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Vascular Flora of Bonnie's Prairie Nature Preserve, Iroquois County, Illinois

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ABSTRACT

Bonnie's Prairie Nature Preserve, located in Iroquois County, Illinois, occurs in the Kankakee Sand Area Section of the Grand Prairie Division. Dominant plant communities within this 4.3 ha preserve include dry sand prairie, temporary sand pond and wet-mesic sand prairie. During the growing seasons of 2005 and 2006, dominant community types within the preserve were sampled and a vouchered inventory of the preserve was conducted. A total of 248 taxa were found within the preserve: 5 ferns and fern allies, 77 monocots, and 166 dicots. Plant families most highly represented included the grass family (Poaceae) with 38 taxa, sunflower family (Asteraceae) with 25 taxa, sedge family (Cyperaceae) with 18 taxa, and rose family (Rosaceae) with 17 taxa. Thirty taxa (12.1% of the flora) were adventive to the site and the Floristic Quality Index (FQI) (with adventives) was 51.1. Dominant species in the dry sand prairie were *Schizachyrium scoparium* (little bluestem), *Achillea millefolium* (yarrow), fall witch grass *Leptoloma cognatum* (fall witch grass), and *Poa pratensis* (Kentucky blue grass). Dominant species of the sand pond were *Glyceria septentrionalis* (floating manna grass), *Persicaria coccinea* (scarlet smartweed), *Bidens cernua* (nodding bur marigold), and *Sparganium androcladum* (branched bur-reed). The wet-mesic sand prairie was dominated by *Calamagrostis canadensis* (blue joint grass), followed by *Persicaria coccinea*, *Erechtites hieracifolia* (fireweed), and *Bidens coronata* (tall swamp marigold). No threatened or endangered species were located during the surveys.

INTRODUCTION

At the turn of the nineteenth century, tallgrass prairie communities occupied approximately 55 – 60% of the total land area in Illinois (7.9 – 8.7 million ha) (Vestal 1931, Anderson 1970, Iverson 1988, Szafoni et al. 2002). Between the years of 1820 and 1980, approximately 99.99% of these tallgrass prairie communities were lost due to agriculture, urban development and succession (White 1978, Iverson 1988). Today, tallgrass prairie communities east of the Missouri River are considered critically endangered ecosystems, now occupying less than 2% of their former range (Christensen et al. 1996).

Tallgrass prairie community subclasses in Illinois include gravel prairie, dolomite prairie, hill prairie, shrub prairie, and sand prairie, with sand prairies representing the largest extant prairie remnants (White 1978, White and Madany 1978). Extensive sand deposits within the state supporting sand prairie and associated sand communities include: 1) the Chicago Lake Plain Section and the Lake Michigan Dunes Section of the Northeastern

Morainal Natural Division, 2) the Green River Lowland Section and the Kankakee Sand Area Section of the Grand Prairie Natural Division, and 3) the Illinois River Section and Mississippi River Section of the Illinois River and Mississippi River Sand Areas Natural Division (Hart and Gleason 1907, Gleason 1910, Schwegman 1973, Lineback 1979, Swink and Wilhelm 1994).

At the time of settlement, sand deposits and resulting sand prairie and associated sand communities covered approximately 497,248 ha (3.4 %) of the state (Lineback 1979, Fehrenbacher et al. 1984). Several early authors studied and described many of the sand communities in various regions (Higley and Raddin 1891, Cowls 1899, McDonald 1900, Hart and Gleason 1907, Gleason 1909, 1910, Gates 1910, 1912, Fell 1957), and these studies have contributed greatly to our present understanding of the historic structure and composition of these areas. In the following decades, however, research subsequent to these initial studies was generally lacking. With the invention of central pivot irrigation in the mid 1900s, many of Illinois' sand regions were rapidly converted to agriculture. In the late 1970s, it was ascertained that less than 0.5% of the state's native sand prairie and associated sand communities still existed in a relatively undisturbed condition (White 1978). Today, in light of such extensive losses, comprehensive studies of our extant remnants are imperative. The present study was undertaken to determine the vascular plant species composition, community structure, and floristic integrity of sand communities occurring in Bonnie's Prairie Nature Preserve (BPNP).

STUDY SITE

Located in Iroquois County, Illinois, approximately 3.5 miles north of Watseka (NE ¼ NW ¼ NE ¼ S17 T27N R12W), BPNP occurs in the Kankakee Sand Area Section of the Grand Prairie Natural Division (Schwegman 1973). This area is characterized by extensive sand formations that were deposited approximately 14,000 to 16,000 years ago by glacial meltwater activity and were subsequently worked and reworked into dune and sheet-like formations by strong winds (Willman and Frye 1970, Wiggers 1997, Killey 1998). Additionally, the deposits at BPNP occur in an area that was once the lakebed of the ancient glacial Lake Watseka, which had drained hundreds of years previous to the deposition of these sands (Willman and Frye 1970, Frankie et al. 1996, Wiggers 1997, Killey 1998, Follmer 2006).

BPNP was dedicated as a state nature preserve in 1992, and is 4.3 ha (10.6 acres) in area. Dominant plant communities in the preserve include dry sand prairie, temporary sand pond, and wet-mesic sand prairie. Smaller and/or more non-contiguous communities in the preserve were characterized by dry sand savanna, degraded dry-mesic sand prairie, marsh/wet sand prairie, and scrubland areas. Environmental heterogeneity resulted in combinations of these community types intergrading almost imperceptibly in many parts of the preserve.

Surficial deposits within the preserve are of the Henry Formation and consist of glacial outwash dominated by sand and gravel and are classified as Parkland facies, which consist of windblown sands in dunes or sheet-like deposits (Willman and Frye 1970, Hansel and Johnson 1996). Soil types as described by Kiefer (1982) indicate the dry sand prairie and dry sand savanna areas occur in excessively drained Chelsea fine sand, while the dry-

mesic sand prairie area occurs on somewhat poorly drained Orthents, loamy soils, which are characterized by surface layers of fine sandy loam or loamy fine sand. The wet-mesic sand prairie areas within the preserve occur on the more poorly drained Roby loamy fine sand. The sand pond areas occupy a position on the landscape where the Chelsea fine sand and Roby loamy sand converge.

East-central Illinois is characterized by a continental climate, having hot summers and cold winters (Fehrenbacher et al. 1984). In the vicinity of BPNP, the mean annual temperature as reported by the Midwestern Regional Climate Center from historical climate data at Watseka, IL, collected between 1971 and 2000, is 50.0° F (10.0° C) (MRCC 2006). July and August are the warmest months, with mean temperatures of 23.3° C (73.9° F) and 22.1° C (71.7° F), respectively, and January and February are the coldest, with mean temperatures of –5.5° C (22.1° F) and –2.8° C (26.9° F), respectively (MRCC 2006). The mean annual precipitation is 91.4 – 96.5 cm (36 – 38 in.), with the highest levels of precipitation occurring during the month of June [11.7 cm (4.62 in.)] (Fehrenbacher et al. 1984, MRCC 2006). The mean number of frost-free days in this region ranges from 160 to 170 (Fehrenbacher et al. 1984).

