lanceolatus var. *simplex*	2	0.01	0.2	--	0.2
Bidens connata	2	0.01	0.2	--	0.2
Caltha palustris	2	0.01	0.2	--	0.2
Eleocharis acicularis	2	0.01	0.2	--	0.2
Epilobium leptophyllum	2	0.01	0.2	--	0.2
Erechtites hieracifolia	2	0.01	0.2	--	0.2
Leersia oryzoides	2	0.06	0.2	--	0.2
Rubus schneideri	2	0.06	0.2	--	0.2
Solidago canadensis	2	0.01	0.2	--	0.2
Triadenum fraseri	2	0.01	0.2	--	0.2
Typha angustifolia	2	0.01	0.2	--	0.2
Typha latifolia	2	0.01	0.2	--	0.2
Totals		140.25	100.0	100.0	200.0
Bare ground and litter		14.20			

APPENDIX 1. Vascular plant species encountered at Hitts Siding Prairie Nature Preserve, Will County, Illinois, are listed alphabetically by family under major plant groups. Collecting numbers preceded by an M were collected by Paul B. Marcum, those presided by a P were collected by Loy R. Phillippe. All specimens are deposited in the Illinois Natural History Survey Herbarium, Champaign, Illinois (ILLS). (*exotic species)

FERN AND FERN-ALLIES

Aspleniaceae
Asplenium platyneuron (L.) Oakes: M4954

Equisetaceae
Equisetum arvense L.: M4678
Equisetum laevigatum A. Br.: P41685

Onocleaceae
Onoclea sensibilis L.: M4732

Osmundaceae
Osmunda regalis L. var. *spectabilis* (Willd.) Gray: M4720

Thelypteridaceae
Thelypteris palustris Schott var. *pubescens* (Laws.) Fern.: M4796

MONOCOTS

Alismataceae
Alisma subcordatum Raf.: M4944
Sagittaria graminea Michx.: M4799

Commelinaceae
Tradescantia ohiensis Raf.: M4698

Cyperaceae
Bulbostylis capillaris (L.) C.B. Clarke: M4810
Carex bicknellii Britt.: M4766
Carex buxbaumii Wahl.: M4712
Carex comosa Boott: M4686
Carex cristatella Britt.: M4728
Carex haydenii Dewey: M4668
Carex longii Mack.: M4742
Carex pellita Willd.: M4677
Carex sartwellii Dewey: M4757
Carex scoparia Schk.: M4737, P41710
Carex swanii (Fern.) Mack.: M4743
Carex vulpinoidea Michx.: M4787

Cyperus erythrorhizos Muhl.: M4832
Cyperus lupulinus (Spreng.) Marcks ssp. *macilentus* (Fern.) Marcks: M4901
Cyperus schweinitzii Torr.: M4949
Cyperus strigosus L.: M4745
Eleocharis erythropoda Steud.: M4800
Eleocharis ovata (Roth) Roem. & Schultes var. *obtusa* (Willd.) Kukenth.: M4827, P41702
Fimbristylis autumnalis (L.) Roem. & Schultes: M4808
Rhynchospora capitellata (Michx.) Vahl: M4907
Schoenoplectus tabernaemontani (C.C. Gmel.) Palla: M4685
Scirpus cyperinus (L.) Kunth: M4676
Scirpus pendulus Muhl.: M4674
Scleria triglomerata Michx.: M4695

Iridaceae
Iris shrevei Sm.: M4694
Sisyrinchium campestre Bickn.: M4887

Juncaceae
Juncus acuminatus Michx.: M4804
Juncus anthelatus (Wieg.) R.E. Brooks: M4929
Juncus brachycarpus Engelm.: M4862
Juncus canadensis J. Gray: M4806
Juncus dudleyi Wieg.: P41724
Juncus effusus L. var. *solutus* Fern. & Wieg.: M4738
Juncus greenei Oakes & Tuckerm.: M4740
Juncus marginatus Rostk.: M4697
Juncus tenuis Willd.: P41714
Juncus torreyi Coville: M4756
Luzula bulbosa (A.W. Wood) Smyth.: M4681

Lemnaceae
Lemna trisulca L.: M4869
Spirodela polyrhiza (L.) Schleiden: M4868

Liliaceae
Aletris farinosa L.: M4683
Lilium michiganense Farw.: M4657

Orchidaceae
Liparis liliifolia (L.) Rich.: M4704, M5222
Platanthera lacera (Michx.) G. Don.: M4703, P41704
Spiranthes cernua (L.) Rich.: M4950
Spiranthes magnicamporum Sheviak: M4883

Poaceae
Agrostis gigantea Roth.: M4741

Agrostis hyemalis (Walt.) BSP.: M4702
Agrostis stolonifera L. var. *palustris* (Huds.) Farw.: M4946
Andropogon gerardii Vitman: M4848
Aristida purpurascens Poir.: M4891
**Bromus japonicus* Thunb.: P41693
**Bromus tectorum* L.: P41699
Calamagrostis canadensis (Michx.) P. Beauv.: M4659
Danthonia spicata (L.) Roem. & Schultes: M4682
Dichanthelium acuminatum (Sw.) Gould & Clark var. *implicatum* (Scribn.) Gould & Clark: M4951
Dichanthelium boreale (Nash) Freckm.: P41703
Dichanthelium oligosanthes (Schult.) Gould var. *scribnerianum* (Nash) Gould: M4909
Dichanthelium praecocius (Hitchc. & Chase) Mohlenbr.: M4824
Dichanthelium villosissimum (Nash) Freckm.: P41697
**Digitaria ischaemum* (Schreb.) Schreb.: M4918
Elymus canadensis L.: M4785
Elymus villosus Muhl.: M4710
**Elytrigia repens* (L.) Desv.: P41727
**Festuca arundinacea* Schreb.: P41694
Glyceria septentrionalis Hitchc.: M4684
Heterostipa spartea (Trin.) Barkworth: P41705
Leptoloma cognatum (Schult.) Chase: M4750
Muhlenbergia frondosa (Poir.) Fern.: M4938
Muhlenbergia mexicana (L.) Trin.: M4935
Muhlenbergia schreberi J.F. Gmel.: M4937
Panicum capillare L.: M4930
Panicum rigidulum Bosc: M4805
Panicum virgatum L.: M4744
Paspalum laeve Michx. var. *circulare* (Nash) Stone: M4934
Paspalum setaceum Michx. var. *stramineum* (Nash) D.J. Banks: M4916
**Phalaris arundinacea* L.: M4788
**Phleum pratense* L.: P41718
Phragmites australis (Cav.) Trin.: M4790
**Poa compressa* L.: M4910
**Poa pratensis* L.: P41692
Schizachyrium scoparium (Michx.) Nash: M4958
Sorghastrum nutans (L.) Nash: M4861
Spartina pectinata Link: M4778
Sphenopholis intermedia (Rydb.) Rydb.: M4693
Sporobolus cryptandrus (Torr.) Gray: M4948
Tridens flavus (L.) Hitchc.: M4906
Triplasis purpurea (Walt.) Chapm.: M4943

Pontederiaceae
Pontederia cordata L.: M4825

Potamogetonaceae
Potamogeton diversifolius Raf.: M4809
Potamogeton foliosus Raf.: M4871

Sparganiaceae
Sparganium americanum Nutt.: M4828

DICOTS

Acanthaceae
Ruellia humilus Nutt.: M4915

Anacardiaceae
Toxicodendron radicans (L.) Kuntze: P41716

Apiaceae
Cicuta maculata L.: M4691
**Daucus carota* L.: M4905
Eryngium yuccifolium Michx.: M4762
Oxypolis rigidior (L.) Raf.: M4859
Sanicula canadensis L.: M4705
Sanicula odorata (Raf.) Pryer & Phillippe: M4706
Sium suave Walt.: M4845
Zizia aurea (L.) Koch: M4714

Apocynaceae
Apocynum cannabinum L.: M4791

Asclepiadaceae
Asclepias hirtella (Pennell) Woodson: M4696
Asclepias incarnata L.: M4722
Asclepias sullivantii Engelm.: M4690
Asclepias syriaca L.: P41731

Asteraceae
**Achillea millefolium* L.: P41706
Ageratina altissima (L.) R.M. King & H. Robins.: M4921
Ambrosia artemesiifolia L.: M4900
Arnoglossum plantagineum Raf.: M4665
Aster dumosus L.: M4903
Aster ericoides L.: M4957
Aster pilosus Willd.: M4897
Aster praealtus Poir.: M4823
Bidens frondosa L.: M4941
Bidens polylepis Blake: M4932
**Cirsium arvense* (L.) Scop.: M4664

Cirsium discolor (Muhl.) Spreng.: M4947
Conyza canadensis (L.) Cronq.: M4815
Coreopsis tripteris L.: M4850
Erechtites hieracifolia (L.) Raf.: M4814
Erigeron annuus (L.) Pers.: P41687.2
Erigeron strigosus Muhl.: M4768, P41687.1
Eupatoriadelphus maculatus (L.) R.M. King & H. Robins.: M4834
Eupatorium perfoliatum L.: M4803
Eupatorium serotinum Michx.: M4820
Euthamia graminifolia (L.) Nutt.: M4885
Euthamia gymnospermoides Greene: M4852
Helenium autumnale L.: M4858
Helianthus grosseserratus Martens: M4723
Helianthus mollis Lam.: M4847
Hieracium canadense Michx. var. *fasciculatum* (Pursh) Fern.: M4811
Hieracium gronovii L.: M4813, M4893
Lactuca canadensis L.: M4926
Liatris aspera Michx.: M4899
Liatris pycnostachya Michx.: M4854
Liatris spicata (L.) Willd.: M4855
Oligoneuron rigidum (L.) Small var. *humile* (T.C. Porter) Nesom: M4955
Parthenium integrifolium L.: M4760
Prenanthes aspera Michx.: M4860
Prenanthes racemosa Michx.: M4890
Pseudognaphalium obtusifolium (L.) Hilliard & Burtt.: M4904
Ratibida pinnata (Vent.) Barnh.: M4780
Rudbeckia hirta L.: M4689
Silphium integrifolium Michx. var. *neglectum* Settle & Fisher: M4924
Solidago altissima L.: M4912
Solidago gigantea Ait.: M4835
Solidago missouriensis Nutt.: M4746
Solidago nemoralis Ait.: M4894
Solidago speciosa Nutt.: M4892, M4956
**Tragopogon dubius* Scop.: P41730
Vernonia fasciculata Michx.: M4779
Vernonia missurica Raf.: M4846

Betulaceae
Betula nigra L.: P41708

Bignoniaceae
**Catalpa speciosa* Warder: P41726

Boraginaceae
Lithospermum croceum Fern.: M4923

Brassicaceae
**Alliaria petiolata* (Bieb.) Cavara & Grande: M4707
Lepidium virginicum L.: P41683

Cactaceae
Opuntia humifusa (Raf.) Raf.: M4754

Caesalpiniaceae
Chamaecrista fasciculata (Michx.) Greene: M4749

Campanulaceae
Campanula aparinoides Pursh: M4667
Campanulastrum americanum (L.) Small: M4783
Lobelia siphilitica L.: M4833
Lobelia spicata Lam.: M4679

Caprifoliaceae
**Lonicera morrowii* Gray: M4680

Caryophyllaceae
**Cerastium fontanum* Baum.: M4886
**Dianthus armeria* L.: P41688
**Saponaria officinalis* L.: M4913
Silene antirrhina L.: P41700
**Silene pratensis* (Spreng.) Godron & Gren.: P41698

Ceratophyllaceae
Ceratophyllum demersum L.: M4870

Cistaceae
Helianthemum bicknellii Fern.: M4902
Lechea mucronata Raf.: M4911
Lechea pulchella Raf.: M4928

Convolvulaceae
Calystegia sepium (L.) R. Br.: M4789

Cornaceae
Cornus obliqua Raf.: M4781
Cornus racemosa Lam.: M4794
Cornus sericea L.: M4857

Corylaceae
Corylus americana Walt.: M4936

Cuscutaceae

Cuscuta gronovii Willd.: M4896

Elaeagnaceae
**Elaeagnus umbellata* Thunb.: P41689

Ericaceae
Gaylussacia baccata (Wang.) K.Koch: M4739

Euphorbiaceae
Acalypha gracilens Gray : M4933
Acalypha rhomboidea Raf.: M4839
Croton glandulosus L. var. *septentrionalis* Muell.-Arg.: M4914
Euphorbia corollata L.: M4763

Fabaceae
Baptisia alba (L.) Vent. var. *macrophylla* (Larisey) Isley: M4927
Dalea purpurea Vent.: M4864
Desmodium canadense (L.) DC.: M4863
Lathyrus palustris L.: M4713
Lespedeza capitata Michx.: M4849
**Lotus corniculatus* L.: P41686
**Medicago lupulina* L.: P41690
**Melilotus alba* Medik.: M4765
**Melilotus officinalis* (L.) Pallas: P41684
**Robinia pseudoacacia* L.: P41715
Stropostyles helvula (L.) Ell.: M4922
Tephrosia virginiana (L.) Pers.: M4953
**Trifolium hybridum* L.: P41719
**Trifolium pratense* L.: P41725
**Trifolium repens* L.: P41717

Fagaceae
Quercus alba L.: M4920
Quercus velutina Lam.: M4908

Gentianaceae
Bartonia virginica (L.) BSP.: M4770
Gentiana andrewsii Griseb.: M4884

Haloragidaceae
Proserpinaca palustris L.: M4731

Hypericaceae
Hypericum majus (Gray) Britt.: M4812
Hypericum mutilum L.: M4826
Hypericum sphaerocarpum Michx.: M4774

Triadenum fraseri (Spach) Gl.: M4866

Lamiaceae
Lycopus americanus Muhl.: M4726
Lycopus uniflorus Michx.: M4802
Lycopus virginicus L.: M4882
Mentha arvensis L. var. *villosa* (Benth.) S.R. Stewart: M4773
Monarda fistulosa L.: M4711
**Nepeta cataria* L.: M4939
Physostegia virginiana (L.) Benth.: M4851
Prunella vulgaris L.: M4771
Pycnanthemum tenuifolium Schrad.: M4764
Pycnanthemum virginianum (L.) Dur. & B.D. Jacks.: M4670
Scutellaria galericulata L.: M4660
Scutellaria lateriflora L.: M4945
Stachys pilosa Nutt. var. *homotricha* (Fern.) Mohlenbr.: M4727
Teucrium canadense L.: M4747

Lauraceae
Sassafras albidum (Nutt.) Nees.: M4895

Lentibulariaceae
Utricularia macrorhiza LeComte: M4867

Linaceae
Linum medium (Planch.) Britt. var. *texanum* (Planch.) Fern.: M4767

Lythraceae
Lythrum alatum Pursh: M4658
**Lythrum salicaria* L.: M4942
Rotala ramosior (L.) Koehne: M4807

Melastomaceae
Rhexia virginica L.: M4795

Molluginaceae
**Mollugo verticillata* L.: M4831

Onagraceae
Circaea lutetiana Aschers. & Magnus ssp. *canadensis* (L.) Aschers. & Magnus: M4840
Epilobium leptophyllum Raf.: M4844
Epilobium x *wisconsinensis* Ugent: M4841
Gaura biennis L.: M4853
Ludwigia alternifolia L.: M4725
Ludwigia palustris (L.) Ell. var. *americana* (DC.) Fern. & Grisc.: M4940
Ludwigia polycarpa Short & Peter: M4755

Oenothera clelandii W. Dietr., Raven, & W.L. Wagner: M4748
Oenothera pilosella Raf.: M4687
Oenothera villosa Thunb.: M4842

Oxalidaceae
Oxalis stricta L.: P41707

Phytolaccaceae
Phytolacca americana L.: M4821

Plantaginaceae
Plantago aristata Michx.: P41696
**Plantago lanceolata* L.: P41691

Polemoniaceae
Phlox glaberrima L. ssp. *interior* (Wherry) Wherry: M4662

Polygalaceae
Polygala cruciata L. var. *aquilonia* Fern. & Schub.: M4751
Polygala polygama Walt. var. *obtusata* Chod.: M4699
Polygala sanguinea L.: M4700

Polygonaceae
Fallopia scandens (L.) Holub.: M4837
Persicaria coccinea (Muhl.) Greene: M4838
Persicaria hydropiperoides (Michx.) Small: M4777, M4801
Persicaria opelousana (Riddell) Small: M4753
Persicaria pensylvanica (L.) Small: M4819
Persicaria punctata (Ell.) Small: M4816
**Persicaria vulgaris* Webb & Moq.: M4836
**Rumex acetosella* L.: M4818
**Rumex crispus* L.: P41721
Rumex verticillatus L.: M4830

Primulaceae
Dodecatheon meadia L.: M5223
Lysimachia lanceolata Walt.: M4701
Lysimachia quadriflora Sims.: M4692
Lysimachia terrestris (L.) BSP.: P41711
Lysimachia thrysiflora L.: M4881

Ranunculaceae
Anemone cylindrica Gray: M4675
Anemone virginiana L.: M4782

Rhamnaceae

**Frangula alnus* Mill.: M4666, P41709

Rosaceae
Agrimonia gryposepala Wallr.: M4730
Agrimonia parviflora Sol.: M4734
Aronia melanocarpa (Michx.) Ell.: M4752
Fragaria virginiana Duchesne: P41713
Geum canadense Jacq.: M4709
Geum laciniatum Murr. var. *trichocarpum* Fern.: M4661
Malus ionensis (Wood) Britt.: M4733
**Malus sieboldii* (Regel.) Rehd.: M4889
Potentilla simplex Michx.: P41728
Prunus serotina Ehrh.: M4784
Rosa carolina L.: M4856
Rosa setigera Michx.: M4673
Rubus flagellaris Willd.: M4952
Rubus frondosus Bigel.: M4729
Rubus hispidus L.: M4769
Rubus pensilvanicus Poir.: P41701
Rubus schneideri Bailey: M4671, M4724, M4761
Spiraea alba DuRoi: M4735
Spiraea tomentosa L.: M4758

Rubiaceae
Cephalanthus occidentalis L.: M4798
Diodia teres Walt.: M4917
Galium obtusum Bigel.: M4792
Galium triflorum Michx.: M4817

