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Plant Communities of the Green River Lowlands in Northwestern Illinois

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PLANT COMMUNITIES OF THE GREEN RIVER LOWLANDS IN NORTHWESTERN ILLINOIS

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ABSTRACT: A few high quality prairies still exist in the sand deposits of the Green River Lowlands on a few state protected lands. The most extensive natural remnants are in the Green River State Wildlife Area, Lee County, Illinois, where some sand communities of high natural quality exist. Three upland prairie communities were surveyed; a dry sand prairie dominated by *Schizachyrium scoparium, Ambrosia psilostachya,* and *Amorpha canescens;* a dry-mesic sand prairie dominated by *Sorghastrum nutans, Schizachyrium scoparium, Antennaria plantaginifolia*, and *Liatris aspera*; and a mesic sand prairie where *Sorghastrum nutans* and *Andropogon gerardii* were the dominant grasses with *Parthenium integrifolium, Fragaria virginiana*, *Liatris pycnostachya*, and *Euthamia gymnospermoides* the common forbs. The lowlands, which include about 325 ha, were dominated by the exotic *Phalaris arundinaceae*, but high natural quality wet sand prairie, sedge meadow, and marsh communities exist. The wet sand prairies were dominated by *Spartina pectinata, Helianthus grosseserratus*, and *Solidago canadensis;* the sedge meadows were dominated by *Carex haydenii, Calamagrostis canadensis*, and *Persicaria coccinea*; while the marsh communities were divided into distinct vegetation zones. These vegetation zones were surveyed in 2002, and were subjected to a destructive fire in 2005. Surveys completed 2006 and 2007 were used to determine successional changes resulting from the 2005 fire.

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INTRODUCTION

Sand deposits are relatively common in the northern half of Illinois, accounting for about 5% of the land area of the state. Most occur on glacial outwash plains resulting from erosional events associated with Wisconsin glaciation (Willman and Frye 1970, King 1981). One extensive sand deposit is the Green River lowlands in northwestern Illinois in parts of Bureau, Henry, Lee, and Whiteside counties. Located just to the west of the terminal moraine of Wisconsin glaciation extensive amounts of sand and gravel were deposited here during intermittent warm periods of the Wisconsin Episode (Killey 1998). These sands were reworked by wind creating numerous small sand dune fields (Willman and Frye 1970).

These sand deposits are scattered throughout the Green River Lowland Section of the Grand Prairie Natural Division (Schwegman 1973). This section, that includes the broad valley of the Green River and lower Rock River, was formed about 10,000 years ago during the retreat of Wisconsin glaciation (Willman and Frye 1970). In early settlement times this section had extensive marshes and wet prairies associated with the Great Inlet Swamp that covered part of Lee County (Lyman 1901, McClain 1992, McClain and Ebinger 2000). Sand deposits containing numerous small dunes were common. Forests and savanna communities grew on the dry sandy ridges, while floodplain forests occurred along the rivers. At the present time grazing, drainage, and cultivation have disturbed nearly all of this section, while fire suppression has resulted in the formation of many poor-quality sand forests with numerous successional and non-native (exotic) species.

Gleason (1910) referred to the vegetation of the Green River Lowlands in his extensive study of the Illinois sand deposits. Until a few years ago that study was the only reference available of the flora of this region. Recently Phillippe et al. (2000, 2003) studied some of the sand prairie communities at the Green River State Wildlife Area (GRSWA); Handel et al. (2003) examined the sand prairie remnants and sedge meadows of the Richardson Wildlife Foundation, a private hunting club, while McClain et al. (2003) examined the vegetation of a dune ridge at Foleys Sand Prairie Nature Preserve. The purpose of this study was to determine the composition and structure of the vegetation of the sand communities present in the GRSWA. Also, as the result of an extensive fire in the marsh community of the GRSWA in 2005, we examine the changes in the vegetation of this large marsh area in 2006 and 2007.