MATERIALS AND METHODS

During the growing seasons of 2005 and 2006, multiple visits were made to BPNP to inventory and sample the vegetation. Voucher specimens were collected for all vascular plant taxa occurring within the preserve, and habitat data and GPS coordinates were recorded for all collections. Collections were identified and deposited in the herbarium of the Illinois Natural History Survey (ILLS), Champaign, Illinois. Nomenclature follows Mohlenbrock (2002).

Ground flora compositions were evaluated by placing 1.0 m² quadrats at every other meter (i.e., 0, 2, 4, etc.) along 100m line transects (50 m in sand pond) in the largest and highest quality representative areas for dominant community types (Figure 1), as well as the marsh/wet sand prairie pond margin between sand pond and wet-mesic sand prairie. Quadrats were placed in an alternating pattern along transects, with every other quadrat being placed to the right or left. Cover values of all species rooted within quadrats were estimated using Daubenmire (1959) cover classes as modified by Bailey and Poulton (1968), and are as follows: class 1 = 0 – <1%, class 2 = 1 – <5%, class 3 = 5 – <25%, class 4 = 25 – <50%, class 5 = 50 – <75%, class 6 = 75 – <95%, and class 7 = 95 – 100%. From these data, frequency, relative frequency, mean cover, relative cover, and importance value (sum of relative frequency and relative cover) were calculated for each species.

To further evaluate floristic integrity, the mean coefficient of conservatism ($\overline{C}$) and floristic quality index (FQI = [I]) were calculated for the entire preserve as well as the dominant community types, according to Taft et al. (1997), using the following formulae, respectively: $\overline{C} = \sum C/N$, where C is the coefficient of conservatism and N is the number of taxa; and $I = \overline{C}\ (\sqrt{N})$, where I is a weighted index of species richness, and is the product of $\overline{C}$ multiplied by the square root of the number of species ($\sqrt{N}$).
Coefficients of conservatism (C) assigned to all vascular plant taxa occurring within the state, according to Taft et al. (1997), consist of a value ranging from 0 to 10 and represent

a measure of each taxon's tolerance to habitat degradation. A *C*-value of 10 indicates the highest degree of fidelity to high quality natural areas, while a value of 0 indicates the lowest. Following this, taxa at the upper end of the conservatism spectrum (i.e., 7-10) are usually the first species to disappear as natural areas undergo various types of disturbance that lead to habitat degradation. Non-native taxa are automatically assigned a *C*-value of 0. For areas intensively surveyed, the FQI provides a rapid and effective means for making qualitative comparisons of floristic integrity among sites. Sites with a FQI (*I*) ≥ 35 or $\overline{C}$ -value ≥ 3.5 are considered regionally noteworthy – possessing sufficient floristic quality to be considered at least marginally high quality natural areas (Swink and Wilhelm 1994, Taft et al. 1997).

Lastly, historic aerial photographs were obtained from the University of Illinois Map and Geography Library, and were examined for each decade beginning with 1940 to further assess past conditions of the site.

RESULTS AND DISCUSSION

Vascular Plant Species Present

A total of 248 species representing 69 families and 168 genera where documented at BPNP (Appendix 1). Of these taxa, 30 (12.1%) were adventive to the site and eighteen (60.0%) of the adventive taxa occurred in, but were not restricted to, the dry sand prairie community in the northeast portion of the preserve. The majority of the remaining adventive taxa occurred in scrubland areas and degraded edges of the preserve (Figure 1). Pteridophytes accounted for 5 taxa, in 4 genera, and 4 families. Among angiosperms, monocots accounted for 77 taxa, in 46 genera, and 11 families, and dicots, 163 taxa, in 116 genera, and 54 families. The Poaceae and Asteraceae represented slightly over 25% of the flora at BPNP, with 38 taxa (15.3%) and 25 taxa (10.1%), respectively, followed by the Cyperaceae [18 taxa (7.3%)], Rosaceae [17 taxa (6.9%)], Fabaceae [12 taxa (4.8%)], and Polygonaceae [11 taxa (4.4%)]. With respect to physiognomy, forbs accounted for 59.2% of the flora, grasses and sedges 22.6%, shrubs 8.5%, trees 5.6%, vines 2.0%, and ferns/fern allies 2.0%. The native FQI for the entire preserve was 54.5 (51.1 with adventive taxa) and the native $\overline{C}$ -value was 3.7 (3.2 with adventive taxa), indicating a natural area still possessing a high degree of natural integrity.

Dry Sand Prairie

The dry sand prairie community, along with a small inclusion of dry sand savanna occurring in the northeast portion of the preserve (Figure 1 – areas 1A & 7A) was moderately degraded, but still possessed a reasonable degree of floristic integrity. The small inclusion of dry sand savanna appears on historical aerial photographs to have been connected to a larger sand savanna just north of the preserve. Woody encroachment is advancing in this sand savanna inclusion as well as on all sides of the sand prairie. The western and southwestern edges of this area, where the dry sand prairie begins to transition to the northernmost sand pond, are being heavily invaded by *Rubus allegheniensis* Porter (common blackberry). Woody species encroaching on the north, east and southeast boundaries of this area include *Crataegus crusgalli* L. (cockspur hawthorn), *Lonicera maackii* (Rupr.) Maxim. (amur honeysuckle), *Morus alba* L. (white mulberry), *Prunus serotina* Ehrh. (black cherry), *Quercus velutina* Lam. (black oak), *Rhus glabra* L. (smooth sumac), *Rosa multiflora* Thumb. (multiflora rose), *Sassafras albidum* (Nutt.) Nees (sassafras), *Toxi-*

codendron radicans (L.) Kuntze (poison ivy), and *Vitis riparia* Michx. (riverbank grape). Several taxa confined to these more shaded successional areas included: *Asplenium platyneuron* (L.) Oakes (ebony spleenwort), *Galium circaezans* Michx. var. *hypomalacum* Fern. (wild licorice), *Polygonatum commutatum* (Schult.) A. Dietr. (Soloman's seal), *Sanicula canadensis* L. var. *canadensis* (black snakeroot), and *Smilacina stellata* (L.) Desf. (starry false Soloman's seal).