Rutaceae
Ptelea trifoliata L.: P41722

Salicaceae
**Populus alba* L.: P41729
Salix discolor Muhl.: M4931
Salix fragilis L.: M4736

Saxifragaceae
Penthorum sedoides L.: M4775

Scropulariaceae
Agalinus purpurea (L.) Pennell: M4822
Agalinus tenuifolia (Vahl) Raf.: M4843
Mimulus ringens L.: M4772
Pedicularis canadensis L.: M4688
Pedicularis lanceolata Michx.: M4759, M4898

Penstemon digitalis Nutt.: M4793
Scrophularia lanceolata Pursh: P41720
Tomanthera auriculata (Michx.) Raf.: M4865
**Verbascum thapsus* L.: P41723
Veronicastrum virginicum (L.) Farw.: M4672

Solanaceae
Solanum carolinense L.: M4919
**Solanum dulcamara* L.: M4669, M4829

Ulmaceae
**Ulmus pumila* L.: P41695

Urticaceae
Boehmeria cylindrica (L.) Sw.: M4721
Parietaria pensylvanica Muhl.: M4708

Verbenaceae
Phyla lanceolata (Michx.) Greene: M4776
Verbena hastata L.: M4663
Verbena stricta Vent.: M4925
Verbena urticifolia L.: M4786

Violaceae
Viola lanceolata L. ssp. *vittata* (Greene) Russell: M4888
Viola sagittata Ait.: P41712

CHAPTER 3. -- **Vascular Flora of Short Pioneer Cemetery Prairie Nature Preserve, Grundy County, Illinois: composition and change since 1977.**

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ABSTRACT--The vascular flora of the dry-mesic sand prairie at Short Pioneer Cemetery Prairie Nature Preserve, Grundy County, Illinois, was studied during the 2005 to 2007 growing seasons. Located at the western edge of the Kankakee sand deposits, this 0.5 ha prairie was examined by the Illinois Natural Areas Inventory in 1976, and dedicated as an Illinois Nature Preserve in 1988. The composition and structure of the flora was determined using m^2 plots placed along line transects. The site supported 137 vascular plant species of which 55 were encountered in the plots. *Helianthis occidentalis* (western sunflower) was the dominant species encountered (I.V. of 24.3/possible 200), followed by *Shizachyrium scoparium* (little bluestem) with an I.V. of 19.6, and *Leptoloma cognatum* (fall witch grass) with an I.V. of 13.4. On this prairie there has been a dramatic decrease in the number of forb species, at least 15 being lost since 1977. Among these species where *Coreopsis triperis* (tall coreopsis), *Dalea purpurea* (purple prairie clover), *Desmodium cuspidatum* (tick trefoil), *D. illinoensis* (Illinois tick trefoil), *Eryngium yuccifolium* (rattlesnake master), *Helianthus divaricatus* (woodland sunflower), *H. grosseserratus* (sawtooth sunflower), *Monarda fistulosa* (wild bergamont), *Parthenium integrifolium* (American feverfew), *Polygonatum commutatum* (Solomon's-seal), *Potentilla arguta* (prairie cinquefoil), *Ratibita pinnata* (drooping coneflower), *Rudbeckia hirta* (black-eyed Susan), *Salix humilis* (prairie willow), *Silphium integrifolium* (rosinweed), and *S. terebinthinaceum* (prairie dock).Exotic species were represented by 43 taxa, 31.4% of the flora. The community had a Floristic Quality Index of 25.31 when exotic species were included in the calculations and 30.38 when they were excluded.

Key Words: dry-mesic sand prairie, loss of forb diversity, Illinois, *Schizachyrium scoparium.*

INTRODUCTION

At the time of European settlement prairie vegetation covered about 60% of Illinois (Iverson et al. 1991). Most was "black soil" tall-grass prairie of the prairie peninsula (Transeau 1935), though sand prairies were relatively common (Schwegman 1973). Sand deposits are found in the northern half of Illinois, accounting for nearly 5% of the land surface of the state (Willman and Frye 1970). Sand prairies and sand savanna communities were common on these sand deposits in pre-settlement times. These sand deposits occur on glacial outwash plains associated with erosional events of Wisconsin glaciation (King 1981; Willman and Frye 1970). The most extensive of these deposits in Illinois is the Kankakee sand deposits in parts of Grundy, Iroquois, Kankakee, and Will counties, Illinois, and adjacent Newton County, Indiana (Schwegman 1973). This sand deposit remained after large glacial lakes were drained about 14,500 years ago as glacial moraines and ice dams were breached resulting in the Kankakee Torrent (Willman 1973).

The present study was undertaken to determine the vascular plant species composition, vegetation structure, and floristic quality of a small dry-mesic sand prairie remnant found associated with a rarely used cemetery, and to compare results with a previous study of the site in 1977 by the Illinois Natural Areas Inventory (White 1978).

DESCRIPTION OF THE STUDY AREA

Short Pioneer Cemetery Prairie Nature Preserve, Grundy County, Illinois, about 0.5 ha in size, is located in the northeastern part of the state about 2 km south of Goose Lake Prairie Nature Preserve and 10 km east of Morris, Illinois (SE1/4 S15, NE1/4 S22 T33N R8E; 41.33136° N, 88.28809° W). Situated at the northwestern edge of a sand

deposit in the shallow valley and adjacent uplands of the Kankakee River, the preserve is within 8 km south of where the Kankakee River enters the Illinois River. It is located on Wisconsin glacial till in the Kankakee Sand Area Section of the Grand Prairie Natural Division (Schwegman 1973), and is about 169 m above sea level (McFall and Karnes 1995).

This small dry-mesic sand prairie is surrounded by upland, immature, disturbed forest, and immediately to the south is an extensive area strip mined for coal (McFall and Karnes 1995). At the northwest corner of the preserve is a *Schizachyrium scoparium* (little bluestem) hay field. The cemetery was founded in 1894, almost all burials were prior to 1910, the last in 1963 (Burnett 1987).

The sandy soil of the preserve is Sparta loamy fine sand, an excessively drained soil that occurs on ridges and uplands of the sand deposits, that has a very dark brown surface layer about 50 cm thick that is loose and subject to blowing (Reineback 1980). The climate is continental and characterized by hot, humid summers and cold winters. Annual precipitation averaged 93.9 cm, with July having the highest rainfall (11.0 cm). Mean annual temperature is 9.7° C, the hottest month being July (average of 23.2° C), the coldest being January (average of –5.7° C). The average number of frost-free days is 177 (Midwestern Regional Climate Center 2009)

METHODS

Floristic Composition. Short Pioneer Cemetery Prairie Nature Preserve was visited every 3-4 weeks during the 2005 and 2006 growing seasons. During each trip flowering or fruiting species encountered were collected and voucher specimens deposited in the

Stover-Ebinger Herbarium of Eastern Illinois University, Charleston, Illinois (EIU) and the Illinois Natural History Survey Herbarium, Champaign, Illinois (ILLS). Nomenclature follows Mohlenbrock (2002) and assignment of non-native status was determined using Taft et al. (1997) and Mohlenbrock (2002).

Ground Layer Sampling. Ground-layer species were analyzed in September 2005 using m^2 plots located at 1 m intervals along two randomly placed 25 m transects oriented at right angles to each other (n=25/transect). Even-numbered plots were placed to the right, odd-numbered to the left. Herbaceous species, shrubs, and tree seedlings to 0.4 m in height were included in the sampling. Percent cover for each species, as well as for bare ground and litter, were determined by using the Daubenmire (1959) cover class system as modified by Bailey and Poulton (1968) (class 1 = 0-1%, class 2 = 2-5%, class 3 = 6-25%, class 4 = 26-50%, class 5 = 51-75%, class 6 = 76-95%, and class 7 = 96-100%). Mean cover, relative cover, frequency (%), relative frequency, and importance value (I.V.) were determined for each species. As used here, I.V. is the sum of the relative frequency and relative cover.

Floristic Quality Index (FQI). Floristic Quality Index (FQI) of the site was determined using the coefficient of conservatism (CC) assigned to each species by Taft et al. (1997). For each species in the Illinois flora, the CC was determined by subjectively assigning an integer from 0 to 10, based on its tolerance to disturbance and its fidelity to habitat integrity. FQI is a weighted index of species richness (N = number of species present), and is the arithmetic product of average coefficient of conservatism (C-Value = the average of all species CCs) multiplied by square root of the species richness ($\sqrt{N}$): FQI = C-Value ($\sqrt{N}$). Therefore, FQI indicates level of habitat degradation and provides an

assessment of the quality of each tract based on taxa present. It is particularly useful when combined with quadrat-based sampling methods and provides a way of making quantitative comparisons among sites.

RESULTS

A total of 137 species representing 51 families and 114 genera were documented for Short Pioneer Cemetery Prairie Nature Preserve (Appendix I). Fern-allies and gymnosperms were represented by six species in five families. Of the remainder, 93 were dicots in 40 families and 81 genera, while 38 were monocots in 6 families and 27 genera. Of these totals, 22 were woody species while 43 were exotic which represented 31.4% of the flora. Predominant plant families were Poaceae with 24 species and Asteraceae with 16 species. FQI for this site, when non-native species were included, was 25.49 with a mean C-value of 2.19; with non-native species excluded from the calculations FQI was 30.38 with a mean C-value of 3.15. No state endangered or threatened species were found (Herkert and Ebinger 2002).

Of 137 species encountered, 55 were recorded in the plots (Table 1). Of these, *Helianthis occidentalis* (western sunflower) had the highest mean cover (15.11), the highest importance value (I.V. of 24.3), but was only found in 58% of the plots. *Schizachyrium scoparium* (little bluestem), in contrast, was second in importance (I.V. of 19.6), had a mean cover of 9.66 but was found in 98% of the plots (Table 1). Other important grasses included *Leptoloma cognatumn* (fall witch grass) (third in I.V.) and *Dichanthelium oligosanthes* (panic grass) was seventh in I.V. Two frequently encountered exotic grasses were *Poa pratensis* (Kentucky blue grass) and *Bromus*

inermis (awnless brome grass) with frequencies of 68% and 16% respectively. A few woody species were common prairie components with *Rosa carolina* (Carolina rose) and *Amorpha canescens* (leadplant) fifth and sixth in I.V., respectively (Table 1). Of the forbs tallied *Ambrosia artemisiifolia* (common ragweed) ranked fourth in I.V., with other important taxa including *Phlox bifida* (cleft phlox), *Ruellia humilis* (wild petunia), *Opuntia macrorhiza* (plains prickly pear), and *Senecio plattensis* (prairie groundsel). Bare ground and litter accounted for a mean cover of 23.76.

Of the 43 exotic species encountered nine were found in the plots (Table 1). The remaining exotic species were restricted to disturbed habitats mostly at the forest edge or small disturbances along the north edge where some dirt had been removed. No exotic shrubs or trees were encountered in the plots, but *Elaeagnus umbellata* (autumn olive), *Rhamnus cathartica* (common buckthorn), and *Lonicera maackii* (Amur honeysuckle) were encountered at the edges of the prairie and adjacent woods. Other woody plants observed included planted ornamentals and seedlings of native trees and shrubs, some being found in the plots (Table 1).

DISCUSSION

Short Pioneer Cemetery Prairie Nature Preserve is similar in native species composition to that described by White and Madany (1978). Unlike dry sand prairies the soils of dry-mesic sand prairies have a dark A horizon, the grasses are commonly more than 1 m tall, and more mesic species of forbs are present. Though the dominant grass of this community is *Schizachyrium scoparium*, White and Madany (1978) listed *Sorghastrum nutans* (Indian grass) and *Heterostipa spartea* (porcupine grass) as co-

dominants with *S. scoparium*. *Heterostipa spartea* ranked fourteenth on this dry-mesic sand prairie with an I.V. of 4.9, while *S. nutans* was rare, not being recorded for the plots. *Andropogon gerardii* (big bluestem) was present but rare, being found in two plots and having an I.V. of 0.5.

During the Illinois Natural Areas Inventory on August 7 and 8 of 1976 the vegetation at the Short Pioneer Cemetery was examined by Harty and Strange (1976). The report lists many species that we were unable to find during our study in 2005. Among these species where *Coreopsis triperis* (tall coreopsis), *Dalea purpurea* (purple prairie clover), *Desmodium cuspidatum* (tick trefoil), *D. illinoensis* (Illinois tick trefoil), *Eryngium yuccifolium* (rattlesnake master), *Helianthus divaricatus* (woodland sunflower), *H. grosseserratus* (sawtooth sunflower), *Monarda fistulosa* (wild bergamont), *Parthenium integrifolium* (American feverfew), *Polygonatum commutatum* (Solomon's-seal), *Potentilla arguta* (prairie cinquefoil), *Ratibita pinnata* (drooping coneflower), *Rudbeckia hirta* (black-eyed Susan), *Salix humilis* (prairie willow), *Silphium integrifolium* (rosinweed), and *S. terebinthinaceum* (prairie dock). The reason for this loss in not known. It is possible that these species were lost due to the small size of the prairie remnant and shading by surrounding vegetation. It is also possible that sometime in the past someone used herbicide on this small prairie with the corresponding loss of many larger forbs. For whatever reason, species diversity in this small prairie remnant has been substantially decreased since 1976. Management alone may not restore these species to this natural area as no seed source is present in the immediate area.

Removing woody and exotic forbs will be necessary to maintain this dry-mesic sand prairie which is slowly disappearing due to woody encroachment. Without

management this small dry-mesic sand prairie will become smaller, decreasing species diversity by shading and competition from exotic species. Very little management has occurred on this site, it was burned in 1984 and occasionally mowed around that time, and only rarely have exotic shrubs and other woody undergrowth been removed (Burnett 1987). Continued maintenance will be necessary to prevent the loss of this dry-mesic sand prairie. To restore and maintain this prairie will require prescribed burns, in high frequencies during restoration, and then every 3 to 5 years depending upon thatch accumulation. Also, removal of exotic species will occasionally be required, and the removal of trees and shrubs at the prairie/forest interface will be necessary to prevent excessive shading.

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LITERATURE CITED

Bailey, A.W. and C.E. Poulton. 1968. Plant communities and environmental relationships in a portion of the Tillamook burn, northwestern Oregon. Ecology 49:1-13.

Burnett, G. 1987. Proposal for dedication as an Illinois Nature Preserve: Short Pioneer Cemetery Prairie, Grundy County, Illinois. Submitted to the Illinois Nature Preserves Commission, Illinois Department of Natural Resources, Springfield, Illinois.

Daubenmire, R. 1959. A canopy coverage method of vegetation analysis. Northwest Science 33:43-64.

Harty, F. and L. Strange. 1976. Illinois Natural Areas Inventory, Cemetery Prairie Survey. Illinois Department of Natural Resources, Springfield, Illinois.

Herkert, J.R. and J.E. Ebinger. eds. 2002. Endangered and Threatened Species of

Illinois: Status and Distribution. Volume 1: Plants. Endangered Species Protection Board, Springfield, IL. 106 pp.

Iverson, L.R., G.L. Rolfe, T.J. Jacob, A.S. Hodgins, and M.R. Jeffords. 1991. Forests of Illinois. Illinois Council on Forest Development, Urbana, and Illinois Natural History Survey, Champaign, Illinois.

King, J.E. 1981. Late Quaternary vegetational history of Illinois. Ecological Monographs 51:43-62.

McFall, D. and J. Karnes. 1995. editors. A Directory of Illinois Nature Preserves. Vol. 2. Northwestern, Central and Southern Illinois. Illinois Department of Natural Resources, Springfield, IL. 321 pp.

Midwestern Regional Climate Center. 2009. http://mcc.sws.uiuc.edu

Mohlenbrock, R.H. 2002. Vascular Flora of Illinois. Southern Illinois University Press, Carbondale and Edwardsville, IL. x + 490 pp.

Reineback, L.M. 1980. Soil Survey of Grundy County, Illinois. United States Department of Agriculture, Soil Conservation Service in cooperation with the Illinois Agricultural Experiment Station.

Schwegman, J.E.. 1973. Comprehensive plan for the Illinois nature preserves system. Part 2. The natural divisions of Illinois. Illinois Nature Preserves Commission, Rockford, IL. 32 pp. + map.

Taft, J.B., G.S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. Floristic quality assessment for vegetation in Illinois, a method for assessing vegetation integrity. Erigenia 15:1-95.

Transeau, E.N. 1935. The prairie peninsula. Ecology 16:423-437.

White J. 1978. Illinois Natural Areas inventory. Technical report. Volume I. Survey methods and results. Illinois Natural Areas Inventory, Urbana. xix+426 pp.

White, J., and M.H. Madany. 1978. Classification of natural communities in Illinois. Illinois Natural Areas Inventory. Technical report. J. White, ed. Illinois Natural Areas Inventory, Urbana, Ill.

Willman, H.B. 1973. Geology along the Illinois waterway - a basis for environmental planning. Illinois State Geological Survey Circular 478. Urbana.

Willman, H.B., and J.C. Frye. 1970. Pleistocene stratigraphy of Illinois. Illinois State Geological Survey Bulletin 94:1-204.