STUDY AREA

The GRSWA, located in the southwestern part of Lee County, about 23 km south of Dixon, Illinois (S7, S8, S17, S18, T19N R9E and S12, S13 T19N R8E), is the most extensive area in public ownership in the Green River Lowlands. The initial purchase of land started in 1938 under the Federal Aid in Wildlife Restoration Act to provide habitat for waterfowl and dwindling populations of the greater prairie chicken (*Tympanuchus cupido*). Subsequent land purchases increased the size of the GRSWA to 1025.2 ha (2,533 acres). The area was under intense grazing prior to 1938, and was subjected to significant brush encroachment, lack of fire until 1987, and heavy mowing. Much of the grasslands of the GRSWA were mowed annually from June through September until 1998 (Todd Bittner - personal observations). During the natural areas inventory in mid 1970's no high quality natural areas were reported for the GRSWA (White 1978).

Since 1993 an active management program at the GRSWA has been implemented including burning, brush removal, restoration plantings, and exotic species control. Besides using prescribed fire to manage the prairie communities, most of the forested areas, including the woody understory, were removed in the fall and winter of 2001. Fire was introduced into many of the potential natural areas of dry, dry-mesic, and mesic sand prairies in 1987 and most were burned once every one to three years. Presently this multiple-use area is managed for the protection and enhancement of wildlife and natural heritage resources.

The soils of the uplands at the GRSWA are Billett fine sandy loam, Chelsea fine sand, and Sparta loamy sand (Zwicker 1985). These soils, which occur on side slopes and ridges of dunes, are relatively low in organic mater, well drained, and have a surface layer of dark gray to yellow brown friable fine sand. The wetland soils are Adrian muck, Gilford fine sandy loam, Orio mucky sandy loam, and Orio sandy loam. Very high in organic material, these soils occur on level, poorly drained outwash plains and are ponded for much of the winter and early spring.

On 18 October of 2005 the extensive marsh at the western part of the GRSWA was burned in an attempt to decrease the growth of the exotic species *Phalaris arundinacea* (Lavergne and Molofsky 2006). Dry conditions at the time of the controlled burn resulted in extensive peat fires. These peat fires continued to smolder, the fire-crew being unable to extinguish them. A temperature inversion two nights after the fire, held the thick smoke close to the ground preventing the movement of car traffic, as well as creating a heath hazard. At that time water was being pumped into the marsh from central pivot irrigation wells located on

surrounding farms. It was difficult, however, to get water to all parts of the marsh. Attempts were made to extinguish the smoldering peat in these areas by disking. Where the peat fires were extensive the area was flooded, then disked, then flooded again and disked again. Some peat fires were not extinguished until the middle of November.

Climate in northwestern Illinois is continental with warm summers and cold winters. Based on weather data from Dixon, located near the north central edge of Green River Lowland, the mean annual precipitation is 94.7 cm, June having the highest rainfall (12.4 cm), and February the lowest (3.6 cm). Mean annual temperature is 8.5^{o}C with the hottest month being July (average of 22.3^{o}C), and the coldest January (average of –7.9^{o}C). Average number of frost-free days is 161 (Midwestern Regional Climate Center 2008).

METHODS

Vascular Plant Species and Communities: The natural areas studied were visited at various times each year throughout the growing seasons of 2000 through 2007. Voucher specimens of each plant species were collected, identified, and deposited in the herbarium of the Illinois Natural History Survey, Champaign, Illinois (ILLS), and the Stover-Ebinger Herbarium of Eastern Illinois University, Charleston, Illinois (EIU). Criteria for designating non-native species followed Mohlenbrock (2002), Gleason and Cronquist (1991), and Taft et al. (1997). Nomenclature follows Mohlenbrock (2002). The plant communities encountered were designated and plotted using the classification system of White and Madany (1978). The locations of threatened and endangered plant species were recorded (Herkert and Ebinger 2002).

From the species encountered the Floristic Quality Index (FQI) was determined for community type using the coefficient of conservatism (CC) assigned each species 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 quadrate-based sampling methods, provides a way to making comparisons among sites. Prairies with an FQI of 35 or higher are considered high quality

natural areas (Taft et al. 1997). All species recorded for the plots as well as all other species observed in the community were used to determine the FQI of each site.