A total of 101 species were encountered in the approximately .26 ha (.64 acre) dry sand prairie and 42 taxa occurred within the sampling quadrats (Table 1). The dominant species was *Schizachyrium scoparium* (Michx.) Nash (little bluestem) with an Importance Value (IV 200%) of 36.6%. Other important taxa included three adventives *Achillea millefolium* L. (yarrow) (IV 26.6%), *Poa pratensis* L. (Kentucky bluegrass) (IV 16.0%), and *Rumex acetosella* L. (field sorrel) (IV 11.1%); and the natives, *Leptoloma cognatum* (Schult.) Chase (fall witch grass) (IV 20.0%), *Rubus flagellaris* Willd. (common dewberry) (IV 13.2%), and *Phlox bifida* Beck. (cleft phlox) (IV 12.9%) (Table 1). Although only five adventive taxa occurred within sampling quadrats (Table 1), the high importance values of three of these taxa are indicative of the more degraded condition of this remnant prairie and reflect a land use history which likely included cattle grazing. Additionally, the dry sand prairie community had more adventive taxa than any other community type in the preserve, with 13 additional adventives occurring here (Appendix 1). The majority of the more conservative taxa including, *Amorpha canescens* Pursh (leadplant), *Anemone cylindrica* Gray (thimbleweed), *Asclepias amplexicaulis* Small (sand milkweed), *Dalea purpurea* Vent. (purple prairie clover), *Helianthemum canadense* (L.) Michx. (common rockrose), *Helianthus occidentalis* Riddell (western sunflower), *Lechea mucronata* Raf. (hairy pinweed), *Liatris aspera* Michx. (rough blazing star), *Sporobolus heterolepis* (Gray) Gray (northern drop seed), and *Tephrosia virginiana* (L.) Pers. (goat's rue), were more scattered and/or infrequent in this community type. The native FQI for this area was 31.6 (28.7 with adventive taxa) and the native $\bar{C}$-value was 3.5 (2.9 with adventive taxa). These values support the interpretation of a moderately degraded habitat, but one that still possess a noteworthy assemblage of plants.

Sand Pond

The northernmost sand pond at BPNP is the deeper and more diverse of the two sand ponds occurring within the preserve and the only of the two which occurs entirely within the preserve boundaries. Both ponds were intensively inventoried, but sampling efforts in the present study were focused on the northern pond, which is approximately .69 ha (1.7 acres) in area. A total of 41 taxa were found in the sand pond with 17 of these occurring within sampling plots (Table 2). Sampling was conducted in September at a time when water levels were very low and the majority of the sand pond was an exposed mudflat. Dominant taxa at the time of surveys (those with IV 200% > 20.0%) were, in descending rank order, *Glyceria septentrionalis* Hitchc. (floating manna grass) (IV 32.5%), *Persicaria coccinea* (Muhl.) Greene (scarlet smartweed) (IV 26.2%), *Bidens cernua* L. (nodding bur marigold) (IV 23.8%) and *Sparganium androcladum* (Engelm.) Morong (burreed) (IV 20.4%) (Table 2). Other important taxa included *Echinochloa muricata* (Michx.) Fern. (wild millet) (IV 17.3%), *Pontederia cordata* L. (pickerelweed) (IV 15.2%), *Phalaris arundinacea* L. (reed canary grass) (IV 11.8%), and *Sagittaria brevirostra* Mack. & Bush (short-beaked arrowhead) (IV 11.6%) (Table 2). Had sampling occurred earlier in the growing season when water levels are typically much higher, cer-

tain taxa would have undoubtedly had higher importance values, including *Nuphar advena* (Aiton) W. T. Aiton (yellow pond lily), *Nymphaea tuberosa* Paine (white water lily), and *Ranunculus flabellaris* Raf. (yellow-flowered water buttercup). Additionally, species such as *Callitriche heterophylla* Pursh (large water starwort), and *Lemna minor* L. (common duckweed), which were not present at the time of sampling, would likely have occurred within sampling plots. Several taxa that occurred in sampling plots which would have been absent during high water levels included *Bidens cernua, B. coronata* (L.) Britt. (tall swamp marigold), *B. frondosa* L. (common tickseed), *Echinochloa muricata*, and *Erechtites hieracifolia* (L.) Raf. (fireweed). Only one exotic taxon, *Persicaria hydropiper* (L.) Opiz (water pepper) occurred in the sand pond. The native FQI for this area was 24.3 (24.1 with adventive taxa) and the native $\overline{C}$ -value was 3.8 (unchanged with adventives). Although the FQI for this area was somewhat low, due in part to the low number of species within this community type, the higher $\overline{C}$ -value of 3.8 is indicative of a noteworthy remnant community that still has a relatively high degree of natural integrity.

Marsh/Wet Sand Prairie Pond Margins

Bordering all sides of both sand ponds were transitional areas where sand pond communities gradually graded into other adjacent community types (Area 5; Figure 1). These areas were slightly more elevated and drier than the ponds, and characterized by zones, often very narrow, of vegetation noticeably different from the vegetation of the community types occurring on either side. These areas were difficult to assign to any one community type, but would be best characterized as a combination of marsh/wet sand prairie. Virtually all areas of this community type had moderate to heavy infestations of *Phalaris arundinacea*. The most diverse area of this type was located on the northern and northeastern margins of the north sand pond between areas 2A and 6 (Figure 1), and occurring here were several taxa with more limited distributions within the preserve, which included *Agrostis gigantea* Roth. (red top), *Boehmeria cylindrica* (L.) Sw. (false nettle), *Carex tribuloides* Wahl. (oval sedge), *Cuscuta polygonorum* Engelm. (knotweed dodder), *Eupatorium perfoliatum* L. (common boneset), *Galium tinctorium* L. (stiff bedstraw), *Leersia oryzoides* (L.) Sw. (rice cut grass), *Spartina pectinata* Link (cord grass), and *Verbena hastata* L. (blue vervain). Sampling results (Table 3) from the zone between areas 2A and 4 (Figure 1) are representative of other marsh/wet sand prairie areas in the preserve and dominant taxa included *Phalaris arundinacea* (IV 43.2%), *Persicaria coccinea* (IV 41.2%), *Bidens cernua* (IV 30.3%), and *Calamagrostis canadensis* (Michx.) P. Beauv. (blue joint grass) (IV 29.8%). Other taxa occurring in this area as well as in this community type throughout the preserve included *Bidens connata* Muhl. (purple-stemmed tickseed), *B. coronata, Bolboschoenus fluviatilis* (Torr.) Sojak, (river bulrush), *Eleocharis palustris* (L.) Roem. & Schult. (great spike rush), *Eupatorium serotinum* Michx. (late boneset), *Persicaria punctata* (Ell.) Small (smartweed), *Salix nigra* Marsh. (black willow), and *Scirpus cyperinus* (L.) Kunth (wool grass).