Table1. Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (I.V.) of the ground layer species encountered in the Fall of 2005 in a dry-mesic sand prairie at Short Pioneer Cemetery Prairie Nature Preserve, Grundy County, Illinois. Species with an I.V. below 0.5 are listed as others. (* exotic species)

Species	Freq %	Mean Cover	Rel. Freq.	Rel. Cover	I.V.
Helianthus occidentalis	58	15.11	3.8	20.5	24.3
Schizachyrium scoparium	98	9.66	6.4	13.2	19.6
Leptoloma cognatum	72	6.27	4.8	8.6	13.4
Ambrosia artemisiifolia	86	5.39	5.7	7.4	13.1
Rosa carolina	94	3.71	6.2	5.1	11.3
Amorpha canescens	44	4.69	2.9	6.4	9.3
Dichanthelium oligosanthes	76	2.88	5.0	3.9	8.9
Phlox bifida	74	2.74	4.9	3.7	8.6
Ruellia humilis	72	2.82	4.8	3.8	8.6
Opuntia macrorhiza	66	2.92	4.4	4.0	8.4
Senecio plattensis	56	2.96	3.7	4.0	7.7
**Poa pratensis*	68	1.44	4.5	2.0	6.5
Callirhoe triangulata	38	1.76	2.5	2.4	4.9
Heterostipa spartea	58	0.84	3.8	1.1	4.9
Tephrosia virginiana	28	2.18	1.9	3.0	4.9
Poinsettia dentata	54	0.32	3.6	0.4	4.0
Carex spp.	50	0.50	3.3	0.7	4.0
**Rumex acetosella*	40	0.65	2.7	0.9	3.6
Solanum carolinense	36	0.83	2.4	1.1	3.5
Cyperus lupulinus	42	0.21	2.9	0.3	3.2
Croton glandulosus	34	0.17	2.3	0.2	2.5
Lespedeza capitata	22	0.41	1.5	0.6	2.1
**Euphorbia cyparissias*	10	0.78	0.7	1.1	1.8
**Bromus inermis*	16	0.47	1.1	0.6	1.7
Lithospermum croceum	10	0.73	0.7	1.0	1.7
Physalis virginiana	22	0.16	1.5	0.2	1.7
Tridens flavus	20	0.20	1.3	0.3	1.6
Equisetum laevigatum	20	0.10	1.3	0.1	1.4
Oenothera biennis	16	0.18	1.1	0.2	1.3
Dichanthelium villosissimum	12	0.26	0.8	0.4	1.2
Ageratina altissima	10	0.20	0.7	0.3	1.0
Physalis heterophylla	10	0.25	0.7	0.3	1.0
**Chenopodium album*	10	0.05	0.7	0.1	0.8
Dichanthelium depauperatum	8	0.24	0.5	0.3	0.8
Euphorbia corollata	10	0.05	0.7	0.1	0.8
Prunus serotina	6	0.13	0.4	0.2	0.6
**Silene pratensis*	8	0.09	0.5	0.1	0.6
Sporobolus cryptandrus	8	0.04	0.5	0.1	0.6
Andropogon gerardii	4	0.12	0.3	0.2	0.5
Eragrostis spectabilis	4	0.12	0.3	0.2	0.5

Panicum virgatum	6	0.08	0.4	0.1	0.5
Quercus velutina	4	0.12	0.3	0.2	0.5
Others (13 species)		0.44	1.5	0.6	2.1
Totals		73.27	100.0	100.0	200.0
Bare ground and litter		23.76			

APPENDIX I. Vascular plant species encountered at Short Pioneer Cemetery Prairie Nature Preserve, Grundy County, Illinois are listed alphabetically by family under the major plant groups. Collecting numbers are preceded by the initial of the collector (B = Daniel T. Busemeyer; P = Loy R. Phillippe ; E = John E. Ebinger). Specimens are deposited in the Illinois Natural History Survey Herbarium (ILLS), Champaign, Illinois, with a few at the Ebinger/Stover Herbarium, Eastern Illinois University, Charleston, Illinois (EIU). (*exotic species)

FERNS AND FERN-ALLIES

Aspleniaceae
Asplenium platyneuron (L.) Oakes: B2494

Equisetaceae
Equisetum laevigatum A. Br.: B2475

Ophioglossaceae
Botrychium dissectum Spreng. var. *obliquum* (Muhl.) Clute: B2505

GYMNOSPERMS

Cupressaceae
Juniperus virginiana L.: B2306
**Thuja occidentalis* L.: B2313 (planted)

Pinaceae
**Picea abies* (L.) H.Karst.: B2333 (planted)

MONOCOTS

Commelinaceae
Tradescantia ohiensis Raf.: E32157

Cyperaceae
Carex blanda Dewey: B2320
Carex foenea Willd. var. *foenea*: B2310
Carex muhlenbergii Schk.: B2286
Carex pensylvanica Lam.: B2297
Carex swanii (Fern.) Mack.: E32014
Cyperus lupulinus (Spreng.) Marcks: B2499

Iridaceae
**Iris flavescens* DC.: B2307

Lilliaceae
Allium canadense L.:E32178

**Asparagus officinalis* L.: B2334
**Convallaria majalis* L.: B2319
Smilacina racemosa (L.) Desf.: B2324
Smilacina stellata (L.) Desf.: B2322

Poaceae
Andropogon gerardii Vitman: E32016
**Bromus inermis* Leyss.:E32670
**Bromus tectorum* L.: B2302, E32017
**Dactylis glomerata* L.: B2329
Dichanthelium depauperatum (Muhl.) Gould: observed
Dichanthelium oligosanthes (Schult.) Gould: B2488
Dichanthelium villosissimum (Nash) Freckm.: E32018
**Digitaria sanguinalis* (L.) Scop.: E32019
**Eragrostis cilianensis* (All.) Vign.: B2519
**Eragrostis neomexicana* Vasey: E32020
Eragrostis spectabilis (Pursh) Steud.: B2493
Heterostipa spartea (Trin.) Barkworth: E32021
Leptoloma cognatum (Schult.) Chase: E32022
Muhlenbergia schreberi J.F. Gmel.: B2495
Panicum capillare L.: B2502
Panicum virgatum L.: B2504
Paspalum setaceum Michx.: E32023
**Poa pratensis* L.: B2288
Schizachyrium scoparium (Michx.) Nash: B2480
**Setaria faberi* R.A.W. Herm.: E32024
Sorghastrum nutans (L.) Nash: B2507
Sporobolus cryptandrus (Torr.) A. Gray: B2514
Tridens flavus (L.) Hitchc.: B2479
Vulpia octoflora (Walt.) Rydb.: B2298

Smilacaceae
Smilax tamnoides L.: B2318

DICOTS

Acanthaceae
Ruellia humilis Nutt.: B2510

Aceraceae
Acer negundo L.: B2331

Apiaceae
**Daucus carota* L.: E32027
Osmorhiza longistylis (Torr.) DC.: B2311
Sanicula canadensis L.: E32028

Asclepiadaceae
Asclepias amplexicaulis Small: E32171
Asclepias verticillata L.: E32158

Asteraceae
**Achillea millefolium* L.: E32159
Ageratina altissima (L.) R.M. King & H. Robins.: B2485
Ambrosia artemisiifolia L.: B2486
Antennaria plantaginifolia (L.) Hook.: B2327
Artemisia campestris L. var. caudate (Michx.) Hall & Clem.: E32029
Aster pilosus Willd.: B2487
Conyza canadensis (L.) Cronq.: B2509
Erigeron strigosus Muhl.: E32160
Eupatorium altissimum L.: B2489
Euthamia gymnospermoides Greene: B2498
Helianthus occidentalis Riddell: B2492
Lactuca canadensis L.: B2501
Senecio plattensis Nutt.: B2304
Solidago canadensis L.: B2481
**Taraxacum officinale* Weber: B2332
**Tragopogon dubius* Scop.: E32161

Berbaridaceae
**Berberis thunbergii* DC.: B2312

Boraginaceae
Hackelia virginiana (L.) I.M. Johnston: E32031
Lithospermum croceum Fern.: B2305

Brassicaceae
**Alliaria petiolata* (Bieb.) Cavara & Grande: B2292

Cactaceae
Opuntia macrorhiza Engelm.: B2517

Campanulaceae
Campanulastrum americanum (L.) Small: E32032

Cannabinaceae
**Cannabis sativa* L.: E32033

Caprifoliaceae
**Lonicera maackii* (Rupr.) Maxim.: B2300
**Lonicera morrowii* Gray: B2301
Triosteum perfoliatum L.: E32034

**Viburnum opulus* L.: B2314

Caryophyllaceae
**Arenaria serpyllifolia* L.: B2316
**Cerastium fontanum* Baum: B2326
**Holosteum umbellatum* L.: P37377
**Saponaria officinalis* L.: E32035
**Silene pratensis* (Spreng.) Godron & Gren.: B2511
**Stellaria media* (L.) Cyrillo: B2325

Celastraceae
Celastrus scandens L.: B2317

Chenopodiaceae
**Chenopodium album* L.: E32037
Chenopodium desiccatum A. Nels.: B2478

Elaeagnaceae
**Elaeagnus umbellata* Thunb.: B2315

Euphorbiaceae
Chamaesyce nutans (Lag.) Small: E32038
Croton glandulosus L.: B2490, E32039
Euphorbia corollata L.: B2516
**Euphorbia cyparissias* L.: B 2309
Poinsettia dentata (Michx.) Kl. & Garcke: E32040

Fabaceae
Amorpha canescens Pursh: E32041
Lespedeza capitata Michx.; B2483
Tephrosia virginiana (L.) Pers.: B2497
**Vicia villosa* Roth: E32043

Fagaceae
Quercus velutina Lam.: B2512

Grossulariaceae
Ribes missouriense Nutt.: P37376

Lamiaceae
**Nepeta cataria* L.: E32044

Malvaceae
Callirhoe triangulata (Leavenw.) Gray: E32045

Molluginaceae
**Mollugo verticillata* L.: E32026

Moraceae
**Morus tatarica* L.: B2303

Onagraceae
Oenothera biennis L.: B2513

Oxalidaceae
Oxalis stricta L.: B2290

Phrymaceae
Phryma leptostachya L.: E32046

Plantaginaceae
Plantago patagonica Jacq.: E32047
Plantago rugelii Decne.: E32048
Plantago virginica L.: B2330

Polemoniaceae
Phlox bifida Beck: B2283

Polygonaceae
**Fallopia convolvulus* (L.) A. Love: B2503
**Rumex acetosella* L.: B2291

Portulacaceae
**Portulaca oleracea* L.: E32050

Ranunculaceae
Anemone cylindrica Gray: E32051
Ranunculus abortivus L.: B2328

Rhamnaceae
**Rhamnus cathartica* L.: B2299

Rosaceae
Agrimonia pubescens Wallr.: E32052
Fragaria virginiana Duchesne: B2308
Geum canadense Jacq.: E32176
Prunus serotina Ehrh.: B2296
**Prunus triloba* Lindl.: B2284 (planted)
Rosa carolina L.: B2508
Rubus occidentalis L.: B2295

Rubus pensilvanicus Poir.: B2294

Rubiaceae
Galium aparine L.: B2293

Scrophulariaceae
Nuttallanthus canadensis (L.) D. Sutton: B2285
Scrophularia lanceolata Pursh: B2289
**Verbascum thapsus* L.: E32053
**Veronica arvensis* L.: B2287

Solanaceae
Physalis heterophylla Nees var. *heterophylla*: B2476
Physalis virginiana Mill.: E32165
Solanum carolinense L.: B2477, E32055
Solanum ptychanthum Dunal: B2520

Ulmaceae
Celtis occidentalis L.: B2321

Urticaceae
Parietaria pensylvanica Muhl.: E32177

Verbenaceae
Verbena stricta Vent.: B2484
Verbena urticifolia L. E32057

CHAPTER 4. -- **Vegetation of Sand Ridge Savanna Nature Preserve, Will County, Illinois.**

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ABSTRACT--The Sand Ridge Savanna Nature Preserve, 4 km east of Braidwood, Will County, Illinois, has a diverse assemblage of sand communities with good quality sedge meadow, wet sand prairie, wet mesic sand prairie, and dry-mesic sand savanna. The dry-mesic sand savanna was dominated by *Quercus velutina* (black oak) with an importance value of 153.3 (possible 200), averaged of 145 stems/ha, and a basal area of 17.065 m^2/ha. *Quercus alba* (white oak) was the only other common tree species. Wet sand prairie occurred in the swales between the forested dunes and was dominated by *Carex pellita* (woolly sedge) Other common grass-like species included *Eleocharis palustris* (marsh spikerush), *Spartina pectinata* (cord grass), and *Carex scoparia* (sedge), while two fern species, *Onoclea sensibilis* (sensitive fern) and *Thelypteris palustris* (marsh fern), were also common. *Scleria triglomerata* (nut rush), *Sorghastrum nutans* (Indian grass), and *Agrostis gigantea* (red top) were the dominated grass-like plants of the wet-mesic sand prairie while *Potentilla simplex* (common cinquefolia), *Platanthera flava* var. *herbiola* (tubercled orchid), and *Solidago canadensis* (Canada goldenrod) were the important forbs. The sedge meadow was dominated by *Carex haydenii* (Hayden's sedge), two species of *Persicaria* (*amphibium* and *coccinea*) and *Calamagrostis canadensis* (bluejoint grass). A total of 337 vascular plant taxa were found on the Preserve while 37 exotic taxa were encountered.

Key Words: dry-mesic sand savanna, Kankakee sand deposits, Illinois, sedge meadow, wet-mesic sand prairie,

INTRODUCTION

Oak savannas were common when European man entered Illinois but virtually disappeared within 40 years after settlement, the results of fire suppression and settler land use patterns (Curtis 1959, Anderson 1983, 1991, Nuzzo 1986). Associated with "black soil" prairie, oak savannas are considered one of the rarest community types in Illinois. Sand savannas, in contrast, are relatively common communities in many of the sand deposits in Illinois. These sand deposits, which account for nearly 5% of the states land surface, are common in the northern half of Illinois due to erosional events associated with Wisconsin glaciation (King 1981; Schwegman 1973; Willman and Frye 1970). The sand deposits remained after glacial lakes were drained about 14,500 years ago as glacial moraines and ice dams were breached resulting in the Kankakee Torrent (Willman 1973). The most extensive being the Kankakee sand deposits in northeastern Illinois.

Depending on topography, fire, and past land uses, other sand communities were commonly associated with these sand savannas. Dry sand prairies were found on the upper slopes and ridges of dunes and other dry areas. In this community the soil lacked a dark A horizon, and the grasses, most of which were bunch-grasses, were mostly less than 1 m tall. In the absence of recurring fires dry sand prairies developed into a dry sand savanna community (White and Madany 1978). In contrast, sedge meadows and wet sand prairies were associated with the lower dune slopes and swales between the dunes. In these communities the soil had a high organic content resulting in a dark A horizon, while many of the grass (Poaceae) were replaced by sedges and rushes (Cyperaceae).

Sand Ridge Savanna Nature Preserve is a unique area that contains some of the best quality dry-mesic sand savanna in northern Illinois. Also, in some of the shallow depressions, and swales between the dunes, wet sand communities are found. These rare communities, including sedge meadows, wet sand prairies, and wet-mesic sand prairies were found in the Preserve and are of high natural quality. The present study was undertaken to determine vascular plant species composition, vegetation structure, and floristic quality of the major natural plant communities of this Preserve.

DESCRIPTION OF THE STUDY AREA

The 90 ha Sand Ridge Savanna Nature Preserve is located in the southwestern corner of Will County about 4 km east of Braidwood, and 20 km south of Joliet (W½ of S14, T12N, R9E; 41.25655°N, -88.16477°W). Presently owned by the Forest Preserve District of Will County, the Preserve is located in the Kankakee Sand Area Section of the Grand Prairie Natural Division (Schwegman 1973). The Preserve, dedicated in 1993, contains the remnants of a dry-mesic sand savanna of good natural quality (McFall and Karnes 1995). An extensive field, cultivated before the land was purchased by the Will County Forest Preserve District, was seeded to mesic sand prairie species. Also, some small areas of the preserve still contain native vegetation of high natural quality, including a sedge meadow, a wet-mesic sand prairie, and a wet sand prairie. The wet sand prairie occurred in swales between some of the forested dunes. Before being purchased most of the Preserve had been grazed though much of the eastern third had been used for agriculture. The preserve was not surveyed during the original Natural Areas Inventory (White 1978).

The Preserve is situated near the edge of former glacial Lake Wauponsee that drained about 14,500 years ago during the Kankakee Torrent leaving sandy beaches and near shore sand deposits (Willman and Frye 1970). These sands were reworked by wind creating the present dune and swale topography. Characteristic sand savanna and sand prairie vegetation became established during the Hypsithermal period about 8,000 years ago (King 1981).

The soils of the low areas between the dunes are Granby fine sandy loams that are on out-wash plains, are poorly drained, and are relatively high in organic material, while the low dune soils are Oakville fine sands that developed from windblown sediments, are excessively well drained, and low in organic material (Hanson 2004). The climate is continental with warm summers and cold winters. Mean annual precipitation is 98.0 cm, with May having the highest rainfall (11.5 cm). Mean annual temperature is 9.9°C with the hottest month being July (average of 23.6°C), and the coldest being January (average of -5.7°C). Frost-free days range from 141 to 206, with the average being 174 days per year (Midwestern Regional Climate Center 2009; Kankakee, Illinois).

METHODS

Floristic Composition. The Preserve was visited six to ten times each year throughout the growing seasons of 2007 to 2009. During these visits voucher specimens were collected and deposited in the herbarium of the Illinois Natural History Survey, Champaign, Illinois (ILLS). The designation of exotic species follows Gleason and Cronquist (1991), Mohlenbrock (2002), and Taft et al. (1997). Nomenclature follows Mohlenbrock (2002).

Ground Layer Sampling. In mid-summer of 2009 transects were located randomly along cardinal compass directions within the wet-mesic sand prairie, the wet sand prairie, and the sedge meadow. Within each of these communities, one or two transects were located (n = 25 or 50 plots). Along each transect, $1m^2$ quadrats were located alternately along each transect. A random numbers table was used to determine the distance (0 to 9 m) a quadrat was located from the transect line. Species cover was determined using the Daubenmire (1959) cover class system as modified by Bailey and Poulton (1968). The modified Daubenmire cover scale is as follows: class 1 = 0 to 1%; class 2 = >1 to 5%; class 3 = >5 to 25%; class 4 = >25 to 50%; class 5 = >50 to 75%; class 6 = >75 to 95%; class 7 = >95 to 100%. Only ground layer species rooted within the quadrat frame were recorded. Mean cover was determined for each taxon using the mid-point values for each cover class, while Importance Value (I.V.) was calculated by summing relative cover and relative frequency.