The Sorensen Index of Similarity (ISs) was used to determine the degree of vegetation similarity between the prairie areas surveyed throughout the Mississippi River sand deposits (Mueller-Dombois and Ellenberg 1974). In this index [ISs = 2C/A+B x 100], where A equals the number of species in the first community, B equals the number of species in the second community, while C equals the number of species common between the two communities.

Ground Layer Sampling: In mid-summer of 2003 through 2007 line transects were located randomly along cardinal compass directions within the sand prairies (Tables 1 & 2), sedge meadows (Tables 2 & 3), and marsh communities (Table 4, 5, 6, 7, 8, 9, 10, & 11). Many of the sites were sampled two or three times during the study, the starting points of each transect were marked with metal stakes and relocated using GPS coordinates during each survey. The dry, dry-mesic, mesic, and wet sand prairies were surveyed once (2006), the marsh communities were tallied in 2002, and again in 2006 and 2007 after a very hot fire damaged the marsh in 2005. The sedge meadow located next to the wet sand prairie was surveyed in 2006; the one associated with the marsh in 2002, 2006, and 2007. Within each community two transects were randomly located. Along each transect, $1m^2$ quadrates were located at 1 to 5 m intervals (on larger sites the quadrats were more widely spaced) alternately along transects (n=50). A random numbers table was used to determine the number of meters (0 to 9) a quadrate was located from the transect line. Species cover was determined using the Daubenmire (1959) cover class system as modified by Bailey and Poulton (1968). Only ground layer species rooted within the quadrate frame were recorded. 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%. Importance value (IV) was determined by summing relative cover and relative frequency.

Forest Sampling: In the summer of 2001 the overstory of the forests at the GRSWA were sampled using circular plots 0.3 ha in size spaced at 25 m intervals along line transects. Within each plot all living individuals $\geq$10.0 cm dbh were identified and diameters recorded. From these data, living-stem density

(stems/ha), basal area (m^2/ha), relative density, relative dominance, importance value, and average diameter (cm) were calculated for each species (Table 12). Determination of the IV followed the procedure used by McIntosh (1957), and is the sum of the relative density and relative dominance (basal area). Woody understory composition and density (stems/ha) was determined using nested circular plots 0.0001, 0.001, and 0.01 ha in size located at 15 m intervals along randomly located east-west transects within each study area. Four additional 0.0001 ha circular plots were located 6 m from the center points of each plot centers 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.

During the late fall and winter of 2001 these forested areas, including their woody understory, were removed. The bare sand and waste material from the forest were left on the sites and no prairie seed was planted. The resulting lowland and upland successional communities were examined in 2002, 2003, and 2006 (Table 13 & 14). Within each community four transects were randomly located. Along each transect, $1m^2$ quadrates were located at 1 m intervals alternately along transects (n=100). A random numbers table was used to determine the number of meters (0 to 9) a quadrate was located from the transect line. Species cover was determined using the Daubenmire (1959) cover class system as modified by Bailey and Poulton (1968). Importance value (IV) was determined by summing relative cover and relative frequency.

Aerial photographs from 1939, 1951, 1970, and 1988 were digitized to determine woody encroachment (trees and large shrubs) at the GRSWA. These aerial photographs were borrowed from the University of Illinois Map Library and scanned with a Microtek ScanMaker. Twenty-one stratified random 5 ha sites, approximately 10.1156% of the GRSWA were interpreted and then digitized using ARC/INFO. The 1939, 1951, and 1970 aerial photographs were all flown in August while the 1988 aerial photograph was flown in April.