Wet-mesic Sand Prairie

Located on the southeast corner of BPNP (Area 4; Figure 1) is a moderately degraded wet-mesic sand prairie approximately .74 ha (1.8 acres) in area. A total of 53 taxa were found in this portion of the preserve and 21 of these occurred in the sampling plots (Table 4). Woody stem encroachment is advancing on the eastern and southeastern boundaries of this wet-mesic sand prairie, with the shrub *Rubus pensylvanicus* Poir. (yankee black-

berry) invading most heavily. Other woody species encroaching along these boundaries included *Cornus obliqua* Raf. (blue-fruited dogwood), *Rubus allegheniensis*, *Salix discolor* Muhl. (pussy willow), and *S. nigra* Marsh (black willow). Diversity in these areas was very low and historical aerial photographs ranging from 1940 to 1973 reveal that these areas previously, were completely open. Similarly, along the northern boundary were several large individuals of *Acer saccharinum* L. (silver maple) and *Quercus palustris* Muench (pin oak) which are absent on 1940 aerial photographs. These highly shaded areas were also lacking in diversity and bare ground/leaf litter was abundant.

All areas of the wet-mesic sand prairie not experiencing advanced woody stem encroachment were dominated by *Calamagrostis canadensis* (Table 4), and these areas were somewhat lacking in diversity. Other important taxa in the open areas included *Persicaria coccinea* (IV 39.9%), *Erechtites hieracifolia* (IV 31.6%), *Bidens coronata* (IV 14.2%), and *Eupatorium serotinum* (IV 9.1%). *Phalaris arundinacea*, although having a lower importance value along the sampling transect, was abundant in scattered patches with the most heavily infested areas usually occurring at the boundaries between areas 4 and 5 (Figure 1).

Several taxa within the preserve were only found in the wet-mesic sand prairie community, and infrequently to occasionally encountered species occurring here included: *Acalypha gracilens* Gray (slender three-leaved mercury), *Asclepias incarnata* L. (swamp milkweed), *Carex pellita* Willd. (wooly sedge), *C. scoparia* Schk. (oval sedge), *Epilobium ciliatum* Raf. (willow herb), *Helianthus mollis* Lam. (downy sunflower), *Hypericum mutilum* L. (dwarf St. John's-wort), *Iris shrevei* Small (blue iris), *Ludwigia alternifolia* L. (seedbox), *Lycopus uniflorus* Michx. (northern bugle weed), *Panicum virgatum* L. (switch grass), *Persicaria opelousana* (Riddell) Small (scaly smartweed), *Rhexia virginica* L. (meadow beauty), *Spiraea alba* Du Roi (meadowsweet), *Stachys pilosa* Nutt. var. *homotricha* (Fern.) Mohlenbr. (woundwort), *Vernonia missurica* Raf. (Missouri ironweed), and *Viola lanceolata* L. (lance-leaved violet). The native FQI for this area was 27.2 (26.7 with adventive taxa) and the $\overline{C}$ -value was 3.7 (3.6 with adventive taxa). As with the previously discussed sand pond habitat, despite having a lower FQI value, the higher $\overline{C}$ -value of 3.7 for this community is indicative of an area with noteworthy remnant quality.

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APPENDIX I.

Vascular plant taxa encountered at Bonnie's Prairie Nature Preserve. Pteridophytes are listed first, followed by angiosperms. Angiosperms are further divided into monocots and dicots. Familes, genera and species are arranged alphabetically within groups. Adventive taxa are indicated by an asterisk (*). Following the binomial and authority, the community type(s) in which each taxa occurred, is indicated. Community designations correspond to areas shown in Figure 1. Designations are: [1=dry sand prairie (A-higher quality, B-highly degraded); 2=sand pond (A-deeper with higher diversity, B-shallower with lower diversity); 3=dry-mesic sand prairie (highly degraded); 4=wet-mesic sand prairie; 5=marsh/wet sand prairie; 6=scrubland (highly degraded successional); 7=dry sand savanna (A-inclusion in higher quality sand prairie, B-inclusion in highly degraded sand prairie); and 8=margins of preserve (E-east margin along railroad, N-north margin along road)]. Nomenclature follows Mohlenbrock (2002). Collecting numbers are those of M. J. C. Murphy (M). All specimens are deposited in the Illinois Natural History Survey Herbarium (ILLS), Champaign, IL.

FERNS AND FERN-ALLIES
Aspleniaceae
Asplenium platyneuron (L.) Oakes: 7; M207
Equisetaceae
Equisetum arvense L.: 3; M636
Equisetum hyemale L. ssp. *affine* Calder & Taylor: 3; M635
Onocleaceae
Onoclea sensibilis L.: 6; M129
Thelypteridaceae
Thelypteris palustris Schott: 6; M607

ANGIOSPERMS
MONOCOTS
Alismataceae
Alisma subcordatum Raf.: 2A, 2B; M571
Sagittaria brevirostra Mack. & Bush.: 2A, 2B; M567
Sagittaria graminea Michx.: 2A, 2B; M221
Commelinaceae
**Commelina communis* L.: 6; M543
Tradescantia ohiensis Raf.: 1A; M107
Cyperaceae
Bolboschoenus fluviatilis (Torr.) Sojak: 2B, 5; M284
Carex brevior (Dewey) Lunell: 1A, 8E; M109
Carex emmonsii Dewey: 6; M134
Carex muhlenbergii Schk. var. *muhlenbergii*: 1A; M198
Carex pellita Willd.: 4; M281
Carex scoparia Schk.: 4; M837
Carex swanii (Fern.) Mack.: 4, 6; M132
Carex tribuloides Wahl.: 5; M559
Carex vulpinoidea Michx.: 4, 5; M277
Cyperus erythrorhizos Muhl.: 2B; M816
Cyperus lupulinus (Spreng.) Marcks var. *lupulinus*: 1A; M521
Cyperus schweinitzii Torr.: 3; M825
Cyperus strigosus L.: 2A, 4; M811
Eleocharis ovata (Roth) Roem. & Schult. var. *obtusa* (Willd.) Kukenth: 2A, 2B; M806
Eleocharis palustris (L.) Roem. & Schultes: 2A, 2B, 4, 5; M570
Schoenoplectus heterochaetus (Chase) Sojak: 2A, 2B, 5; M149
Schoenoplectus tabernaemontani (C. C. Gmel.) Palla: 2A; M572
Scirpus cyperinus (L.) Kunth: 5; M566
Iridaceae
Iris shrevei Small: 4; M805
Juncaceae
Juncus acuminatus Michx.: 3; M631
Juncus biflorus Ell. f. *biflorus*: 3; M621
Juncus brachycarpus Englem.: 3; M627
Juncus greenei Oakes & Tuckerm.: 3; M622
Juncus interior Wieg.: 1A; M194
Juncus tenuis Willd.: 1A, 4; M591
Luzula bulbosa (A. W. Wood) Smyth.: 6; M133
Lemnaceae
Lemna minor L.: 2A, 2B; M22
Liliaceae
**Asparagus officinalis* L.: 1A, 7A; M119
Polygonatum commutatum (Schult.) A. Dietr.: 1A, 7A; M120
Smilacina stellata (L.) Desf.: 1A, 7A; M117