Overstory Sampling. During summer of 2008, a north/south transect 150 m by 200 m was established in the best quality area of the savanna community and was surveyed by dividing this transect into 48 contiguous quadrates 25 m on a side (3 ha). All living and dead-standing woody individuals $\geq$ 10.0 cm dbh were identified and their diameters recorded. From these data, living-stem density (stems/ha), basal area (m^2/ha), relative density, relative dominance (basal area), importance value (I.V.), and average diameter (cm) were calculated for each species. Importance Values are calculated as the sum of the relative density and relative dominance (McIntosh 1957). Dead-standing density (stem/ha) and basal area (m^2/ha) were also calculated.

Woody understory composition and density (stems/ha) were determined using nested circular plots 0.0001, 0.001, and 0.01 ha in size with the centers located at 25 m intervals along randomly located north/south transects within the study area. Four additional 0.0001 ha circular plots were located 6 m from the center point of each plot center along cardinal compass directions. In the 0.0001 ha plots, woody seedlings (≤50 cm tall) were counted; in the 0.001 ha circular plots small saplings (>50 cm tall and <2.5 cm dbh) were recorded; and in the 0.01 ha circular plots large saplings (2.5-9.9 cm dbh) were tallied.

RESULTS

Floristic Composition. The preserve supports a total of 337 vascular plant taxa in 77 families (Appendix I). Fern, fern-allies, and gymnosperms were represented by 6 taxa in 5 families. Of the remaining taxa, 90 were monocots in 12 families, and 241 were dicots in 60 families. Non-native (exotic) species accounted for 37 taxa, about 11% of the species collected. Predominant plant families were Asteraceae with 49 species, Poaceae with 39 species, and Cyperaceae with 25 taxa. The only state endangered species found was *Hypericum adpressum* (creeping St. John's-wort), while two state threatened species were encountered: *Drosera intermedia* (narrow-leaved sundew) and *Platanthera flava* var. *herbiola* (tubercled orchid) (Illinois Endangered Species Protection Board 2005).

Dry-mesic sand savanna. The overstory of the dry-mesic sand savanna averaged 213.3 stems/ha with a basal area of 20.041 m^2/ha. *Quercus velutina* (black oak) dominated the canopy with 145 stems/ha, nearly 75% of the basal area, an I.V. of 153.3%, and an average diameter of 33.7 cm (Table 1). *Quercus alba* (white oak), the only other tree

species that entered the canopy, averaged 28.7 stems/ha, and an I.V. of 25.6. *Quercus velutina* had an unusual size class distribution, dominating the 10-20 and 50+ diameter classes, probably the result of past logging. The extent of multiple-stemmed individuals (12.6 coppice stems/ha) also indicated that the site had been logged in the past, while the large number of small diameter stems of *Sassafras albidum* (sassafras) indicates that that management fires have not been used within the past 7-10 years, or that the fires were of low intensity.

Numerous seedlings and small saplings were found in the understory; woody seedlings averaged 51,751 stems/ha, small saplings averaged 29,542 stems/ha (Table 2). Large saplings were not common, averaged only 133 stems/ha, indicating some low intensity management fires have been used recently to keep the understory open. The tree species *Sassafras albidum, Q. velutina, Q. alba, and Prunus serorina* (black cherry) dominated the woody seedlings and small sapling area. Many were multiple-stemmed sprouts from old root crown. The remaining understory species were mostly shrubs with *Rubus* spp. (blackberries and raspberries), *Rosa carolina* (pasture rose), and *Toxicodendron radicans* (poison ivy) the most important. The only exotic woody species encountered in the plots was *Elaeagnus umbellata* (autumn olive).

Wet Sand Prairie. The wet sand prairie surveyed was less than 0.25 ha and situated in the swale between two forested dunes (Table 3). The surrounding closed savanna allowed for full sunlight for less than half of the day. *Carex pellita* (woolly sedge) dominated with an I.V. of 37.8. Other common grass-like species included *Eleocharis palustris* (marsh spikerush), *Spartina pectinata* (cord grass), and *Carex scoparia* (sedge), that ranked third, forth, and fifth in I.V., respectively. Two fern species, *Onoclea sensibilis* (sensitive

fern) and *Thelypteris palustris* (marsh fern), were included in the six most important taxa found. Of the 37 species encountered in the west sand prairie plots native wet prairie or sedge meadow species except for the exotic *Poa pratensis* (Kentucky blue grass) found in only one plot.

Sedge meadow. Near the southeastern edge of the Preserve are a few small sedge meadows, each about 0.5 ha in size (Table 4). The sedge meadow surveyed was dominated by *Carex haydenii* (Hayden's sedge), and probably some *C. stricta* (tussock sedge), with an I.V. of 50.2 and a mean cover of 29.46 %. The few flowering stems found were all identified to *C. haydenii*, though both species were probably present. These species are difficult to separate based on vegetative material, and both formed low hummocks on which many of the other species grow. Sterile material of *Persicaria amphilium* and *P. coccinea* (smartweeds) together accounted for and I.V. of 36.6, and a mean cover of 18.94, while *Calamagrostis canadensis* (bluejoint grass) was the only other species present with an I.V. greater than 9.0 (Table 4). Of the 39 species encountered in the plots all were native wet prairie or sedge meadow species.

Wet-mesic Sand prairie: The wet-mesic sand prairie examined was more than 1.5 ha, and was located adjacent to the sedge meadow studied. This prairie had high diversity with 97 species occurring in the plots of which only 20 species had I.V.'s greater than 4.0. The important grass-like plants were *Scleria triglomerata* (nut rush) which ranked second with an I.V. of 10.5, *Sorghastrum nutans* (Indian grass) which ranked fifth in I.V. (9.0), while *Agrostis gigantea* (red top) ranked sixth (I.V. of 7.8). Important forbs included *Potentilla simplex* (common cinquefoil) which was first (I.V. of 21.0), the state threatened *Platanther flava* var. *herbiola* was third (I.V. of 9.8), and *Solidago canadensis*

(Canada goldenrod) was forth (I.V. of 9.7). Nearly all of the species encountered in the plots were native wet prairie species, only six being exotics, the most important being *Achillea millefolium* (I.V. of 4.8) and *Poa pratensis* (I.V. of 2.8)

DISCUSSION

The dry-mesic savannas studied in the Kankakee sand deposits are similar in woody species composition and structure. These include the Iroquois County Conservation Area (McDowell et al 1983, Phillippe et al. 2009c), the Hooper Branch Nature Preserve (Johnson and Ebinger 1992, 1995, Phillippe et al. 2009b), the Pembrook Township savannas (Phillippe et al 2009a), and the Braidwood Dunes and Savanna Nature Preserve (Phillippe 2008)] . At all sites *Quercus velutina* was the dominant species and accounted for about 70% or more of the I.V., while *Q. alba* was second, with *Prunus serotina* and *Sassafras albidum* sometimes present in low numbers and small diameters.

These sand savannas are different today compared to the early 1800s, mostly due to a reduced fire frequency followed by the total absence of fire in recent decades (Taft 1997). Originally natural fires and those set by early aborigines decreased the extent of woody invasion, while early settlers used fire to maintain open pasture (Ebinger and McClain 1995, McClain and Elzinga 1994). With the decrease in grazing in Illinois by the early 1940s and the increase in home sites and agriculture, the number and intensity of woodland fires dramatically decreased. In those savannas the trees had an open-grown appearance with low branches and branch-scars. Presently, a few large, open-grown trees remain in the study plots.

Presently, occasional fires and the droughty conditions have allowed for the perpetuation of oak species. Black and white oaks are reproducing on the site with numerous seedlings and saplings in the understory. Fire has been the management tool of choice in maintaining these sand savanna communities. Johnson and Ebinger (1992, 1995) found that annual burns decrease woody seedling and shrub density, and increased the number of top-killed individuals. They also found that less frequent burning accounted for a higher density of woody understory species, and a higher frequency of some herbaceous species.

Of the herbaceous communities surveyed, all are relatively rare and little data is available concerning species composition and structure. In particular, wet and wet-mesic sand prairies are very uncommon in Illinois. The only published information available for wet sand prairies is a brief description by White and Madany (1978): a community where surface water is present for as much as one-third of the year, particularly in winter and spring; and that wet sand prairie is floristically similar to "black soil" wet prairie with relatively few species present. They list the dominant species as *Calamagrostis canadensis*, *Carex* spp., *Spartina pectinata*, and *Thelypteris palustris*. The wet prairie studied had the same species as dominants except *Calamagrostis canadensis* was missing from the plots.

Wet-mesic sand prairie is also an uncommon community in Illinois, very little information having been published. For this community White and Madany (1978) listed *Andropogon gerardii* (big bluestem), *Calamagrostis canadensis*, *Carex* sp., *Sorghastrum nutans,* and *Spartina pectinata* as the dominant species. Of these species, only *Carex* spp. and *Sorghastrum nutans* were present as dominants in the wet-mesic sand prairie

studied, the remaining species uncommon or not encountered in the plots. Many of these species, however, as well as others reported by White and Madany (1978) did occur in other parts of the sand prairie studied. The high diversity encountered appears to be typical of wet-mesic sand prairies. Presently, the study site is being invaded by *Elaeagnus umbellata*. This species, and other invading woody species, should be removed by cutting and herbicide treatment.

Sedge meadows are also rare, but more common than wet and wet-mesic sand prairies. We have occasionally encountered and studied sedge meadows at Braidwood Dunes and Savanna Nature Preserve in the Kankakee sand deposits (Chapter1), the Richards Wildlife Foundation in the Green River lowlands sand deposits of Lee County (Handle et al. 2003), and Matanzas Nature Preserve in the Illinois River sand deposits of Mason County (Feist et al. 2007). In all of these sedge meadows the species composition and vegetation structure was similar with the *Carex haydenii/stricta* complex dominating and forming hummocks on which many other species grow.

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LITERATURE CITED

Anderson, R.C. 1983. The eastern prairie-forest transition-an overview. pages 86-92. **in** R. Brewer, editor. Proceedings of the Eighth North American Prairie Conference. Western Michigan University, Kalamazoo, Michigan.

Anderson, R.C. 1991. Presettlement forest of Illinois. pages 9-19. **in** G.V. Burger, J.E.

Ebinger, and G.S. Wilhelm, editors. Proceedings of the oak woods management workshop. Eastern Illinois University, Charleston, Illinois.

Bailey, A.W., and C.E. Poulton. 1968. Plant communities and environmental relationships in a portion of the Tillamook burn, northwestern Oregon. Ecology 49:1-13.

Daubenmire, R. 1959. A canopy coverage method of vegetation analysis. Northwest Science 33:43-64.

Curtis, J.T. 1959. The vegetation of Wisconsin: An ordination of plant communities. University of Wisconsin Press, Madison. Wisconsin.

Ebinger, J. E. and W. E. McClain. 1991. Forest succession in the prairie peninsula of Illinois. Illinois Natural History Survey Bulletin 34:375-381.

Feist, M.A, M.J. Morris, M., L.R. Phillippe, J.E. Ebinger, and W.E. McClain. 2008. Sand prairie communities of Matanzas Nature Preserve, Mason County, Illinois. Castanea 73:177-187.

Gleason, H. A., and A. Cronquist. 1991. Manual of the vascular flora of northeastern United States and adjacent Canada. Second Edition. The New York Botanical Garden, Bronx, New York.

Handel, W.C., L.R. Phillippe, and J.E. Ebinger. 2003. Floristic assessment of sand prairies and sedge meadows, Lee County, Illinois. The Prairie Naturalist 35:33-46.

Hanson, K.D. 2004. Soil survey of Will County, Illinois. United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Illinois Agricultural Experiment Station, Champaign, Illinois. 537 pp.

Illinois Endangered Species Protection Board. 2005. Checklist of Endangered and Threatened Animals and Plants of Illinois. Endangered Species protection Board, Springfield, Illinois. 16 pp.

Johnson, K.C. and J.E. Ebinger. 1992. Effects of prescribed burns on the woody vegetation of a dry sand savanna, Hooper Branch Nature Preserve, Iroquois County, Illinois. Transactions of the Illinois State Academy of Science 85:105-111.

Johnson, K.C. and J.E. Ebinger. 1995. Effects of different fire regimes on the ground layer vegetation of a dry sand savanna, Hooper Branch Nature Preserve, Iroquois County, Illinois. Erigenia 14:37-40.

King, J.E. 1981. Late Quaternary vegetational history of Illinois. Ecological Monographs 51:43-62.

McClain, W. E. and S. L. Elzinga. 1994. The occurrence of prairie and forest fires in Illinois and other Midwestern states, 1679 to 1854. Erigenia 13:79-90.

McDowell, B., J. Newman, and J. Ebinger. 1983. Survey of the woody vegetation of the Kankakee Sand Area Section of Indiana and Illinois. Proceeding of the Indiana Academy of Science 93:187-193. 1983.

McFall, D. and J. Karnes. 1995. (editors). A directory of Illinois Nature Preserves. Volume 2. Northwestern, Central and Southern Illinois. Illinois Department of Natural Resources, Springfield, Illinois.

McIntosh, R.P. 1957. The York Woods. A case history of forest succession in southern Wisconsin. Ecology 38:29-37.

Midwestern Regional Climate Center. 2009. http:/mcc.sws.uiuc.edu

Mohlenbrock, R. H. 2002. Vascular flora of Illinois. Southern Illinois University Press, Carbondale and Edwardsville. Illinois.

Nuzzo, V.A. 1986. Extent and status of Midwest oak savanna: presettlemet and 1985. Natural Areas Journal 6:6-36.

Phillippe, L.R., D.T. Busemeyer, P.B. Marcum, M.A. Feist, and J.E. Ebinger. 2008. Prairie and savanna vegetation of Braidwoods Dunes and Savanna Nature Preserve, Will County, Illinois. Castanea 73:1-15.

Phillippe, L.R., M.A. Feist, D.T. Busemeyer, P.B. Marcum, C.J. Carroll-Cunningham, G.R. Spyreas, and J.E. Ebinger. 2009a. Vegetation of sand forest/savanna communities in northeastern Illinois. Southeastern Naturalist (in press).

Phillippe, L.R., M.A. Feist, R.L. Larimore, D.T. Busemeyer, P.B. Marcum, C.J. Carroll-Cunningham, J.L. Ellis, and J.E. Ebinger. 2009b. Vegetation of Hooper Branch Nature Preserve, Iroquois County, Illinois. (in press).

Phillippe, L.R., M.A. Feist, R.L. Larimore, D.T. Busemeyer, P.B. Marcum, C.J. Carroll-Cunningham, J.L. Ellis, and J.E. Ebinger. 2009c. Composition and structure of the ground layer vegetation at Iroquois County Conservation Area, northeastern Illinois. (in press)

Schwegman, J.E. 1973. Comprehensive plan for the Illinois nature preserves system. Part 2. The natural divisions of Illinois. Illinois Nature Preserves Commission, Rockford, Illinois.

Taft, J. B. 1997. Savanna and open woodland communities. Pages 24-54. **in** M. W. Schwartz (editor). Conservation in highly fragmented landscapes. Chapman and Hall, New York.

Taft, J.B., G.S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. Floristic quality assessment for vegetation in Illinois, a method for assessing vegetation integrity. Erigenia 15:1-95.

White, J. 1978. Illinois Natural Areas Inventory. Technical report. Volume I. Survey methods and results. Illinois Natural Areas Inventory, Urbana. Xix+426 pp.

White, J., and M.H. Madany. 1978. Classification of natural communities in Illinois. p. 310-405. In White, J. (ed.). Illinois natural areas inventory. Technical report. Illinois Natural Areas Inventory, Urbana, Illinois.

Willman, H.B. 1973. Geology along the Illinois waterway - a basis for environmental planning. Illinois State Geological Survey Circular 478. Urbana.

Willman, H.B. and J.C. Frye. 1970. Pleistocene stratigraphy of Illinois. Illinois State Geological Survey Bulletin 94:1-204.

Table 1. Density by diameter class (stems/ha), basal area (m^2/ha), relative density, relative dominance, importance value, and average diameter for the tree species recorded in a dry-mesic savanna at the Sand Ridge Savanna Nature Preserve, Will County, Illinois.