RESULTS

Dry Sand Prairie: One good quality dry sand prairie was encountered on the GRSWA. This site, about 2 ha in size, was located on the ridge and upper slopes of a large stabilized sand dune of Chelsea fine sand (SW1/4 SW1/4 S7 T19N R9E). The dominant grasses, which did not exceed 1 m in height, were

Schizachyrium scoparium (IV of 48.7), *Koeleria macrantha* (IV of 5.0), *Dichanthelium villosissimum* (IV of 4.7), and *Leptoloma cognatum* (IV of 4.4)*. Ambrosia psilostachya* ranked second in IV (25.2), while other common forbs included *Chrysopsis camporum, Solidago nemoralis*, and *Coreopsis lanceolata*. *Amorpha cansecens* (third in IV), *Rosa carolina*, and *Rhus aromatica* were the only woody species encountered in the plots (Table 1). Based on the Sorensen Index of Similarity the dry sand prairie was similar to the dry mesic sand prairie (ISs of 58.82) but had no species in common with the sedge meadows (Table 15). Of the 48 taxa recorded in the plots four were exotic species, *Achillea millefolium (IV of 6.2)* being the most common. Average bare ground and litter was 29%. A total of 94 species were observed in the dry sand prairie for an FQI of 36.16 and a mean CC of 3.73.

Dry-mesic Sand Prairie: On the east side of the GRSWA was a dry-mesic sand prairie on Chelsea fine sand. This sand prairie, covering about 3 ha, occupied the dune ridge and upper dune slopes (NE1/4 SW1/4 S17 T19N R9E). The dominant grasses, which were between 0.9 and 1.3 m tall, included *Sorghastrum nutans* (IV of 18.1) and *Schizachyrium scoparium* (IV of 15.1). Other relatively common grasses were shorter and included *Dichanthelium villosissimum, D. oligosanthes, D. perlongum*, and Leptoloma cognatum (Table 1). Common forbs included *Antennaria plantaginifolia* (IV of 29.2), *Liatris aspera* (IV of 18.9), *Euthamia gymnospermoides* (IV of 16.9), and *Euphorbia corollata* (IV of 13.6). *Antennaria plantaginifolia* commonly covered small areas in a near monoculture. Three exotic species were recorded, *Rumex acetosella* (IV of 5.0), *Poa pratensis*, and *Achillea millefolium*. Based on the Sorensen Index of Similarity the dry-mesic and mesic prairies were similar (ISs of 49.38) but had only a few species in common with the wet prairies and sedge meadows (Table 15). Overall, 37 species were found in the plots. In the dry-mesic sand prairie the vegetation was relatively sparse as indicated by the high cover for bare ground and litter (25%). A total of 102 species were observed in the dry-mesic sand prairie for an FQI of 37.77 and a mean CC of 3.74.

Mesic Sand Prairie: One high quality mesic to wet-mesic sand prairie occurred on the GRSWA. This extensive area, about 34 ha in size, had high natural quality, few exotic species, and high diversity (SW1/4 S17 T19N R9E). Topographic differences were responsible for the mosaic of sand species that existed here, varying from the dry-mesic sand prairies on the low dune ridges to sand ponds in the small depressions.

Mesic sand prairie vegetation occurred on the slopes of the dunes where the soils were Dakota sandy loam. In contrast, the wet-mesic prairie was on the lower ground between the dunes on Hoopeston fine sandy loam. *Sorghastrum nutans* (IV of 23.7) and *Andropogon gerardii* (IV of 8.4) were the dominant tall grasses, commonly being more than 1.6 m tall. Other common grasses included *Dichanthelium acuminatum* (IV of 11.4), *Agrostis gigantea* (IV of 5.7), and *Panicum virgatum* (IV of 4.8) (Table 1). The common native forbs included *Parthenium integrifolium* (IV of 27.5)*, Fragaria virginiana* (IV of 16.6), *Liatris pycnostachya* (IV of 14.2), and *Euthamia gymnospermoides* (IV of 11.0) (Table 1). Based on the Sorensen Index of Similarity the mesic sand prairie was similar to the dry mesic sand prairies (ISs of 49.38), and have very low similarity to the wet sand prairie and sedge meadows (Table 15). A total of 44 taxa were encountered in the plots, including three exotic taxa. Bare ground and litter averaged 13%. A total of 124 species were observed in the mesic prairie for an FQI of 45.21 and a mean CC of 4.06.