Poaceae
Agrostis hyemalis (Walt.) BSP.: 1A, 8E; M189
Agrostis gigantea Roth.: 4, 5; M558
Agrostis perennans (Walter) Tuck.: 6; M608
Andropogon gerardii Vitman: 1A; M761
Andropogon virginicus L.: 3; M813
Aristida purpurascens Poir.: 1A; M756
**Bromus commutatus* Schrad.: 1A, 8E; M187
**Bromus inermis* Leyss: 1A, 8E; M121
**Bromus tectorum* L.: 1A, 8E; M103
Calamagrostis canadensis (Michx.) P. Beauv.: 2A, 2B, 4, 5; M214
Cenchrus longispinus (Hack.) Fern.: 3; M826
Dichanthelium acuminatum (Sw.) Gould & Clark: 1A; M193
Dichanthelium oligosanthes (Schult.) Gould var. *scribnerianum* (Nash) Gould: 1A; M126
Dichanthelium villosissimum (Nash) Freckm.: 1A; M201
**Digitaria sanguinalis* (L.) Scop.: 2B; M818
Echinochloa muricata (Michx.) Fern.: 2A, 2B; M774
Elymus canadensis L.: 1A; M548
Eragrostis pectinacea (Michx.) Nees: 1A, 8E; M762
Eragrostis spectabilis (Pursh) Steud.: 1A, 1B; M611
Glyceria septentrionalis Hitchc.: 2A, 2B, 5; M211
Heterostipa spartea (Trin. & Rupr.) Barkworth: 1A; M122
Koeleria macrantha (Ledeb.) Spreng.: 1A, 8E; M96
Leersia oryzoides (L.) Swartz: 2A, 5; M786
Leptoloma cognatum (Schult.) Chase: 1A, 8E; M527
Panicum dichotomiflorum Michx.: 2B; M817
Panicum rigidulum Bosc var. *rigidulum*: 6; M609
Panicum virgatum L.: 4; M579
*Paspalum setaceum*Michx. var. *ciliatifolium* (Michx.) Vasey: 1A; M824
**Poa compressa* L.: 1A, 1B, 3, 4, 7A & B, 8E, 8N; M530
**Poa pratensis* L.: 1A, 1B, 3, 6, 7, 8E, 8N; M114
Phalaris arundinacea L.: 2A, 2B, 4, 5, 6, 8E; M136
Schizachyrium scoparium (Michx.) Nash: 1A, 1B, 3; M829
Sorghastrum nutans (L.) Nash: 1A; M755
Spartina pectinata Link: 5; M557
Sporobolus cryptandrus (Torr.) Gray: 1A; M760
Sporobolus heterolepis (Gray) Gray: 1A; M759
Tridens flavus (L.) Hitch.: 1A, 1B, 8E, 8N; M765
Triplasis purpurea (Walt.) Chapm.: 1B, 3; M624
Pontederiaceae
Pontederia cordata L.: 2A, 2B; M569
Sparganiaceae
Sparganium androcladum (Engelm.) Morong: 2A, 2B; M568
Sparganium eurycarpum Englem.: 2A, 2B, 5; M601
Typhaceae
Typha latifolia L.: 2A, 5; M273

DICOTS
Aceraceae
Acer saccharinum L.: 4, 5, 6; M137
Anacardiaceae
Rhus glabra L.: 1A, 7A; M202
Rhus hirta L.: 6; M612
Toxicodendron radicans (L.) Kuntze: 1A, 1B, 3, 4, 6, 7A, 7B; M603
Apiaceae
**Daucus carota* L.: 1A, 1B, 3, 8E, 8N; M541
Sanicula canadensis L. var. *canadensis*: 8N; M639
Sium suave Walt.: 2A, 2B, 5; M564
Asclepiadaceae
Asclepias amplexicaulis Small: 1A; M209
Asclepias incarnata L.: 4; M1853
Asclepias syriaca L.: 1A, 1B, 3, 8E, 8N; M828
Asclepias verticillata L.: 1A, 1B, 3; M768
Asteraceae
**Achillea millefolium* L.: 1A, 1B, 3, 8E, 8N; M124
Ambrosia artemisiifolia L.: 1A, 1B, 4, 3, 8E, 8N; M526
Antennaria neglecta Greene: 1A, 1B; M268
Antennaria plantaginifolia (L.) Hook.: 1A, 1B; M267
Aster pilosus Willd.: 1A, 1B, 3, 8E, 8N; M753
Bidens cernua L.: 2A, 2B, 5; M773
Bidens connata Muhl.: 2A, 2B, 5; M777
Bidens coronata (L.) Britt.: 2A, 2B, 4, 5; M778
Bidens frondosa L.: 2A, 2B, 4, 5; M771
Boltonia asteroides (L.) L' Her. Var. *recognita* (Fern. & Grisc.) Cronq.: 2B/5; M1853

Cirsium discolor (Muhl.) Spreng.: 1A; M763
Conyza canadensis (L.) Cronq.: 3, 8E, 8N; M525
Erechtites hieracifolia (L.) Raf.: 2A, 2B, 4, 5; M575
Erigeron strigosus Muhl.: 1A, 1B; M208
Eupatorium perfoliatum L.: 4, 5; M604
Eupatorium serotinum Michx.: 4, 5, 8E; M556
Euthamia gymnospermoides Greene: 3, 4; M781
Helianthus mollis Lam.: 4; M583
Helianthus occidentalis Riddell: 1A; M757
Hieracium gronovii L.: 3; M630
Lactuca canadensis L.: 1A, 7A; M545
Liatris aspera Michx.: 1A; M787
Pseudognaphalium obtusifolium (L.) Hilliard & Burtt.: 3; M820
Solidago altissima L.: 1A; 3, 4, 8E, 8N; M764
Vernonia missurica Raf.: 4; M581

Betulaceae
**Betula populifolia* Marsh.: 6; M135

Bignoniaceae
**Catalpa speciosa* Warder: 1A/8E; M195

Boraginaceae
Hackelia virginiana (L.) I. M. Johnst.: 6; M628
Lithospermum croceum Fern.: 1A, 8E; M110
Myosotis verna Nutt.: 6; M131

Brassicaceae
Cardimine parviflora L. var. *arenicola* (Britt.) O.E. Schultz: 6; M153
Lepidium virginicum L.: 1A, 1B, 8E; M101
Rorippa palustris (L.) Besser: 2A; Observed

Caesalpiniaceae
Chamaecrista fasciculata (Michx.) Greene: 1A, 8E, 8N; M524

Callitrichaceae
Callitriche heterophylla Pursh: 2A; M216

Cannabinaceae
**Cannabis sativa* L.: 6; M573

Caprifoliaceae
**Lonicera maackii* (Rupr.) Maxim.: 1A, 6, 7A, 8N; M640
Sambucus canadensis L.: 6; M552