Species	Diameter Classes (cm)					Total #/ha	Basal Area m^2/ha	Rel. Den.	Rel. Dom.	I.V.	Av. Diam. (cm)
	10-19	20-29	30-39	40-49	50+						
Quercus velutina	57.3	11.3	10.7	26.7	39.3	145.3	17.065	68.1	85.2	153.3	33.7
Quercus alba	5.3	8.0	11.0	2.7	1.7	28.7	2.449	13.4	12.2	25.6	30.9
Prunus serotina	25.7	--	--	--	--	25.7	0.331	12.1	1.6	13.7	12.4
Sassafras albidum	13.3	0.3	--	--	--	13.6	0.196	6.4	1.0	7.4	13.2
Totals	101.6	19.6	21.7	29.4	41.0	213.3	20.041	100.0	100.0	200.0	

Table 2. Density (stems/ha) of woody seedlings, small saplings, and large saplings encountered in a dry-mesic savanna at Sand Ridge Savanna Nature Preserve, Will County, Illinois. (*exotic species)

Species	Seedlings	Small Saplings	Large Saplings
Sassafras albidum	14666.7	8166.7	12.5
Quercus velutina	9500.0	2958.3	70.8
Rubus allegheniensis	8333.3	13833.3	--
Rosa carolina	4083.2	--	--
Quercus alba	3666.7	2125.0	12.5
Toxicodendron radicans	3500.0	--	--
Prunus serotina	1416.7	1416.7	27.5
Celastrus scandens	1250.5	583.3	--
Ribes missouriense	833.3	--	--
**Elaeagnus umbellata*	750.0	--	--
Rubus flagellaris	666.7	--	--
Cornus racemosa	583.7	41.7	--
Gaylussacia baccata	416.7	--	--
Rubus occidentalis	416.7	--	--
Spiraea tomentosa	416.7	--	--
Others	1250.0	416.7	--
Totals	51750.9	29541.7	133.3

Table 3. Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (I.V.) of the ground layer species encountered in a swale in a dry-mesic savanna at Sand Ridge Savanna Nature Preserve, Will County, Illinois. (*exotic species)

Species	Freq. %	Mean Cover	Rel. Freq.	Rel. Cover	I. V.
Carex pellita	100	14.04	10.6	27.2	37.8
Onoclea sensibilis	76	11.76	8.1	22.7	30.8
Eleocharis palustris	76	4.88	8.1	9.4	17.5
Spartina pectinata	72	2.80	7.6	5.4	13.0
Carex scoparia	72	2.60	7.6	5.1	12.7
Thelypteris patustris	20	3.90	2.1	7.5	9.6
Bidens polylepis	68	0.44	7.2	0.9	8.1
Lycopus americanus	44	1.20	4.7	2.3	7.0
Ludwigia alternifolia	32	1.82	3.4	3.5	6.9
Acer saccharinum	60	0.22	6.4	0.4	6.8
Lycopus uniflorus	48	0.64	5.1	1.2	6.3
Iris shrevei	16	1.92	1.7	3.7	5.4
Lysimachia terrestris	24	1.52	2.5	2.9	5.4
Galium tinctorum	40	0.40	4.3	0.9	5.2
Spiraea tomentosa	16	0.96	1.7	1.9	3.6
Agrimonia parviflora	8	0.62	0.9	1.2	2.1
Vernonia missurica	8	0.62	0.9	1.2	2.1
Boehmeria cylindrica	16	0.08	1.7	0.2	1.9
Hypericum mutilum	12	0.16	1.3	0.3	1.6
Juncus anthelatus	12	0.16	1.3	0.3	1.6
Viola lanceolata	12	0.16	1.3	0.3	1.6
Agrostis hyemalis	12	0.06	1.3	0.1	1.4
Eleocharis wolfii	12	0.06	1.3	0.1	1.4
Epilobium coloratum	12	0.06	1.3	0.1	1.4
Tracaulon sagittatum	12	0.06	1.3	0.1	1.4
Toxicodendron radicans	8	0.14	0.9	0.3	1.2
Agrostis gigantea	8	0.04	0.9	0.1	1.0
Aster praealtus	8	0.04	0.9	0.1	1.0
Asclepias incarnata	4	0.12	0.4	0.2	0.6
Cornus obliqua	4	0.04	0.4	0.2	0.6
**Poa pratensis*	4	0.12	0.4	0.2	0.6
Cardamine parviflora	4	0.02	0.4	--	0.4
Cicuta maculata	4	0.02	0.4	--	0.4
Euthamia gymnospermoides	4	0.02	0.4	--	0.4
Leersia virginica	4	0.02	0.4	--	0.4
Solidago canadensis	4	0.02	0.4	--	0.4
Verbena hastata	4	0.02	0.4	--	0.4
Totals		51.84	100.0	100.0	200.0
Bare ground and litter		45.00			

Table 4. Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (I.V.) of the ground layer species encountered in a sedge meadow at Sand Ridge Savanna Nature Preserve, Will County, Illinois.

Species	Freq. %	Mean Cover	Rel. Freq.	Rel. Cover	I. V.
Carex haydenii/stricta	100	29.46	13.9	36.3	50.2
Persicaria amphibium/coccinea	96	18.94	13.4	23.2	36.6
Calamagrostis canadensis	96	14.73	13.4	18.1	31.5
Caltha palustris	32	3.21	4.9	3.9	8.8
Boehmeria cylindrica	38	2.71	5.3	3.3	8.6
Lycopus uniflorus	38	2.28	5.3	2.8	8.1
Iris shrevei	26	3.24	3.6	4.0	7.6
Galium triflorum	36	0.58	5.0	0.7	5.7
Lemna minor	32	0.36	4.9	0.4	5.3
Eleocharis palustris	24	0.32	3.4	0.4	3.8
Bidens polylepis	24	0.27	3.4	0.3	3.7
Aster puniceus	12	1.27	1.7	1.6	3.3
Scutellaria lateriflora	18	0.34	2.5	0.4	2.9
Proserpinaca palustris	18	0.09	2.5	0.1	2.6
Thelypteris palustris	10	0.97	1.4	1.2	2.6
Lathyrus palustris	16	0.28	2.2	0.3	2.5
Lysimachia terrestris	16	0.08	2.2	0.1	2.3
Leersia oryzoides	12	0.21	1.7	0.3	2.0
Carex sartwellii	8	0.38	1.0	0.5	1.5
Cephalanthus occidentalis	4	0.60	0.5	0.7	1.2
Epilobium coloratum	8	0.09	1.0	0.1	1.1
Carex buxbaumii	8	0.04	1.0	--	1.0
Solidago gigantea	4	0.31	0.5	0.4	0.9
Spiraea alba	4	0.31	0.5	0.4	0.9
Lycopus americanus	6	0.03	0.8	--	0.8
Campanula aparinoides	4	0.02	0.5	--	0.5
Ludwigia palustris	4	0.02	0.5	--	0.5
Eupatorium perfoliatum	2	0.06	0.3	0.1	0.4
Euthamia gymnospermoides	2	0.06	0.3	0.1	0.4
Oxypolis rigidior	2	0.06	0.3	0.1	0.4
Pilea pumila	2	0.06	0.3	0.1	0.4
Pycnanthemum virginianum	2	0.06	0.3	0.1	0.4
Cardamine bulbosa	2	0.01	0.3	--	0.3
Carex pellita	2	0.01	0.3	--	0.3
Mentha arvensis	2	0.01	0.3	--	0.3
Scirpus atrovirens	2	0.01	0.3	--	0.3
Verbena hastata	2	0.01	0.3	--	0.3
Totals		81.49	100.0	100.0	200.0
Bare ground and litter		22.00			

Table 5. Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (I.V.) of the ground layer species encountered in wet sand prairie at Sand Ridge Savanna Nature Preserve, Will County, Illinois. (*exotic species)

Species	Freq. %	Mean Cover	Rel. Freq.	Rel. Cover	I. V.
Potentilla simplex	94	25.20	4.0	17.0	21.0
Scleria trigomerata	84	10.15	3.6	6.9	10.5
Platanthera flava var. herbiola	78	9.54	3.4	6.4	9.8
Solidago canadensis	70	9.99	3.0	6.7	9.7
Sorghastrum nutans	70	8.85	3.0	6.0	9.0
Agrostis gigantea	94	5.69	4.0	3.8	7.8
Solidago missouriensis	72	6.30	3.1	4.2	7.3
Parthenium integrifolium	34	6.13	1.5	4.1	5.6
Comandra umbellata	90	2.08	3.9	1.4	5.3
Rudbeckia fulgidia	62	3.57	2.7	2.4	5.1
Lysimachia lanceolata	80	2.27	3.4	1.5	4.9
**Achillea millefoilium*	78	2.11	3.4	1.4	4.8
Dichanthelium clandestinum	32	4.69	1.4	3.2	4.6
Euphorbia corollata	66	2.30	2.8	1.6	4.4
Carex pensylvanica	46	3.24	2.0	2.2	4.2
Dichanthelium acuminatum	72	1.69	3.1	1.1	4.2
Euthamia gymnospermoides	48	3.15	2.1	2.1	4.2
Helianthus mollis	26	4.24	1.1	2.9	4.0
Krigia biflora	46	2.95	2.0	2.0	4.0
Viola sagittata	78	0.89	3.4	0.6	4.0
Equisetum arvense	60	0.50	2.6	0.3	2.9
Luzula bulbosa	62	0.31	2.7	0.2	2.9
Coreopsis tripteris	22	2.79	0.9	1.9	2.8
**Poa pratensis*	44	1.35	1.9	0.9	2.8
Carex conoidea	48	0.84	2.1	0.6	2.7
Liatris spicata	26	1.97	1.1	1.3	2.4
Agrimonia parviflora	20	1.97	0.9	1.3	2.2
Silphium integrifolium	22	2.00	0.9	1.3	2.2
Pedicularis canadensis	16	1.89	0.6	1.3	1.9
Tradescantia ohiensis	36	0.63	1.5	0.4	1.9
Cornus racemosa	18	1.40	0.8	0.9	1.7
Fragaria virginiana	26	0.96	1.1	0.6	1.7
Lactuca (yellow sap)	26	0.67	1.1	0.5	1.6
Rosa carolina	28	0.54	1.2	0.4	1.6
Rubus flagellaria	22	0.94	0.9	0.6	1.5
Sisyrinchium albidum	30	0.25	1.3	0.2	1.5
Cirsium discolor	18	0.87	0.8	0.6	1.4
Pteridium aquilinum	10	1.50	0.4	1.0	1.4
Lathyrus palustris	24	0.42	1.0	0.3	1.3
**Poa campressa*	22	0.65	0.9	0.4	1.3

Eleocharis verrucosa	24	0.27	1.0	0.2	1.2
Vernonia missourica	12	0.98	0.5	0.7	1.2
Erigeron strigosus	16	0.76	0.6	0.5	1.1
Juncus interior	24	0.12	1.0	0.1	1.1
Lespedeza capitata	20	0.30	0.9	0.2	1.1
Pycnanthemum virginianum	10	0.92	0.5	0.6	1.1
Carex scoparia	20	0.15	0.9	0.1	1.0
Quercus velutina	10	0.73	0.4	0.5	0.9
Smilacina racemosa	18	0.09	0.8	0.1	0.9
Prunella vulgaris	14	0.32	0.6	0.2	0.8
**Rumex acetosella*	16	0.37	0.6	0.2	0.8
Ambrosia artemisiifolia	16	0.08	0.6	0.1	0.7
Polygala sanguinea	14	0.07	0.6	0.1	0.7
Saxifraga pensylvanica	10	0.44	0.4	0.3	0.7
Solidago gigantea	12	0.35	0.5	0.2	0.7
Corylus americana	2	0.75	0.1	0.5	0.6
Dichanthelium oligosanthes	6	0.42	0.3	0.3	0.6
Eryngium yuccifolium	4	0.60	0.2	0.4	0.6
Rubus allegheniensis	8	0.43	0.3	0.3	0.6
Lilium michiganense	10	0.10	0.4	0.1	0.5
Panicum virgatum	6	0.37	0.3	0.2	0.5
**Phleum pratense*	10	0.10	0.4	0.1	0.5
Calystegia sepium	10	0.05	0.4	--	0.4
Castilleja coccinea	10	0.05	0.4	--	0.4
Equisteum laevigatum	10	0.05	0.4	--	0.4
Potentilla arguta	8	0.14	0.3	0.1	0.4
Spartina pectinata	6	0.13	0.3	0.1	0.4
Solanum carolinense	10	0.05	0.4	--	0.4
Solidago nemoralis	6	0.13	0.3	0.1	0.4
Carex haydenii	4	0.12	0.2	0.1	0.3
**Elaeagnus umbellata*	2	0.30	0.1	0.2	0.3
Gaura biennis	4	0.12	0.2	0.1	0.3
Heuchera richardsonii	4	0.07	0.2	0.1	0.3
Lycopus americanus	8	0.04	0.3	--	0.3
Phlox glaberrima	6	0.03	0.3	--	0.3
Veronicastrum virginianum	2	0.30	0.1	0.2	0.3
Aletris farinosa	2	0.06	0.1	0.1	0.2
Apocynum cannabinum	4	0.02	0.2	--	0.2
Asclepias hirtella	2	0.06	0.1	0.1	0.2
Hypericum mutilum	4	0.02	0.2	--	0.2
Juncus marginatus	4	0.02	0.2	--	0.2
Lobelia spicata	4	0.02	0.2	--	0.2
Onoclea sensibilis	2	0.06	0.1	0.1	0.2
Strpohostyles leiosperma	2	0.06	0.1	0.1	0.2
Verbena hastata	4	0.02	0.2	--	0.2
Vitis riparia	2	0.06	0.1	0.1	0.2

Acer negundo	2	0.01	0.1	--	0.1
Allium canadense	2	0.01	0.1	--	0.1
Asclepias syriaca	2	0.01	0.1	--	0.1
Cerastium fontanum	2	0.01	0.1	--	0.1
Galium trflorum	2	0.01	0.1	--	0.1
Gentiana saponaria	2	0.01	0.1	--	0.1
Juncus anthelatus	2	0.01	0.1	--	0.1
Lycopus uniflorus	2	0.01	0.1	--	0.1
Ophioglossum pusillum	2	0.01	0.1	--	0.1
Polygala polygama	2	0.01	0.1	--	0.1
Prunus serotina	2	0.01	0.1	--	0.1
Totals		148.29	100.0	100.0	200.0
Bare ground and litter		11.34			

APPENDIX I. Vascular plant species encountered at Sand Ridge Savanna Nature Preserve, Will County, Illinois are listed alphabetical by family under the major plant groups. Collecting numbers are preceded by the initial of the collector (P = Loy R. Phillippe). Specimens are deposited in the Illinois Natural History Survey Herbarium (ILLS), Champaign, Illinois. (*exotic species)

FERN AND FERN-ALLIES

Equisetaceae
Equisetum arvense L.: P41749, P41824
Equisetum hyemale L.: P40284, P41825

Onocleaceae
Onoclea sensibilis L.: P39713

Ophioglossaceae
Ophioglossum pusillum Raf.: P41821

Osmundaceae
Osmunda regalis L.: P39710

Thelypteridaceae
Thelypteris palustris Schott: P39966

MONOCOTS

Alismataceae
Alisma subcordatum Raf.: P39919
Sagittaria latifolia Willd.: P40276

Commelinaceae
**Commelina communis* L.: P40026
Tradescantia ohiensis Raf.: P39874

Cyperaceae
Bolboschoenus fluviatilis (Torr.) Sojak: P40249
Bulbostylis capillaris (L.) C.B. Clarke: P39890
Carex brachyglossa Mack.: P39733, P41828
Carex buxbaumii Wahlenb.: P41748
Carex conoidea Schk.: P41823
Carex cristatella Britt.: P39926
Carex foenea Willd.: P39440
Carex haydenii Dewey: P39442
Carex longii Mack.: P39734
Carex meadii Dewey: P39438
Carex pellita Willd.: P39723

Carex pensylvanica Lam.: P39420
Carex sartwellii Dewey: P41812
Carex scoparia Schk.: P39725, P41812, P41822
Carex swanii (Fern.) Mack.: P39738
Carex vulpinoidea Michx.: P41830
Cyperus lupulinus (Spreng.) Marcks var. *macilentus* (Fern.) Marcks: P39980
Cyperus strigosus L.: P39884, P40012
Eleocharis ovata (Roth) Roem. & Schultes: P40275
Eleocharis palustris (L.) Roem. & Schultes: P39724
Eleocharis verrucosa (Svenson) Harms: P39888
Eleocharis wolfii Gray: P39877
Scirpus atrovirens Willd.: P39741
Scirpus cyperinus (L.) Kunth: P39882
Scleria triglomerata Michx.: P40037

Iridaceae
Iris shrevei Small: P39709
Sisyrinchium albidum Raf.: P41827

Juncaceae
Juncus acuminatus Michx.: P39744
Juncus anthelatus (Wieg.) R. E. Brooks: P41808
Juncus brachycarpus Engelm.: P39878, P40283
Juncus dudleyi Wieg.: P39743
Juncus greenei Oakes & Tuckerm.: P39869
Juncus marginatus Rostk.: P39740
Juncus torreyi Coville: P39923
Luzula bulbosa (A.W. Wood) Smyth: P39434

Lemnaceae
Lemna minor L.: P41817

Liliaceae
Aletris farinosa L.: P39705
Allium canadense L.: P41757
Lilium michiganense Farw.: P39746
Polygonatum commutatum (Schult.) A. Dietr.: P40240
Smilacina racemosa (L.) Desf.: P41750

Orchidaceae
Liparis liliifolia (L.) Rich.: P39728
Platanthera flava (L.) Lindl. var. *herbiola* (R.Br.) Luer: P39748
Spiranthes magnicamporum Sheviak: P40229

Poaceae
Agrostis gigantea Roth: P39721

Agrostis hyemalis (Walt.) BSP.: P39732
Agrostis perennans (Walt.) Tuckerm.: P39977
Andropogon gerardii Vitman: P39995
Aristida purpurascens Poir.: P39963
**Bromus inermis* Leyss.: P39899
**Bromus tectorum* L.: P41760
Calamagrostis canadensis (Michx.) P. Beauv.: P39750
Dichanthelium acuminatum (Sw.) Gould and Clark: P39984, P39983
Dichanthelium clandestinum (L.) Gould: P39720
Dichanthelium lindheimeri (Nash) Gould: P39735
Dichanthelium oligosanthes (Schult.) Gould: P39996
Digitaria sanguinalis (L.) Scop.: P40023
**Echinochloa crus-galli* (L.) P. Beauv.: P39924, P40034
Elymus riparius Wieg.: P40239, P40271
Eragrostis spectabilis (Pursh) Steud.: P39991
**Festuca arundinacea* Schreb.: P41735
Glyceria striata (Lam.) Hitchc.: P39726
Leersia oryzoides (L.) Swartz: P40230
Leptoloma cognatum (Schult.) Chase: P39990
Muhlenbergia mexicana (L.) Trin.: P40014, P40272
Muhlenbergia schreberi J.F. Gmel.: P40264
Panicum capillare L.: P40013
Panicum rigidulum Bosc: P39908
Panicum virgatum L.: P39905
Paspalum bushii Nash: P40002
Paspalum laeve Michx.: P40010
**Phalaris arundinacea* L.: P41753
**Phleum pratense* L.: P41751
**Phragmites australis* (Cav.) Trin.: P40035
**Poa compressa* L.: P41734, P41811
**Poa pratensis* L.: P41732
Schizachyrium scoparium (Michx.) Nash: P40287
**Setaria faberi* R.A.W. Herrm.: P40027
Sorghastrum nutans (L.) Nash: P39994
Spartina pectinata Link.: P39881
Sphenopholis intermedia (Rydb.) Rydb.: P39727
Tridens flavus (L.) Hitchc.: P40331
Vulpia octoflora (Walt.) Rydb.: P39928

Smilacaceae
Smilax tamnoides L.: P40267

Typhaceae
Typha angustifolia L.: P40248

Xyridaceae

Xyris torta Sm.: P39887

DICOTS

Aceraceae
Acer saccharinum L.: P39417

Anacardiaceae
Rhus glabra L.: P40285
Toxicodendron radicans (L.) Kuntze: P40259

Apiaceae
Cicuata maculata L.: P39722
**Daucus carota* L.: P39895
Eryngium yuccifolium Michx.: P39880
Osmorhiza longistylis (Torr.) DC.: P41745
Oxyplois rigidior (L.) Raf.: P40036
Sanicula canadensis L.: P40022
Thaspium trifoliatum (L.) Gray: P41756