Wet sand prairie: Along the western and northern edges of the sedge meadow located at the southeastern part of the GRSWA is a 5 ha wet sand prairie (NE1/4 SW1/4 S17 T19N R9E). The vegetation of this prairie was transition between the sedge meadow and wet-mesic to mesic sand prairie to the north and west. Here slight changes in species composition occurred depending upon slight differences in elevation. *Spartina pectinatus* was the dominant grass (IV of 18.8), while *Carex haydenii* was the common sedge (IV of 11.6). Common forbs included *Helianthus grosseserratus*, *Solidago canadensis, Onoclea sensibils*, *Galium obtusum*, *Hypericum sphaerocarpum*, and *Silpium integrifolium* all with IV's of 8.0 or higher (Table 2). Based on the Sorensen Index of Similarity the wet sand prairie was similar to the mesic sand prairies and the sedge meadows, with low similarity to the drier sand communities (Table 15). Within the wet prairie 68 taxa were encountered in the plots, including three exotic species, *Poa pratensis* (IV of 1.2) being the most important. Bare ground and litter was uncommon. A total of 102 species were observed in the wet sand prairie for an FQI of 39.11 and a mean CC of 3.87.

Sedge meadows: Hummocks were present throughout the sedge meadows, their height dependent on the distance from the sedge meadow center, the smaller hummocks near the edge, the larger and taller near the center. One small sedge meadow, covering less than 0.5 ha, occurred in a shallow depression near the

southeast corner of the GRSWA (NE1/4 SW1/4 S17 T19N R9E) (sedge meadow East). *Bolboschoenus fluvatilis* (IV of 44.3) was the most important species, with *Carex haydenii* (IV of 38.9) second. The common species recorded for this sedge meadow included *Thelypteris palustris* (IV of 19.8), *Onoclea sensibilis* (IV of 16.5), and *Aster praealtus* (IV of 12.6). At the south edge of this sedge meadow was a depression that probably represents an old sand pond that became partially filled and no longer holds water year around. *Bolboschoenus fluviatalis* dominated this depression with *Persicaria amphibium* common. A total of 44 species were observed in this sedge meadow for an FQI of 30.30 and a mean CC of 4.57.

At the southeast corner of the marsh is a 1.5 ha sedge meadow (SE1/4 NE1/4 S13 T19N R8E) (sedge meadow West). In 2002 this sedge meadow was dominated by *Carex haydenii* (IV of 43.7) and *Calamagrostis canadensis* (IV of 42.7), while *Persicaria coccinea* (IV of 24.0) was also common (Table 3). Three exotic species were recorded with *Mentha arvensis* extremely common with an IV of 15.0, followed by *Chenopodium album* and *Persicaria vulgaris*. Though burned in 2005, no peat fires occurred and the area was not subjected to disking. During the 2006 and 2007 surveys the three top dominant species maintained their importance. Eleven additional species were found in the plots in 2006. By 2007 most of these species were lost or greatly reduced in abundance, and the original dominants of 2002 had regained much of their previous importance. By 2007 two native forbs had become more obvious, *Teucrium canadense* (IV of 3.7 in 2002 to 7.1 in 2007), and *Aster praealtus* (IV of 0.9 in 2002 to 30.8 in 2007) (Table 3). In 2002, a total of 42 species were observed in the dry sand prairie for an FQI of 21.49 and a mean CC of 3.31.

Marsh: Located along the western edge of the GRSWA, the marsh was divided into five vegetation zones (W1/2 S13 T19N R8E). Within this 40 ha marsh/sedge meadow complex the vegetation zones were mostly dependent on slight differences in elevation, soils, and past disturbance, particularly drainage attempts and fire frequency, intensity, and time of year. The transition between the various vegetation zones was rapid, the edge of the zones being very distinct. Very few non-native species were encountered, most species were native and some were conservative species. With the marsh 36 species were found in the plots, five being exotic taxa. The FQI of the marsh was 18.48 while the mean CC was 3.08. Much of this marsh area was burned in the fall of 2005.