Caryophyllaceae
**Silene pratensis* (Spreng.) Godron & Gren.: 1A, 8E, 8N; M522

Chenopodiaceae
Chenopodium desiccatum A. Nels.: 1A; M767

Cistaceae
Helianthemum canadense (L.) Michx.: 1A; M204
Lechea mucronata Raf.: 1A; M766
Lechea pulchella Raf.: 3; M619

Cornaceae
Cornus obliqua Raf.: 4, 5, 6; M553

Corylaceae
Corylus americana Walt.: 6; M606

Cuscutaceae
Cuscuta polygonorum Engelm.: 2A, 2B, 4, 5; M562

Elaeagnaceae
**Elaeagnus umbellata* Thunb.: 6; M614

Euphorbiaceae
Acalypha gracilens Gray: 4; M588
Acalypha rhomboidea Raf.: 3, 4, 6; M814
Chamaesyce maculata (L.) Small: 3; M827
Chamaesyce nutans (Lag.) Small: 8N; M830
Euphorbia corollata L.: 1A, 8E, 8N; M265
Poinsettia dentata (Michx.) Kl. & Garcke: 1A; M520

Fabaceae
Amorpha canescens Pursh: 1A; M266
Apios americana Medic.: 5, 8N; M537
Crotolaria sagittalis L.: 3; M618
Dalea purpurea Vent.: 1A; Observed
Desmodium illinoense Gray: 1A, 3; M752
Desmodium sessilifolium (Torr.) Torr. & Gray: 3; M822
Lespedeza capitata Michx.: 1A, 3; M531
Lespedeza hirta (L.) Hornem.: 1A; M542
**Melilotus alba* Medic.: 1A, 1B, 3, 8E, 8N; M190
Strophostyles helvula (L.) Ell.: 1A; M528
Strophostyles leiosperma (Torr. & Gray) Piper: 1A; M532
Tephrosia virginiana (L.) Pers.: 1A, 8E; M185

Fagaceae
Quercus palustris Muench: 4, 5, 6; M544
Quercus velutina Lam.: 1A, 1B, 3, 6, 7A, 7B; M533

Geraniaceae
Geranium carolinianum L.: 1A, 8N; M108

Grossulariaceae
Ribes missouriense Nutt.: 6; M551

Hypericaceae
Hypericum mutilum L.: 4; M576

Lamiaceae
Lycopus americanus Muhl.: 4, 5; M582
Lycopus uniflorus Michx.: 4; M593
Monarda punctata L.: 1A, 1B; M539
Prunella vulgaris L. var. *elongata* Benth.: 3, 6, 8N; M629
Scutellaria lateriflora L.: 6; M597
Stachys pilosa Nutt. var. *homotricha* (Fern.) Mohlenbr.: 4; M274
Lauraceae
Sassafras albidum (Nutt.) Nees: 1A, 6, 7A, 7B, 8E, 8N; M16
Linaceae
Linum medium (Planch.) Britt.: 3; M616
Lythraceae
Rotala ramosior (L.) Koehne: 2A; M808
Melastomaceae
Rhexia virginica L.: 4; M594
Molluginaceae
**Mollugo verticillata* L.: 3; M633
Moraceae
**Morus alba* L.: 1A, 6, 7A, 8N; M799
Nyctaginaceae
**Mirabilis nyctaginea* (Michx.) MacM.: 1A, 3; M206
Nymphaeaceae
Nuphar advena (Ait.) Ait. f.: 2A, 2B; M148
Nymphaea tuberosa Paine: 2A, 2B; M147
Oleaceae
Fraxinus lanceolata Borkh.: 6; M838
Fraxinus pennsylvanica Marsh.: 3, 6; M610
Onagraceae
Circaea lutetiana Aschers. & Magnus: 6; M602
Epilobium ciliatum Raf.: 4; M590
Ludwigia alternifolia L.: 4; M589
Ludwigia palustris (L.) Ell.: 2B; M596
Ludwigia polycarpa Short & Peter.: 2A; M807
Oenothera biennis L.: 3, 4, 8E, 8N; M577
Oenothera clelandii W. Dietr., Raven & W. L. Wagner: 1A; M769
Oxalidaceae
Oxalis stricta L.: 1A, 1B, 3, 6, 8E, 8N; M111
Phytolaccaceae
Phytolacca americana L.: 6, 8E; M796
Plantaginaceae
**Plantago lanceolata* L.: 1A, 6, 8E, 8N; M270
**Plantago patagonica* Jacq.: 1A; M203
Plantago virginica L.: 1A; M100
Polemoniaceae
Phlox bifida Beck.: 1A, 8N, 8E; M15
Polygalaceae
Polygala sanguinea L.: 3; M615
Polygonaceae
**Fallopia convolvulus* (L.) A. Love: 8N; M538
Persicaria coccinea (Muhl.) Greene: 2A, 2B, 4, 5; M563
**Persicaria hydropiper* (L.) Opiz: 2A; M809
Persicaria hydropiperoides (Michx.) Small: 2A, 2B, 5; M775
Persicaria lapathifolia (L.) S. F. Gray: 2A; M776
Persicaria opelousana (Riddell) Small: 4; M586
Persicaria pensylvanica (L.) Small: 2A, 2B, 5; M592
Persicaria punctata (Ell.) Small: 2A, 2B, 4, 5; M561
**Persicaria vulgaris* Webb & Moq.: 3; M634
**Rumex acetosella* L.: 1A, 1B, 3, 8E, 8N; M116
Rumex verticillatus L.: 2A, 5; M218
Portulacaceae
Claytonia virginica L.: 1A, 6; M14
Ranunculaceae
Anemone cylindrica Gray: 1A; M199
Ranunculus flabellaris Raf.: 2A, 2B; M146
Rosaceae
Agrimonia parviflora Sol.: 3, 4; M584
Crataegus crus-galli L.: 1A; M754
Fragaria virginiana Duchesne: 1A, 1B, 3, 6, 7A; M115
Geum canadense Jacq.: 6; M536
Potentilla simplex Michx.: 1A, 1B, 6; M112
**Potentilla recta* L.: 1A; M200
Prunus serotina Ehrh.: 1A, 6, 7A, 7B; M130
Rosa carolina L.: 1A; M196
**Rosa multiflora* Thunb.: 6, 8E; M141
Rosa X *rudiuscula* Greene: 4; M585
Rosa setigera Michx.: 6; M269
Rubus allegheniensis Porter: 1A, 4, 6; M118
Rubus flagellaris Willd.: 1A, 6; M264
**Rubus laciniatus* Willd.: 6; M605
Rubus occidentalis L.: 6; M127
Rubus pensilvanicus Poir.: 4; M280
Spiraea alba Du Roi: 4; M287
Rubiaceae
Diodia teres Walt.: 1A, 1B, 3; M758
Galium aparine L.: 1A, 6, 8; M102
Galium circaezans Michx. var. *hypomalacum* Fern.: 6, 7A; M535
Galium tinctorium L.: 2A, 4, 5; M565
Salicaceae
Populus deltoides Marsh: 3, 6, 8E; M801
Salix amygdaloides Anders.: 5, 6; M210
Salix discolor Muhl.: 3, 4, 6; M823
Salix interior Rowlee: 6; M599