Apocynaceae
Apocynum androsaemifolium L.: P39752

Aquifoliaceae
Ilex verticillata (L.) Gray: P39912

Asclepiadaceae
Asclepias hirtella (Pennell) Woodson: P39901
Asclepias incarnatum L.: P41831
Asclepias syriaca L.: P41829

Asteraceae
**Achillea millefolium* L.: P39898
Ageratina altissima (L.) R.M. King & H. Robins.: P40236
Ambrosia artemisiifolia L.: P39985
Ambrosia trifida L.: P40253
Antennaria neglecta Greene: P39864
Antennaria plantaginifolia (L.) Hook.: P39424
Aster ericoides L.: P40282
Aster fragilis Willd.: P40232 (not in Mohlenbrock 2002)
Aster novae-angliae L.: P40280
Aster pilosus Willd.: P40279
Aster puniceus L.: P40273
Bidens cernua L.: P40277
Bidens frondosa L.: P40238
Bidens polylepis Blake: P40225

Cirsium muticum Michx.: P40224
Conyza canadensis (L.) Cronq.: P39992
Coreopsis tripteris L.: P39998
Erechtites hieracifolia (L.) Raf.: P40030
Erigeron strigosus Muhl.: P39704
Eupatorium altissimum L.: P40286
Eupatorium perfoliatum L.: P39970
Eupatorium serotinum Michx.: P40025, P40237
Euthamia gymnospermoides Greene: P40218
Helenium autumnale L.: P40336
Helianthus mollis Lam.: P40008
Hieracium canadense Michx.: P39982
Hieracium gronovii L.: P39978
Ionactis linariifolius (L.) Greene: P40330
Krigia biflora (Walt.) Blake: P41755
Krigia virginica (L.) Willd.: P39453
Lactuca canadensis L.: P40019
Lactuca floridana (L.) Gaertn.: P40024
Liatris aspera Michx.: P39988
Liatris spicata (L.) Willd.: P40001
Oligoneuron riddellii (Frank) Rydb.: P40278
Parthenium integrifolium L.: P39883
Prenanthes aspera Michx.: P39981
Pseudognaphalium obtusifolium (L.) Hilliard & Burtt.: P40219
Rudbeckia fulgida Ait.: P40228
Rudbeckia subtomentosa Pursh: P40270
Silphium integrifolium Michx.: P40033
Solidago altissima L.: P40220
Solidago gigantea Ait.: P39967
Solidago missouriensis Nutt.: P39863
Solidago nemoralis Ait.: P39989
Solidago speciosa Nutt.: P40288
**Taraxacum officinale* Weber: P39439
Tragopogon dubius Scop.: P41737
Vernonia missourica Raf.: P39964

Betulaceae
Betula nigra L.: P39909

Bignoniaceae
Catalpa speciosa Warder: P41758

Boraginaceae
Hackelia virginiana (L.) I.M. Johnston: P40016
Lithospermum croceum Fern.: P39454

Brassicaceae
**Alliaria petiolata* (Bierb.) Cavara & Grande: P39436
**Barbarea vulgaris* R. Br.: P39441
Cardamine bulbosa (Muhl.) BSP.: P39416
Cardamine parviflora L.: P39421
Lepidum virginicum L.: P41738

Cactaceae
Opuntia humifusa (Raf.) Raf.: P40000

Caesalpiniaceae
Chamaecrista fasciculata (Michx.) Greene: P39871

Campanulaceae
Campanula aparinoides Pursh: P39747
Lobelia cardinalis L.: P40032
Lobelia siphilitica L.: P39968
Lobelia spicata Lam. var. *spicata*: P40223
Triodanthus perfoliata (L.) Nieuwl.: P41809

Caprifoliaceae
**Lonicera morrowii* Gray: P39451
Sambucus canadensis L.: P39731

Caryophyllaceae
**Cerastium fontanum* Baum: P41826
**Holosteum umbellatum* L.: P39411
Moehringia lateriflora (L.) Fenzl.: P39431
Paronychia canadensis (L.) Wood: P41818
Paronychia fastigiata (Raf.) Fern.: P39745
**Saponaria officinalis* L.: P40029
Silene antirrhina L.:P41740
**Silene pratensis* (Spreng.) Godron & Gren.: P39961
Silene stellata (L.) Ait. f.: P39907

Celastraceae
Celastrus scandens L.: P40269

Chenopodiaceae
**Chenopodium album* L.: P40018
Chenopodium standleyanum Aellen: P40017

Cistaceae
Helianthemum bicknellii Fern.: P39997
Lechea mucronata Raf.: P40005
Lechea tenuifolia Michx.: P40006

Cornaceae
Cornus obliqua Raf.: P39718, P40281

Corylaceae
Corylus americana Walt.: P40265

Cuscutaceae
Cuscuta campestris Yuncker: P40251

Droseraceae
Drosera intermedia Hayne: P39892, P40011

Elaeagnaceae
**Elaeagnus umbellata* Thunb.: P39452

Ericaceae
Gaylussacia baccata (Wang.) K. Koch: P39861
Vaccinium angustifolium Ait.: P39426

Euphorbiaceae
Acalypha gracilens Gray: P39979
Acalypha rhomboidea Raf.: P39973, P40015
Croton glandulosus L.: P40003
Euphorbia corollata L.: P39873

Fabaceae
Apios americana Medic.: P40290
Baptisia alba (L.) Vent.: P39701
Crotalaria sagittalis L.: P39870
Desmodium sessilifolium (Torr.) Torr. & Gray: P39866
Lathyrus palustris L.: P39751
Lespedeza capitata Michx.: P39993
**Lespedeza cuneata* (Dum.-Cours.) G. Don: P40221
Lupinus perennis L.: P39448
**Medicago lupulina* L.: P41733
**Melilotus albus* Medic.: P39894
Strophostyles leiosperma (Torr. & Gray) Piper: P40009

Fagaceae
Quercus alba L.: P39435
Quercus velutina Lam.: P41744

Gentianaceae
Bartonia virginica (L.) BSP.: P39737
Gentiana saponaria L.: P40289

Grossulariaceae
Ribes missouriense Nutt.: P40258

Haloragidaceae
Proserpinaca palustris L.: P40233

Hypericaceae
Hypericum adpressum Barton: P39876, P39906
Hypericum gentianoides (L.) BSP.: P39889
Hypericum majus (Gray) Britt.: P39875, P39891
Hyperiucm mutilum L.: P39972

Lamiaceae
Hedeoma hispida Pursh: P39962
**Leonurus cardiaca* L.: P40021
Lycopus americanus Muhl.: P39927
Lycopus uniflorus Michx.: P39971, P40274
**Mentha arvensis* L.: P39922
Monarda fistulosa L.: P39893
Physostegia virginiana (L.) Benth.: P40031
Prunella vulgaris L. var. *elongata* Benth.: P39897
Pycnanthemum virginianum (L.) Dur. & B.D. Jacks.: P39879
Scutellaria lateriflora L.: P39974
Stachys hispida Pursh: P39714
Teucrium canadense L.: P39885

Lauraceae
Sassafras albidum (Nutt.) Nees: P39419

Lythraceae
Lythrum alatum Pursh: P39739
Rotala ramosior (L.) Koehne: P39911

Malvaceae
Hibiscus moscheutos L.: P40231

Melastomaceae
Rhexia virginica L.: P39868

Moraceae
**Maclura pomifera* (Raf.) Schneider: P41819
**Morus alba* L.: P40262

Onagraceae
Circaea lutetiana Aschers & Magnus: P39717

Epilobium coloratum Spreng.: P40260
Ludwigia alternifolia L.: P39921
Ludwigia palustris (L.) Ell.: P39918
Ludwigia polycarpa Short & Peter: P39920, P40234
Oenothera biennis L.: P39986
Oenothera clelandii W. Dietr., Raven, & W.L. Wagner: P40007
Oenothera pilosella Raf.: P39925

Oxalidaceae
Oxalis stricta L.: P41739
Oxalis violacea L.: P39433

Phytolaccaceae
Phytolacca americana L.: P40268

Polemoniaceae
Phlox bifida Beck.: P39437
Phlox glaberrima L.: P39749
Polemonium reptans L.: P39446

Polygalaceae
Polygala cruciata L.: P39886
Polygala polygama Walt.: P39703, P39960
Polygala sanguinea L.: P39702

Polygonaceae
**Fallopia convolvulus* (L.) A. Love: P40020
Fallopia scandens (L.) Holub: P40261
Persicaria hydropiperoides (Michx.) Small: P40235
Persicaria opelousana (Riddell) Small: P39910
Persicaria pensylvanica (L.) Small: P40250
Persicaria punctata (Ell.) Small: P39987
Polygonum tenue Michx.: P40004
**Rumex acetosella* L.: P39449
**Rumex crispa* L.: P41736
Tracaulon sagittatum (L.) Small: P40247

Portulacaceae
Claytonia virginica L.: P39422

Primulaceae
Lysimachia lanceolata Walt.: P39707
Lysimachia quadriflora Sims.: P39917
Lysimachia terrestris (L.) BSP.: P39711

Ranunculaceae

Anemone quinquefolia L.: P39447
Anemone virginiana L.: P39900
Caltha palustris L.: P39443
Ranunculus abortivus L.: P39432

Rhamnaceae
**Frangula alnus* Mill.: P39719

Rosaceae
Agrimonia parviflora Sol.: P39965
Aronia melanocarpa (Michx.) Ell.: P39425, P39872
Aronia prunifolia (Marsh.) Rehd.: P39913
Fragaria virginiana Duchesne: P39430
Geum canadense Jacq.: P41742
Geum laciniatum Murr.: P39729
Malus ioensis (Wood) Britt.: P39415
Potentilla arguta Pursh: P41820
Potentilla simplex Michx.: P41747
Prunus serotina Ehrh.: P41746
Prunus virginiana L.: P39418
**Rosa multiflora* Thunb.: P39730
Rosa palustris Marsh.: P39716
Rubus alleghiensis Porter: P39867
Rubus hispidus L.: P39708
Rubus occidentalis L.: P41743
Rubus pensilvanicus Poir.: P39742
Spiraea alba DuRoi: P39903
Spiraea tomentosa L.: P39865

Rubiaceae
Cephalanthus occidentalis L.: P39712
Galium tinctorium L.: P39736, P41813
Galium trifidum L.: P39975
Galium triflorum Michx.: P41810

Salicaceae
Populus deltoids Marsh.: P41741
Populus tremuloides Michx.: P39904
Salix discolor Muhl.: P39412
Salix humilis Marsh.: P39427
Salix nigra Marsh.: P41759

Saxifragaceae
Heuchera richardsonii R. Br.: P41754
Penthorum sedoides L.: P39915
Saxifraga pensylvanica L.: P41752

Scrophulariaceae
Agalinis tenuifolia (Vahl) Raf.: P40222
Castilleja coccinea (L.) Spreng.: P40217
Gratiola neglecta Torr.: P39715
Mimulus ringens L.: P39916
Nuttallanthus canadensis (L.) D. Sutton: P39450
Pedicularis canadensis L.: P39445
Pedicularis lanceolata Michx.: P40227
Penstemon digitalis Nutt.: P39706
Scrophularia lanceolata Pursh: P40028
**Verbascum thapsus* L.: P39896
Veronicastrum virginicum (L.) Farw.: P39914

Simaroubaceae
**Ailanthus altissima* (Mill.) Swingle: P40266

Solanaceae
Solanum carolinense L.: P40252
**Solanum dulcamara* L.: P40255

Ulmaceae
Ulmus rubra Muhl.: P40257

Urticaceae
Boehmeria cylindrica (L.) Sw.: P39976
Parietaria pensylvanica Muhl.: P39862
Pilea pumila (L.) Gray: P40254

Verbenaceae
Verbena hastata L.: P39969
Verbena stricta Vent.: P39999

Violaceae
Viola lanceolata L.: P39429
Viola pedata L.: P39423
Viola pratincola Greene: P39444
Viola sagittata Ait.: P39428

Vitaceae
Parthenocissus quinquefolia (L.) Planch.: P40256
Vitis riparia Michx.: P40263, P41816

CHAPTER 5. -- **Vegetation of Wilmington Shrub Prairie Nature Preserve, Will County, Illinois.**

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ABSTRACT -- Wilmington Shrub Prairie Nature Preserve is located in the southwestern corner of Will County about 4 km east of Braidwood and located in the Kankakee Sand Area Section of the Grand Prairie Natural Division. The Preserve, dedicated in 1989, contains remnants of dry-mesic to mesic prairie, dry-mesic to mesic sand prairie, sedge meadows, marshes, and sand savannas. Extensive areas of the preserve have been degraded by past grazing, peat fires, and other disturbances before the land was purchased by the Illinois Department of Natural Resources. It is also probable that some section of the preserve have been farmed. Some areas of the preserve still contain native vegetation of high natural quality including two small dry-mesic to mesic black soil prairies that were surveyed during this study. On both prairies *Helianthus mollis* (downy sunflower), *Parthenium integrifolium* (America feverfew), and *Schizachjyrium scoparium* (little bluestem) were the top three species in importance values (IV). Other common forbs encountered were *Eryngiuim yuccifolium* (rattlesnake master), *Euthamia gymnospermoides* (viscid grass-leaved goldenrod), *Coreopsis tripteris* (tall tickseed), *Solidago missouriensis* (Missouri goldenrod), and *Potentilla simplex* (common cinquefoil). Other common grasses encountered were *Sorghastrum nutans* (Indian Grass) and *Andropogon gerardii* (big bluestem) while many member of the Cyperaceae (sedge family) were encountered. Overall, less than 25 species on each prairie had an I.V. greater than 2.5, though 61species were recorded for the 50 plots surveyed in one prairie, and 102 were recorded for the second. Only eight exotic species were recorded in the plots, *Poa pratensis* (Kentucky blue grass) and *Achillea millefolium* (yarrow) being the most common. Of the 307 vascular plant taxa found on the Preserve 25 exotic taxa were encountered.

Key Words: Kankakee sand deposits, Illinois, dry-mesic to mesic prairie.

INTRODUCTION

Sand deposits are relatively common in the northern half of Illinois and account for nearly 5% of the land surface of the state. These deposits, the result of erosion events associated with Wisconsin glaciation, took place about 14,500 years ago (King 1981; Schwegman 1973; Willman and Frye 1970). The sand deposits remained after glacial lakes were drained as glacial moraines and ice dams were breached resulting in the Kankakee Torrent (Willman 1973). This torrent also carried large amounts of sand and gravel down the Kankakee and Illinois River valleys into the Illinois River Section of the Illinois River and the Mississippi River Sand Area Natural Division south of present day Hennepin, Illinois (Schwegman 1973). The Kankakee sand deposits in northeastern Illinois are the most extensive in the state, extending from Newton County, Indiana west through large parts of Iroquois, Kankakee, Will, and Grundy counties, Illinois.

Since the early studies of Illinois sand deposits by Hart and Gleason (1907), Gleason (1910), and Vestal (1913) only occasional articles, mostly concerned with one particular nature preserve or community type, have been published. The only exception was a detailed study of the sand deposits of the Mississippi River valley in northwestern Illinois (Ebinger et al. 2006). Dry habitats are characteristic of sand deposits, and the commonly associated species are those adapted to xeric conditions (White and Madany 1978). Plant communities of sand deposits, however, are extremely diverse and include marshes, sedge meadows, and wet to mesic sand prairies. In Will County, these wetland communities are found on the extensive outwash plains and old lake beds of Wisconsian glaciation. In these wet to mesic communities the soil has a high organic content resulting

in a dark A horizon, while some of the dominant grass species (Poaceae) are replaced by sedges and rushes (Cyperaceae).

These communities are common in some of the nature preserves in Will County where sand areas are interspersed with "black soil" prairies in some preserves and dunes commonly associated with sand deposits are uncommon. One of these preserves, Wilmington Shrub Prairie Nature Preserve, contains wetland communities on both fine sand and sandy loam soils. The present study was undertaken to determine vascular plant species composition, vegetation structure, and floristic quality of the major natural plant communities of this Preserve.

DESCRIPTION OF THE STUDY AREA

The 72 ha Wilmington Shrub Prairie Nature Preserve is located in the southwestern corner of Will County about 4 km east of Braidwood, and 20 km south of Joliet (SW1/4 S2 NW1/4 S11 T32N R10E; 41.27934°N, -88.166576°W). Presently owned by the Illinois Department of Natural Resources, the Preserve is located in the Kankakee Sand Area Section of the Grand Prairie Natural Division (Schwegman 1973). Dedicated in 1989, this Preserve contains remnants of dry-mesic to mesic prairie, dry-mesic to mesic sand prairie, sedge meadows, marshes, and sand savannas (McFall and Karnes 1995). Extensive areas of the preserve have been degraded by past grazing and other disturbances before the land was purchased by the Illinois Department of Natural Resources. It is likely that extensive peat fires occurred in bog and sedge meadow communities in the mid 1900s, long before the Preserve was purchased by the Illinois Department of Natural Resources. It is also probable that some section of the preserve

have been farmed in the distant past. Some areas of the preserve still contain native vegetation of high natural quality, including sedge meadows and dry-mesic to mesic prairie.

The Preserve is situated near the edge of former glacial Lake Wauponsee that drained about 14,500 years ago during the Kankakee Torrent leaving sandy beaches and near shore sand deposits (Willman and Frye 1970). Characteristic sand savanna and sand prairie vegetation became established during the Hypsithermal period about 8,000 years ago (King 1981).

The soils of the Preserve are mostly fine sandy loam (Gilford and Grundy) that are poorly drained, and relatively high in organic material. Some Watseka and Ade loamy fine sand are also present on slightly higher ground. These fine sands developed from windblown sediments, are well drained, and relatively low in organic material (Hanson 2004). The climate is continental with warm summers and cold winters. Mean annual precipitation is 98.0 cm, with May having the highest rainfall (11.5 cm). Mean annual temperature is 9.9°C with the hottest month being July (average of 23.6°C), and the coldest being January (average of -5.7°C). Frost-free days range from 141 to 206, with the average being 174 days per year (Midwestern Regional Climate Center 2009; Kankakee, Illinois).

METHODS

Floristic Composition. The Preserve was visited six to ten times each year throughout the growing seasons of 2007 to 2009. During these visits voucher specimens were collected and deposited in the herbarium of the Illinois Natural History Survey,

Champaign, Illinois (ILLS). The designation of exotic species follows Gleason and Cronquist (1991), Mohlenbrock (2002), and Taft et al. (1997). Nomenclature follows Mohlenbrock (2002).

Ground Layer Sampling. In mid-summer of 2009 transects were located randomly along cardinal compass directions within each community. Within each of these communities, two transects were located (n = 50 plots). Along each transect, $1m^2$ quadrats were located alternately along each transect. A random numbers table was used to determine the distance (0 to 9 m) a quadrat was located from the transect line. Species cover was determined using the Daubenmire (1959) cover class system as modified by Bailey and Poulton (1968). The modified Daubenmire cover scale is as follows: class 1 = 0 to 1%; class 2 = >1 to 5%; class 3 = >5 to 25%; class 4 = >25 to 50%; class 5 = >50 to 75%; class 6 = >75 to 95%; class 7 = >95 to 100%. Only ground layer species rooted within the quadrat frame were recorded. Mean cover was determined for each taxon using the mid-point values for each cover class, while Importance Value (I.V.) was calculated by summing relative cover and relative frequency.

RESULTS

Floristic Composition. The preserve supports a total of 307 vascular plant taxa in 77 families (Appendix I). Fern, fern-allies, and gymnosperms were represented by 10 taxa in 6 families. Of the remaining taxa, 85 were monocots in 11 families, and 212 were dicots in 60 families. Non-native (exotic) species accounted for 25 taxa, about 8% of the species collected. Predominant plant families were Asteraceae with 53 species, Poaceae with 36 species, and Cyperaceae with 23 taxa. The only state endangered species found

was *Platanthera clavellata* (wood orchid). No state threatened species were encountered (Illinois Endangered Species Protection Board 2005).

Dry-mesic to mesic prairie. Two small dry to dry mesic "black soil" prairies were surveyed, one at the northwest corner of the Preserve (41.27989°N, -88.16562°W), the other near the southwest corner of the Preserve (41.27446°N, -88.16428°W). Both are on fine sandy loam soils high in organic material. On both prairies the dominant grass was *Shizachyrium scoparium* (little bluestem) with *Sorghastrum nutans* (Indian grass) ranging from fifth to eight in I.V. on these prairies while *Andropogon gerardii* (big bluestem) was present but not common (Tables 1 and 2). *Schizachyrium scoparium* was distributed throughout the prairie as indicated by its high frequency, the other two species being less common.

On both prairies *Helianthus mollis* (downy sunflower) and *Parthenium integrifolium* (America feverfew) were among the top three species in I.V. Other common forbs encountered were *Eryngiuim yuccifolium* (rattlesnake master), *Euthamia gymnospermoides* (viscid grass-leaved goldenrod), *Coreopsis tripteris* (tall tickseed), *Solidago missouriensis* (Missouri goldenrod), and *Potentilla simplex* (common cinquefoil). Overall, less than 25 species on each prairie had an I.V. greater than 2.5 (possible 200), though 61 species were recorded for the 50 plots surveyed in one prairie (Table 1), and 102 were recorded for the second (Table 2). Only six exotic species were recorded in the plots, *Poa pratensis* (Kentucky blue grass) and Achillea millefolium (yarrow) being the most common.

DISCUSSION

Dry to dry-mesic "black soil" prairies are relatively common in northern Illinois (White and Madany 1978). The dry-mesic community, as described by White and Madany (1978), is dominated by *Schizachyrium scoparium* along with similar to smaller amounts of *Sorghastrum nutans* and *Heterostipa spartea* (Porcupine grass), a species not observed in our plots. In contrast, White and Madany (1978) mentions that mesic prairies are dominated by *Andropogon gerardii* and *Sorghastrum nutans*. All three grasses were found on both of the dry to dry mesic prairies examined. *Schizachyrium scoparium* was the most important grass encountered (I.V. of 13.4 to 20.8) and was well distributed throughout the prairies, occurring in most plots (94-100% frequency). *Sorghastrum nutans*, in contrast, had a lower frequency (82 to 88 %) and importance (I.V. of 6.9 to 12.0), while *Andropogon gerardi* was uncommon (16-36% frequency) (Tables 1 and 2). These three grass species were well distributed throughout the prairies, not being clumped and restricted to certain areas, an indication that the community was drier than typical mesic prairie. The forbs encountered ion both prairies were typical of those associated with mesic prairies, and the number of species encountered in the plots was typical of mesic sites. The few exotic species present and high species diversity indicates that the prairie is of high quality. Management should consist of occasional burns and the removal of trees and forest shrubs by cutting and the use of herbicides.

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LITERATURE CITED

Bailey, A.W., and C.E. Poulton. 1968. Plant communities and environmental relationships in a portion of the Tillamook burn, northwestern Oregon. Ecology 49:1-13.

Daubenmire, R. 1959. A canopy coverage method of vegetation analysis. Northwest Science 33:43-64.

Ebinger, J.E., L.R. Phillippe, R.W. Nyboer, W.E. McClain, D.T Busemeyer, K.R. Robertson, and G.A. Levin. 2006. Vegetation and flora of the sand deposits of the Mississippi River valley in northwestern Illinois. Illinois Natural History Survey Bulletin 37: 191-238.

Gleason, H.A. 1910. The vegetation of the inland sand deposits of Illinois. Bulletin of the Illinois State Laboratory of Natural History 9:21-174.

Gleason, H.A., and A. Cronquist. 1991. Manual of the vascular flora of northeastern United States and adjacent Canada. Second Edition. The New York Botanical Garden, Bronx, New York.

Hanson, K.D. 2004. Soil survey of Will County, Illinois. United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the Illinois Agricultural Experiment Station, Champaign, Illinois. 537 pp.

Hart, C.A. and H.A. Gleason 1907. On the biology of the sand areas of Illinois. Bulletin of the Illinois State Laboratory of Natural History 7:137-272.

Illinois Endangered Species Protection Board. 2005. Checklist of Endangered and Threatened Animals and Plants of Illinois. Endangered Species protection Board, Springfield, Illinois. 16 pp.

King, J.E. 1981. Late Quaternary vegetational history of Illinois. Ecological Monographs 51:43-62.

McFall, D. and J. Karnes. 1995. (editors). A directory of Illinois Nature Preserves. Volume 2. Northwestern, Central and Southern Illinois. Illinois Department of Natural Resources, Springfield, Illinois.

Midwestern Regional Climate Center. 2009. http:/mcc.sws.uiuc.edu

Mohlenbrock, R. H. 2002. Vascular flora of Illinois. Southern Illinois University Press, Carbondale and Edwardsville. Illinois.

Schwegman, J.E. 1973. Comprehensive plan for the Illinois nature preserves system. Part 2. The natural divisions of Illinois. Illinois Nature Preserves Commission, Rockford, Illinois.

Taft, J.B., G.S. Wilhelm, D.M. Ladd, and L.A. Masters. 1997. Floristic quality assessment for vegetation in Illinois, a method for assessing vegetation integrity. Erigenia 15:1-95.

Vestal, A.G. 1913. An association study of Illinois sand prairies. Bulletin of the Illinois State Laboratory of Natural History 10:1-96.

White, J., and M.H. Madany. 1978. Classification of natural communities in Illinois. p. 310-405. In White, J. (ed.). Illinois natural areas inventory. Technical report. Illinois Natural Areas Inventory, Urbana, Illinois.

Willman, H.B. 1973. Geology along the Illinois waterway - a basis for environmental planning. Illinois State Geological Survey Circular 478. Urbana.

Willman, H.B. and J.C. Frye. 1970. Pleistocene stratigraphy of Illinois. Illinois State

Geological Survey Bulletin 94:1-204.

Table 1. Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (I.V.) of the ground layer species encountered in a dry-mesic prairie at Wilmington Shrub Prairie Nature Preserve, Will County, Illinois.

Species	Freq. %	Mean Cover	Rel. Freq.	Rel. Cover	I. V.
Parthenium integrifolium	100	19.71	5.3	15.6	20.9
Schizachyrium scoparium	100	19.50	5.3	15.5	20.8
Helianthus mollis	98	13.02	5.2	10.3	15.5
Cornus racemosa	88	9.36	4.6	7.4	12.0
Sorghastrum nutans	82	9.66	4.3	7.7	12.0
Eryngium yuccifolium	92	7.65	4.9	6.1	11.0
Euthamia gymnospermoides	92	6.11	4.9	4.8	9.7
Coreopsis tripteris	90	5.96	4.7	4.7	9.4
**Poa pratensis*	100	3.67	5.3	2.9	8.2
Viola sagittata	100	2.73	5.3	2.2	7.5
Carex umbellata	88	2.57	4.6	2.1	6.7
Rubus flagellaris	60	4.43	3.2	3.5	6.7
Phlox glaberrima	92	2.00	4.9	1.6	6.5
**Achillea millefolium*	94	1.57	5.0	1.3	6.3
Andropogon gerardii	36	2.76	1.9	2.2	4.1
Solidago nemoralis	38	1.76	2.0	1.4	3.4
Euphorbia corollata	42	0.71	2.2	0.6	2.8
Potentilla simplex	36	1.12	1.9	0.9	2.8
Lespedeza capitata	36	1.07	1.9	0.8	2.7
Scleria triglomerata	30	1.28	1.6	1.0	2.6
**Rumex acetosella*	28	1.26	1.5	1.0	2.5
Solidago canadensis	20	1.80	1.1	1.4	2.5
Dichanthelium acuminatum	40	0.35	2.1	0.3	2.4
Liatris spicata	36	0.63	1.9	0.5	2.4
Rosa carolina	28	0.93	1.5	0.7	2.2
Lathyrus palustris	30	0.20	1.6	0.2	1.8
Agrimonia parviflora	26	0.18	1.4	0.1	1.5
Juncus interior	20	0.20	1.1	0.2	1.3
Solidago speciosa	10	0.97	0.5	0.8	1.3
Juncus greenei	20	0.15	1.1	0.1	1.2
Lysimachia lanceolata	16	0.33	0.8	0.3	1.1
Rudbeckia hirta	10	0.20	0.5	0.2	0.7
Panicum virgatum	8	0.19	0.4	0.2	0.6
Solidago gigantea	8	0.24	0.4	0.2	0.6
Solidago missouriensis	6	0.42	0.3	0.3	0.6
Vernonia missurica	4	0.36	0.2	0.3	0.5
Agrostis gigantea	8	0.18	0.4	0.1	0.5
Bartonia virginica	8	0.04	0.4	--	0.4
Polygala polygama	8	0.04	0.4	--	0.4
Prunus serotina	8	0.04	0.4	--	0.4

Aster dumosus	4	0.12	0.2	0.1	0.3
Aster novae-angliae	4	0.12	0.2	0.1	0.3
**Bromus inermis*	4	0.12	0.2	0.1	0.3
**Lotus corniculatus*	4	0.12	0.2	0.1	0.3
Muhlenbergia mexicana	4	0.12	0.2	0.1	0.3
Polygala sanguinea	6	0.03	0.3	--	0.3
Penstemon digitalis	4	0.02	0.2	--	0.2
Salix humilis	4	0.02	0.2	--	0.2
Acer saccharinum	2	0.01	0.1	--	0.1
Asclepias hirtella	2	0.06	0.1	--	0.1
Aster ericoides	2	0.01	0.1	--	0.1
Aster pilosus	2	0.01	0.1	--	0.1
Botrychium dissectum	2	0.01	0.1	--	0.1
Coreopsis palmata	2	0.01	0.1	--	0.1
**Elaeagnus umbellata*	2	0.06	0.1	--	0.1
Fraxinus lanceolata	2	0.01	0.1	--	0.1
**Poa compressa*	2	0.01	0.1	--	0.1
Prenanthes aspera	2	0.01	0.1	--	0.1
Pycnanthemum virginianum	2	0.01	0.1	--	0.1
**Frangula alnus*	2	0.01	0.1	--	0.1
Vitis riparia	2	0.01	0.1	--	0.1
Totals		126.25	100.0	100.0	200.0
Bare ground and litter		19.65			

Table 2. Frequency (%), mean cover (% of total area), relative frequency, relative cover, and importance value (I.V.) of the ground layer species encountered in a dry-mesic prairie at Wilmington Shrub Prairie Nature Preserve, Will County, Illinois.

Species	Freq. %	Mean Cover	Rel. Freq.	Rel. Cover	I. V.
Helianthus mollis	100	21.93	3.4	14.2	17.6
Parthenium integrifolium	100	19.71	3.4	12.7	16.1
Schizachyrium scoparium	94	15.78	3.2	10.2	13.4
Solidago missouriensis	100	14.22	3.4	9.2	12.6
Rubus flagellaris	62	13.02	2.1	8.4	10.5
Euthamia gymnospermoides	98	9.84	3.4	6.4	9.8
Potentilla simplex	100	8.80	3.4	5.7	9.1
Sorghastrum nutans	88	6.04	3.0	3.9	6.9
**Poa pratensis*	82	3.31	2.8	2.1	4.9
Aletris farinosa	56	4.13	1.9	2.7	4.6
Phlox glaberrima	100	1.45	3.4	0.9	4.3
Scleria triglomerata	94	1.67	3.2	1.1	4.3
Coreopsis tripteris	88	1.64	3.0	1.1	4.1
Euphorbia corollata	86	1.1`3	3.0	0.7	3.7
Antennaria plantaginifolia	58	2.54	2.0	1.6	3.6
Spiraea tomentosa	48	3.12	1.6	2.0	3.6
Viola sagittata	88	0.54	3.0	0.4	3.4
**Achillea millefolium*	72	1.26	2.5	0.8	3.3
Juncus greenei	86	0.43	3.0	0.3	3.3
Hieracium scabrum	74	0.92	2.5	0.6	3.1
Liatris pycnostachya	82	0.46	2.8	0.3	3.1
**Rumex acetosella*	74	0.97	2.5	0.6	3.1
Comandra umbellata	70	0.60	2.4	0.4	2.8
Krigia biflora	60	0.75	2.1	0.5	2.6
Lespedeza capitata	52	1.01	1.8	0.7	2.5
Thelypteris palustris	14	3.00	0.5	1.9	2.4
Gentiana saponaria	58	0.44	2.0	0.3	2.3
Solidago nemoralis	46	1.07	1.6	0.7	2.3
Cornus racemosa	32	1.72	1.1	1.1	2.2
Dichanthelium acuminatum	54	0.32	1.9	0.2	2.1
Panicum virgatum	40	0.75	1.4	0.5	1.9
Aronia melanocarpa	18	1.90	0.6	1.2	1.8
Linum medium	46	0.23	1.6	0.2	1.8
Tradescantia ohiensis	44	0.22	1.5	0.2	1.7
Rudbeckia hirta	38	0.49	1.3	0.3	1.6
Agrimonia parviflora	30	0.40	1.0	0.3	1.3
Antennaria neglecta	32	0.16	1.1	0.1	1.2
Lespedeza virginica	32	0.16	1.1	0.1	1.2
Lysimachia lanceolata	28	0.29	1.0	0.2	1.2
Solidago speciosa	22	0.65	0.8	0.4	1.2

Acer saccharinum	22	0.11	0.8	0.1	0.9
Carex bicknellii	22	0.21	0.8	0.1	0.9
Carex scoparia	24	0.17	0.8	0.1	0.9
Agrostis hyemalis	20	0.10	0.7	0.1	0.8
Osmunda regalis	6	0.90	0.2	0.6	0.8
Andropogon gerardii	16	0.13	0.5	0.1	0.6
Helianthus grosseserratus	6	0.66	0.2	0.4	0.6
Polygala cruciata	16	0.08	0.5	0.1	0.6
Solidago canadensis	6	0.66	0.2	0.4	0.6
Carex swanii	12	0.16	0.4	0.1	0.5
Eleocharis verrucosa	12	0.16	0.4	0.1	0.5
Polygala sanguinea	14	0.07	0.5	--	0.5
Prunella vulgaris	12	0.11	0.4	0.1	0.5
**Frangula alnus*	6	0.37	0.2	0.2	0.4
Juncus interior	12	0.06	0.4	--	0.4
Quercus velutina	8	0.09	0.3	0.1	0.4
Spiraea alba	8	0.09	0.3	0.1	0.4
Asclepias hirtella	6	0.08	0.2	0.1	0.3
Aster praealtus	4	0.36	0.1	0.2	0.3
Bartonia virginica	8	0.04	0.3	--	0.3
Carex cephalophora	6	0.13	0.2	0.1	0.3
Erechtites hieracifolia	8	0.04	0.3	--	0.3
Galium obtusum	6	0.08	0.2	0.1	0.3
Platanthera clavellata	10	0.05	0.3	--	0.3
Onoclea sensibilis	4	0.31	0.1	0.2	0.3
Rubus allegheniensis	2	0.30	0.1	0.2	0.3
Spartina pectinata	6	0.18	0.2	0.1	0.3
Zizia aurea	6	0.13	0.2	0.1	0.3
Carex longii	6	0.03	0.2	--	0.2
Fallopia scandens	6	0.03	0.2	--	0.2
Vernonia missourica	4	0.12	0.1	0.1	0.2
Acalypha rhomboidea	4	0.07	0.1	--	0.1
Ageratina altissima	4	0.2	0.1	--	0.1
Ambrosia artemisiifolia	4	0.02	0.1	--	0.1
Antenoron virginianum	2	0.01	0.1	--	0.1
Calamagrostis canadensis	4	0.02	0.1	--	0.1
Cirsium discolor	2	0.01	0.1	--	0.1
Cyperus esculentus	2	0.01	0.1	--	0.1
**Elaeagnus umbellata*	4	0.02	0.1	--	0.1
Epilobium coloratum	4	0.02	0.1	--	0.1
Equisetum arvense	4	0.02	0.1	--	0.1
Erigeron strigosus	2	0.01	0.1	--	0.1
Euthamia graminifolia	4	0.07	0.1	--	0.1
Geum laciniatum	2	0.01	0.1	--	0.1
Juncus brachycarpus	2	0.01	0.1	--	0.1
Juncus marginatus	2	0.01	0.1	--	0.1