Salix nigra Marsh.: 2A, 4, 5, 6; M213
Scrophulariaceae
Agalinis besseyana Britt.: 3; M632
Gratiola virginiana L.: 2A: M1857
Lindernia anagallidea (Michx.) Pennell: 2A; M810
Scrophularia lanceolata Pursh: 1A, 7A; M123
Solanaceae
Physalis virginiana Mill.: 1A; M197
Solanum carolinense L.: 4; M275
**Solanum dulcamara* L.: 8E; M139
Solanum ptychanthum Dunal.: 8E; M800
Urticaceae
Boehmeria cylindrica (L.) Sw.: 5, 6; M555
Verbenaceae
Verbena hastata L.: 4, 5; M554
Violaceae
Viola lanceolata L.: 4; M151
Viola sagittata Aiton: 6; M271
Vitaceae
Parthenocissus quinquefolia (L.) Planch.: 1A, 1B, 3, 4, 6, 7A, 7B, 8E, 8N; M637
Vitis riparia Michx.: 1A, 3, 4, 5, 6, 7A, 8E, 8N; M125

Figure 1. Natural communities of Bonnie's Prairie Nature Preserve, Iroquois County, Illinois. 1=dry sand prairie (A-higher quality, B-highly degraded); 2=temporary sand pond (A-deeper with higher diversity, B-shallower with lower diversity); 3=dry-mesic sand prairie (highly degraded); 4=wet-mesic sand prairie; 5=marsh/web sand prairie; 6=scrubland (highly degraded successional); 7=dry sand savanna (A-eastern inclusion in higher quality sand prairie, B-western inclusion in more degraded sand prairie); 8=margins of preserve (N-north margin along road, E-eastern margin along railroad tracks). Paired arrows show locations of sampling transects within community types.

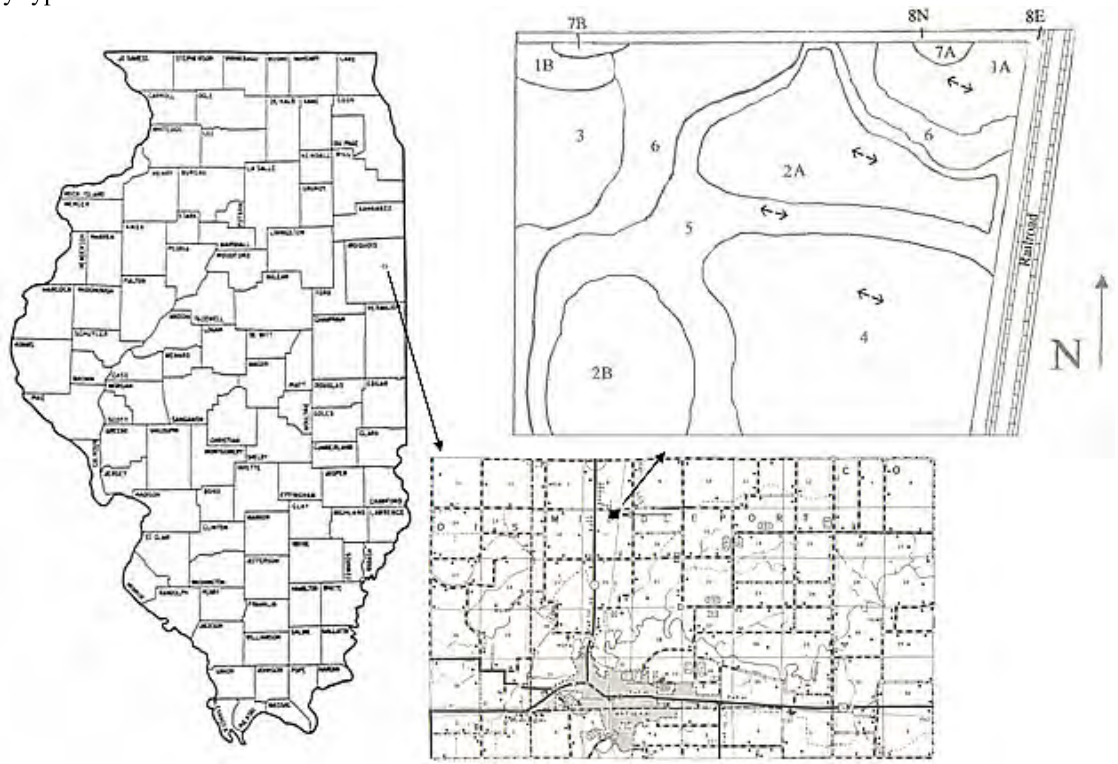

Table 1. Frequency, mean cover, relative frequency, relative cover, and importance values (IV 200) of ground flora species occurring in dry sand prairie sampling plots at Bonnie's Prairie Nature Preserve, Iroquois Co., Illinois. Species are listed in descending rank order by importance value. Importance values are the sum of the relative frequency and relative cover (* = adventive species).

Species	Freq. %	Mean Cover	Rel.Freq. %	Rel.Cover %	IV 200 (%)
Schizachyrium scoparium	100	17.91	9.28	27.29	36.6
**Achillea millefolium*	100	11.40	9.28	17.37	26.6
Leptoloma cognatum	82	8.12	7.61	12.37	20.0
**Poa pratensis*	96	4.63	8.91	7.05	16.0
Rubus flagellaris	60	5.01	5.57	7.63	13.2
Phlox bifida	94	2.74	8.72	4.17	12.9
**Rumex acetosella*	56	3.90	5.19	5.94	11.1
Ambrosia artemisiifolia	64	1.64	5.94	2.50	8.4
Cyperus lupulinus var. lupulinus	70	1.10	6.49	1.68	8.2
Aster pilosus	28	1.36	2.60	2.07	4.7
Lithospermum croceum	24	1.29	2.23	1.97	4.2
**Bromis inermis*	20	1.51	1.86	2.30	4.2
Dichanthelium oligosanthes var. scribnerianum	28	0.92	2.60	1.40	4.0
Helianthemum canadense	26	0.53	2.41	0.81	3.2
Carex muhlenbergii var. muhlenbergii	24	0.27	2.23	0.41	2.6
Euphorbia corollata	22	0.31	2.04	0.47	2.5
Paspalum setaceum var. ciliatifolium	18	0.53	1.67	0.81	2.5
Dichanthelium villosissimum	16	0.33	1.48	0.50	2.0
Sporobolus cryptandrus	16	0.13	1.48	0.20	1.7
Physalis virginiana	14	0.17	1.30	0.26	1.6
**Potentilla recta*	14	0.17	1.30	0.26	1.6
Lespedeza capitata	12	0.11	1.11	0.17	1.3
Potentilla simplex	10	0.20	0.93	0.30	1.2
Oxalis stricta	12	0.06	1.11	0.09	1.2
Tradescantia ohiensis	10	0.05	0.93	0.08	1.0
Sorghastrum nutans	8	0.09	0.74	0.14	0.9
Sassafras albidum	6	0.18	0.56	0.27	0.8
Aristida purpurascens	8	0.04	0.74	0.06	0.8
Amorpha canescens	2	0.30	0.19	0.46	0.6
Antennaria plantaginifolia	2	0.30	0.19	0.46	0.6
Diodia teres	6	0.03	0.56	0.05	0.6
Strophostyles leiosperma	6	0.03	0.56	0.05	0.6
Conyza canadensis	4	0.02	0.37	0.03	0.4
Dalea purpurea	4	0.02	0.37	0.03	0.4
Cirsium discolor	2	0.06	0.19	0.09	0.3
Desmodium illinoense	2	0.06	0.19	0.09	0.3
Rosa carolina	2	0.06	0.19	0.09	0.3
Antennaria neglecta	2	0.01	0.19	0.02	0.2
Asclepias verticillata	2	0.01	0.19	0.02	0.2
Lechea mucronata	2	0.01	0.19	0.02	0.2
Oenothera clelandii	2	0.01	0.19	0.02	0.2
Poinsettia dentata	2	0.01	0.19	0.02	0.2
Totals		65.63	100.00	100.00	200.0
Bare ground and litter		31.42			