Juniperus virginiana	2	0.01	0.1	--	0.1
Lactuca canadensis	2	0.01	0.1	--	0.1
Liparis loeselii	2	0.01	0.1	--	0.1
Ludwigia alternifolia	4	0.02	0.1	--	0.1
Lycopus uniflorus	2	0.01	0.1	--	0.1
Malus ioensis	2	0.01	0.1	--	0.1
Muhlenbergia mexicana	2	0.01	0.1	--	0.1
Oxypolis rigidior	2	0.01	0.1	--	0.1
Pilea pumila	2	0.01	0.1	--	0.1
**Poa compressa*	2	0.01	0.1	--	0.1
Prenanthes racemosa	4	0.02	0.1	--	0.1
Prunus serotina	2	0.01	0.1	--	0.1
Sphenopholis intermedia	4	0.02	0.1	--	0.1
Thalictrum dasycarpum	4	0.07	0.1	--	0.1
Ulmus americana	2	0.01	0.1	--	0.1
Totals		154.98	100.0	100.0	200.0
Bare ground and litter		17.58			

APPENDIX 1. Vascular plant species encountered at Wilmington Shrub Prairie Nature Preserve, Will County, Illinois, are listed alphabetically by family under major plant groups. Collecting numbers are preceded by a P were collected by Loy R. Phillippe. All specimens are deposited in the Illinois Natural History Survey Herbarium, Champaign, Illinois (ILLS). (*exotic species)

FERN AND FERN-ALLIES

Aspleniaceae
Asplenium platyneuron (L.) Oakes: P41187

Equisetaceae
Equisetum arvense L.: P41205
Equisetum fluviatile L.: P40104
Equisetum hyemale L.: P40315

Onocleaceae
Onoclea sensibilis L.: P39779

Ophioglossaceae
Botrychium virginianum (L.) Sw.: P41766
Ophioglossum vulgatum L.: P39778

Osmundaceae
Osmunda cinnamomea L.: P40045
Osmunda regalis L.: P39759

Thelypteridaceae
Thelypteris palustris Schott: P40319

MONOCOTS

Alismataceae
Alisma subcordatum Raf.: P40108
Sagittaria cuneata Sheld.: P400105

Amaryllidaceae
Hypoxis hirsuta (L.) Coville: P39457

Araceae
Arisaema dracontium (L.) Schott: P40326

Commelinaceae
Tradescantia ohiensis Raf.: P39780

Cyperaceae

Carex bicknellii Britt.: P41837
Carex brachyglossa Mack.: P41796
Carex buxbaumii Wahlenb.: P40911
Carex cephalophora Muhl.: P41783
Carex conoidea Schk.: P39462
Carex cristatella Britt.: P40320
Carex longii Mack.: P40210
Carex pellita Willd.: P39768
Carex sartwellii Dewey: P41793
Carex scoparia Schk.: P39769
Carex swanii (Fern.) Mack.: P39819
Carex umbellata Schk.: P39461
Carex vulpinoidea Michx.: P41794
Cyperus erythrorhizos Muhl.: P40110
Cyperus esculentus L.: P40109
Eleocharis ovata (Roth) Roem. & Schultes var. *obtuse* (Willd.) Kukenth: P41801
Eleocharis palustris (L.) Roem. & Schultes: P39767
Eleocharis verrucosa (Svenson) Harms: P41836
Eleocharis wolfii Gray: P41799
Scirpus atrovirens Willd.: P40086
Scirpus cyperinus (L.) Kunth: P39770
Scirpus pendulus Muhl.: P39815
Scleria triglomerata Michx.: P39812

Iridaceae
Iris shrevei Small: P39766
Sisyrinchium albidum Raf.: P39468

Juncaceae
Juncus acuminatus Michx.: P39784
Juncus anthelatus (Wieg.) R.E. Brooks: P41774
Juncus brachycarpus Engelm.: P41782
Juncus dudleyi Wieg.: P39822
Juncus effusus L.: P39756
Juncus greenei Oakes & Tuckerm.: P40124
Juncus interior Wieg.: P41842
Juncus marginatus Rostk.: P40815
Juncus tenuis Willd.: P39776
Juncus torreyi Coville: P40306

Liliaceae
Aletris farinosa L.: P40298
**Asparagus officinalis* L.: P40313
Lilium michiganense Farw.: P40816
Smilacina racemosa (L.) Desf.: P40097

Orchidaceae
Goodyera pubescens (Willd.) R. Br.: P40812
Liparis loeselii (L.) Rich.: P40112
Platanthera clavellata (Michx.) Luer: P40814
Platanthera lacera (Michx.) G. Don: P41807

Poaceae
Agrostis gigantea Roth: P39762
Agrostis hyemalis (Walt.) BSP.: P39793
Agrostis perennans (Walt.) Tuckerm.: P40100
Andropogon gerardii Vitman: P40073
Andropogon virginicus L.: P40329
Aristida purpurascens Poir.: P40297
**Bromus inermis* Leyss.: P41791
Calamagrostis canadensis (Michx.) P. Beauv.: P39755
Cinna arundinacea L.: P40102
Dichanthelium acuminatum (Sw.) Gould & Clark var. *implicatum* (Scribn.) Gould & Clark: P39820
Dichanthelium clandestinum (L.) Gould: P39777
**Echinochloa crus-galli* (L.) P. Beauv.: P40106
Elymus canadensis L.: P40066
Elymus virginicus L.: P40111
**Elytrigia repens* (L.) Desv.: P41800
Eragrostis frankii C.A. Meyer: P40128
Festuca subverticillata (Pers.) E.B. Alexeev.: P41765
Glyceria striata (Lam.) Hitchc.: P39794
Heterostipa spartea (Trin.) Barkworth: P39807
Koeleria macrantha (Ledeb.) Spreng.: P39811
Leersia oryzoides (L.) Swartz: P41191
Leersia virginica Willd.: P40325
Muhlenbergia mexicana (L.) Trin.: P40042
Panicum capillare L.: P40136
Panicum rigidulum Bosc.: P41193
Panicum virgatum L.: P40077
**Phalaris arundinacea* L.: P41792
**Phragmites australis* (Cav.) Trin.: P40322
**Poa compressa* L.: P41838
**Poa pratensis* L.: P39475
Schizachyrium scoparium (Michx.) Nash: P40119
**Setaria faberi* R.A.W. Herrm.: P40135
Sorghastrum nutans (L.) Nash: P40120
Spartina pectinata Link: P41208
Sphenopholis intermedia (Rydb.) Rydb.: P39801
Vulpia octoflora (Walt.) Rydb.: P41785

Typhaceae

Typha latifolia L.: P39771

DICOTS

Acanthaceae
Ruellia humilis Nutt.: P39816

Aceraceae
Acer saccharinum L.: P39482

Anacardiaceae
Rhus glabra L.: P40138
Toxicodendron radicans (L.) Kuntze: P41203

Apiaceae
Cicuata maculata L.: P39763
Cryptotaenia canadensis (L.) DC.: P40061
Eryngium yuccifolium Michx.: P41188
Oxypolis rigidior (L.) Raf.: P40053
Sanicula canadensis L.: P41763
Sanicula odorata (Raf.) Pryer & Phillippe: P41786
Sium suave Walt.: P40113
Zizia aurea (L.) Koch: P41840

Apocynaceae
Apocynum cannabinum L.: P41805

Asclepiadaceae
Asclepias hirtella (Pennell) Woodson: P40122
Asclepias incarnata L.: P39764
Asclepias sullivantii Engelm.: P40317

Asteraceae
**Achillea millefolium* L.: P39824
Ambrosia artemisiifolia L.: P40099
Antennaria neglecta Greene: P41835
Antennaria plantaginifolia (L.) Hook.: P39473
Arnoglossum plantagineum Raf.: P39805
Aster dumosus L.: P40115, P40211
Aster ericoides L.: P40310
Aster novae-angliae L.: P40304
Aster ontarionis Wieg.: P40303
Aster pilosus Willd.: P40295
Aster praealtus Poir.: P40081
Aster puniceus L.: P40307
Bidens comosa (Gray) Wieg.: P40318

Cirsium discolor (Muhl.) Spreng.: P40046
**Cirsium vulgare* (Savi) Tenore: P40137
Coreopsis tripteris L.: P40065
Erechtites hieracifolia (L.) Raf.: P40085
Erigeron annuus (L.) Pers.: P41773
Erigeron strigosus Muhl.: P41844
Eupatoriadelphus maculatus (L.) R.M. King & H. Rob.: P40084
Eupatorium altissimum L.: P40311
Eupatorium perfoliatum L.: P40038
Eupatorium serotinum Michx.: P40131
Euthamia graminifolia (L.) Nutt.: P40090
Euthamia gymnospermoides Greene: P40213
Helianthus grosseserratus Maretns: P40076
Helianthus mollis Lam.: P40093
Heliopsis helianthoides (L.) Sweet: P40139
Hieracium scabrum Michx.: P40096
Krigia biflora (Walt.) Blake: P41779
Lactuca biennis (Moench) Fern.: P40067
Lactuca canadensis L.: P40121
Liatris pycnostachya Michx.: P41834
Liatris spicata (L.) Willd.: P40071, P40082
Oligoneuron riddellii (Frank) Rydb.: P40308
Parthenium integrifolium L.: 39810
Prenanthes racemosa Michx.: P40302
Pseudognaphalium obtusifolium (L.) Hilliard & Burtt.: P40292
Ratibida pinnata (Vent.) Barnh.: P39818
Rudbeckia hirta L.: P39806
Rudbeckia laciniata L.: P40047
Rudbeckia subtomentosa Pursh: P40055
Rudbeckia sullivantii Boynt. & Beadle: P40129
Silphium integrifolium Michx.: P40064
Silphium laciniatum L.: P40314
Silphium terebinthinaceum Jacq.: P40059
Solidago altissima L.: P40216
Solidago gigantea Ait.: P40057
Solidago missouriensis Nutt.: P40117
Solidago nemoralis Ait.: P40214
Solidago speciosa Nutt.: P40215
Vernonia fasciculata Michx.: P40114
Vernonia missurica Raf.: P40054

Balsaminaceae
Impatiens capensis Meerb.: P40083

Boraginaceae
Lithospermum canescens (Michx.) Lehm.: P39467

Brassicaceae
**Alliaria petiolata* (Bierb.) Cavara & Grande: P39456
Arabis shortii (Fern.) Gl.: P39455
Cardamine bulbosa (Muhl.) BSP.: P39477

Caesalpiniaceae
Chamaecrista fasciculata (Michx.) Greene: P40293
Gleditsia triacanthos L.: P41788

Campanulaceae
Campanula aparinoides Pursh: P39796
Campanulastrum americanum (L.) Small: P40051
Lobelia cardinalis L.: P40092
Lobelia siphilitica L.: P40324
Lobelia spicata Lam.: P40134

Caprifoliaceae
**Lonicera x bella* Zabel: P39799
Sambucus canadensis L.: P39782
Viburnum lentago L.: P39775
Viburnum prunifolium L.: P39478

Caryophyllaceae
**Stellaria media* (L.) Cyrillo: P39480

Chenopodiaceae
**Chenopodium album* L.: P41197

Convolvulaceae
Calystegia sepium (L.) R. Br.: P41798

Cornaceae
Cornus obliqua Raf.: P39758
Cornus racemosa Lam.: P40050

Corylaceae
Corylus americana Walt.: P40101

Cuscutaceae
Cuscuta coryli Engelm.: P40068:

Elaeagnaceae
**Elaeagnus umbellata* Thunb.: P39465

Ericaceae

Vaccinium angustifolium Ait.: P39472

Euphorbiaceae
Acalypha rhomboidea Raf.: P40098
Euphorbia corollata L.: P39813

Fabaceae
Amorpha canescens Pursh: P39808
Dalea purpurea Vent.: P39814
Desmodium canadense (L.) DC.: P40123
Lathyrus palustris L.: P39765, P40079
Lespedeza capitata Michx.: P40116
Lespedeza virginica ((L.) Britt.: P41832
**Lotus corniculatus* L.: P39821
Strophostyles helvula (L.) Ell.: P41195

Fagaceae
Quercus velutina Lam.: P40328

Gentianaceae
Bartonia virginica (L.) BSP.: P40209
Gentiana saponaria L.: P40296

Haloragidaceae
Proserpinaca palustris L.: P39788

Hypericaceae
Hypericum majus (Gray) Britt.: P41189
Hypericum sphaerocarpum Michx.: P39774
Triadenum fraseri (Spach) Gl.: P40088

Lamiaceae
Lycopus americanus Muhl.: P40062
Lycopus uniflorus Michx.: P40103
Monarda fistulosa L.: P41207
Physostegia virginiana (L.) Benth.: P40078
Prunella vulgaris L. var. *elongata* Benth.: P40305
Pycnanthemum virginianum (L.) Dur. & B.D. Jacks.: P40074
Scutellaria lateriflora L.: P40041
Stachys pilosa Nutt.: P39773
Teucrium canadense L.:P41804

Lauraceae
Sassafras albidum (Nutt.) Nees: P39464

Linaceae

Linum medium (Planch.) Britt.: P40813

Lythraceae
Lythrum alatum Pursh: P39792

Menispermaceae
Menispermum canadense L.: P40303.1

Mimosaceae
Desmanthus illinoensis (Michx.) MacM.: P40132

Moraceae
**Morus alba* L.: P41803

Nyssaceae
Nyssa sylvatica Marsh.: P39761

Oleaceae
Fraxinus lanceolata Borkh.: P41802

Onagraceae
Circaea lutetiana L.: P39800
Epilobium coloratum Biehler: P40044
Ludwigia alternifolia L.: P40089
Ludwigia palustris (L.) Ell.: P39790
Ludwigia polycarpa Short & Peter: P39789
Oenothera pilosella Raf.: P39772

Oxalidaceae
Oxalis violacea L.: P39459

Phrymaceae
Phryma leptostachya L.: P40056

Phytolaccaceae
Phytolacca americana L.: P41764

Plantaginaceae
Plantago rugelii Decne: P40309

Polemoniaceae
Phlox glaberrima L.: P39757
Polemonium reptans L.: P39476

Polygalaceae
Polygala cruciata L.: P41199

Polygala sanguinea L.: P40118

Polygonaceae
Antenoron virginianum (L.) Roberty & Vautier: P40060
Fallopia scandens (L.) Holub: P40069
Persicaria hydropiperoides (Michx.) Small: P41202
Persicaria pensylvanica (L.) Small: P40141
Persicaria punctata (Ell.) Small: P40058
**Rumex acetosella* L.: P39823

Portulacaceae
Claytonia virginica L.: P39458

Primulaceae
Lysimachia lanceolata Walt.: P40212
Lysimachia quadriflora Sims.: P39817
Lysimachia terrestris (L.) BSP.: P39760

Ranunculaceae
Caltha palustris L.: P39483
Ranunculus abortivus L.: P39479
Thalictrum dasycarpum Fisch. & Lall.: P39802

Rhamnaceae
**Frangula alnus* Mill.: P39798
**Rhamnus cathartica* L.: P41806

Rosaceae
Agrimonia parviflora Sol.: P40063
Aronia melanocarpa (Michx.) Ell.: P39463
Fragaria virginiana Duchesne: P39470
Geum canadense Jacq.: P39795
Geum laciniatum Murr.: P39804
Malus ioensis (Wood) Britt.: P39481
**Malus pumila* Mill.: P39466
**Potentilla norvegica* L.: P41787
Potentilla simplex Michx.: P41198
Prunus serotina Ehrh.: P40142
Rosa palustris Marsh.: P39754
Rubus allegheniensis Porter: P41843
Rubus flagellaris Willd.: P41841
Rubus hispidus L.: P41780
Rubus occidentalis L.: P41767
Spiraea alba DuRoi: P39781
Spiraea tomentosa L.: P40094

Rubiaceae
Cephalanthus occidentalis L.: P39785
Galium obtusum Bigel.: P41204
Galium triflorum Michx.: P40301

Salicaceae
Populus deltoids Marsh.: P41790
Populus tremuloides Michx.: P41797
Salix discolor Muhl.: P41769
Salix nigra Marsh.: P41789

Santalaceae
Comandra umbellata (L.) Nutt.: P41196

Saxifragaceae
Penthorum sedoides L.: P40125

Scrophulariaceae
Agalinis purpurea (L.) Pennell: P40291
Agalinis tenuifolia (Vahl) Raf.: P40127
Castilleja coccinea (L.) Spreng.: P41778
Chelone glabra L.: P41200
Leucospora multifida (Michx.) Nutt.: P40126
Lindernia dubia (L.) Pennell: P39786
Mimulus alatus Sol.: P40040
Pedicularis canadensis L.: P39809
Pedicularis lanceolata Michx.: P40070
Penstemon digitalis Nutt.: P40133
Scrophularia lanceolata Pursh: P41194
Veronicastrum virginicum (L.) Farw.: P39803

Solanaceae
**Solanum dulcamara* L.: P39783
**Solanum dulcamara* L. f. *albiflorum* House: P39797
Solanum ptychanthum Duanl: P40095

Ulmaceae
Ulmus americana L.: P40327

Urticaceae
Boehmeria cylindrica (L.) Sw.: P40039
Parietaria pensylvanica Muhl.: P41762
Pilea fontana (Lunell) Rydb.: P40321
Pilea pumila (L.) Gray: P40300
Urtica gracilis Ait.: P41209

Verbenaceae
Phyla lanceolata (Michx.) Greene: P40107
Verbena hastata L.: P39791
Verbena urticifolia L.: P40048

Violaceae
Viola lanceolata L.: P39471
Viola pratincola Greene: P39469
Viola sagittata Ait.: P39460, P39474

Vitaceae
Parthenocissus quinquefolia (L.) Planch.: P40043
Vitis riparia Michx.: P40087