Table 2. Frequency, mean cover, relative frequency, relative cover, and importance values (IV 200) of ground flora species occurring in sand pond (northern) sampling plots at Bonnie's Prairie Nature Preserve, Iroquois Co., Illinois. Species are listed in descending rank order by importance value. Importance values are the sum of the relative frequency and relative cover.

Species	Freq. %	Mean Cover	Rel.Freq. %	Rel.Cover %	IV 200 (%)
Glyceria septentrionalis	88	13.34	12.15	20.38	32.5
Persicaria coccinea	72	10.66	9.94	16.28	26.2
Bidens cernua	96	6.90	13.26	10.54	23.8
Sparganium androcladum	48	9.04	6.63	13.81	20.4
Echinochloa muricata	68	5.20	9.39	7.94	17.3
Pontederia cordata	48	5.60	6.63	8.55	15.2
Phalaris arundinacea	44	3.72	6.08	5.68	11.8
Sagittaria brevirostra	52	2.90	7.18	4.43	11.6
Persicaria hydropiperoides	24	3.06	3.31	4.67	8.0
Ranunculus flabellaris	48	0.64	6.63	0.98	7.6
Nymphaea tuberosa	32	1.92	4.42	2.93	7.4
Acer saccharinum	36	0.18	4.97	0.27	5.2
Nuphar advena	20	1.08	2.76	1.65	4.4
Erechtites hieracifolia	24	0.42	3.31	0.64	4.0
Leersia oryzoides	12	0.74	1.66	1.13	2.8
Bidens frondosa	8	0.04	1.10	0.06	1.2
Bidens coronata	4	0.02	0.55	0.03	0.6
Totals		65.46	100.00	100.00	200.0
Bare ground and litter		15.36			

Table 3. Frequency, mean cover, relative frequency, relative cover, and importance values (IV 200) of ground flora species occurring in marsh/wet sand prairie pond margin sampling plots at Bonnie's Prairie Nature Preserve, Iroquois Co., Illinois. Species are listed in descending rank order by importance value. Importance values are the sum of the relative frequency and relative cover.

Species	Freq. %	Mean Cover	Rel.Freq. %	Rel.Cover %	IV 200 (%)
Phalaris arundinacea	76	28.98	12.67	30.55	43.2
Persicaria coccinea	100	23.24	16.67	24.50	41.2
Bidens cernuua	80	16.12	13.33	16.99	30.3
Calamagrostis canadensis	88	14.38	14.67	15.16	29.8
Bidens connata	52	5.62	8.67	5.92	14.6
Eleocharis palustris	68	0.84	11.33	0.89	12.2
Scirpus cyperinus	24	3.54	4.00	3.73	7.7
Persicaria punctata	24	0.22	4.00	0.23	4.2
Eupatorium serotinum	24	0.12	4.00	0.13	4.1
Quercus palustris	20	0.3	3.33	0.32	3.6
Bidens frondosa	12	0.36	2.00	0.38	2.4
Schoenoplectus heterochaetus	12	0.26	2.00	0.27	2.3
Erechtites hieracifolia	8	0.14	1.33	0.15	1.5
Bidens coronata	4	0.6	0.67	0.63	1.3
Leersia oryzoides	4	0.12	0.67	0.13	0.8
Acer saccharinum	4	0.02	0.67	0.02	0.7
Totals		65.46	100.00	100.00	200.0
Bare ground and litter		15.36			

Table 4. Frequency, mean cover, relative frequency, relative cover, and importance values (IV 200) of ground flora species occurring in wet-mesic sand prairie sampling plots at Bonnie's Prairie Nature Preserve, Iroquois Co., Illinois. Species are listed in descending rank order by importance value. Importance values are the sum of the relative frequency and relative cover.

Species	Freq. %	Mean Cover	Rel.Freq. %	Rel.Cover %	IV 200 (%)
Calamagrostis canadensis	100	66.10	21.65	59.86	81.5
Persicaria coccinea	98	20.62	21.21	18.67	39.9
Erechtities hieracifolia	86	14.31	18.61	12.96	31.6
Bidens coronata	46	4.63	9.96	4.19	14.1
Eupatorium serotinum	32	2.44	6.93	2.21	9.1
Persicaria opelousanum	22	0.26	4.76	0.24	5.0
Phalaris arundinacea	12	0.95	2.60	0.86	3.5
Persicaria punctatum	14	0.17	3.03	0.15	3.2
Viola lanceolata	10	0.49	2.16	0.44	2.6
Acalypha rhomboidea	10	0.05	2.16	0.05	2.2
Quercus palustris	8	0.14	1.73	0.13	1.9
Cuscuta polygonorum	4	0.02	0.87	0.02	0.9
Hypericum mutilum	4	0.02	0.87	0.02	0.9
Acer saccharinum	2	0.06	0.43	0.05	0.5
Ambrosia artemisiifolia	2	0.06	0.43	0.05	0.5
Cornus obliqua	2	0.06	0.43	0.05	0.5
Carex swanii	2	0.01	0.43	0.01	0.4
Cyperus strigosus	2	0.01	0.43	0.01	0.4
Dichanthelium acuminatum	2	0.01	0.43	0.01	0.4
Eleocharis palustris	2	0.01	0.43	0.01	0.4
Galium tinctorium	2	0.01	0.43	0.01	0.4
Totals		110.43	100.00	100.00	200.0
Bare ground and litter		13.07			