Phalaris Vegetation Zone: Shallow areas throughout the marsh, where water level fluctuations were more pronounced, *Phalaris arundinacea* was the common species (Table 4). This disturbance community occurred in areas where water levels were usually low and flooding was of short duration. This zone was found throughout nearly all of the extensive wetlands at the GRSWA, and in this marsh in the western edge of the GRSWA accounted for nearly half of the marsh area. When surveyed in 2002 *Phalaris arundinacea* dominated with an IV of 130.1 and a mean cover of 79% while *Persicaria coccinea* had an IV of 44.3. Six other species were encountered all being uncommon. In 2006, after the 2005 fire, *P. arundinacea* continued to dominate, and in 2007 had an IV of 142.4. Many other species were also common in 2006, but by 2007 many had disappeared (Table 4). Most notable was *Ambrosia artemisiifolia* which in 2006 was second with an IV of 31.8, but was not found in the plots in 2007.

Salix interior thickets were common at the edge of the marsh as narrow bands at the base of the stabilized dunes. When surveyed in 2002 *Phalaris arundinacea* dominated the ground layer beneath these willow thickets with an IV of 146.3 and a mean cover of 59%. *Persicaria punctatum* was second in IV while only seven other species were occasionally encountered (Table 5). After the 2005 fire, P. arundinacea was still the dominant, followed by *Urtica gracilis* in 2006 (IV of 29.6) while in 2007 *U. gracilis* dropped to third. Five taxa not found in 2002 were encountered in 2006, while this number increased to 14 in 2007.

One extensive *Phalaris arundinacea* population occurred in a shallow depression near the middle of the GRSWA and close to the office building (SW1/4 NE1/4 S18 T19N R9E). During the 2005 fire this entire area burned and extensive peat fires destroyed much of the peat that smoldered for about 2 weeks. The depression was flooded and finally disked. In 2006 *P. arundinacea* was not recorded in any of the plots when the site was surveyed. Numerous native and some exotic species were common with the exotic *Circium arvense* the dominate taxon (IV of 123.8, mean cover of 63%) (Table 6). Other common species included the native taxa *Oenothera biennis, Verbena hastata,* and *Persicaria punctata* along with the exotic *Chenopodium album*. By 2007 *P. arundinacea* had returned (IV of 9.9 and a mean cover of 1%). During this 2007 survey *C. arvense* had nearly disappeared and though many native weedy species had invaded, extensive areas of bare ground were present, increasing from 22% in 2006 to 71% in 2007 (Table 6).

Typha/Persicaria Vegetation Zone: In 2002, scattered throughout the marsh were extensive areas where *Typha latifolia* was the dominant and obvious species with an IV of 86.7 and a mean cover of 56% (Table 7). *Persicaria cooccinea* (IV of 32.0) was common under and among the cattails as was *Carex lacustris* (IV of 27.8). Many other species were occasionally encountered, 14 being found in the plots, none very obvious, being in low numbers and stature. After the 2005 fire, *T. latifolia* nearly disappeared with an IV of 0.9 in 2006, increasing to an IV of 16.1 and a mean cover of 4% in 2007 (Table 7). In 2006 *Phalaris arundinaceae* was invading this site, and by 2007 was the dominant species present with an IV of 88.4, mean cover of 62.07. Thirteen additional species were recorded in these plots in 2006 while many disappeared by 2007.

One extensive *Typha latifolia* population, about 16 ha in size, occurred next to the road at the western edge of the marsh, separated from the rest of the marsh by a narrow sand ridge. During the 2005 fire much of this area burned and the fire destroyed extensive areas of peat, the fires smoldering for a few days. The depression was flooded and finally disked. Though the dominant species before the 2005 fire, *T. latifolia* had an IV of 4.6 in 2006, which increased to 41.6 in 2007 (Table 8). *Phalaris arundinacea,* which was rarely encountered before the 2005 fire, had and IV of 132.5 and a mean cover of 80% in 2006, which decreased to an IV of 65.5 and a mean cover of 18% in 2007.

Bolboschoenus fluviatilis Vegetation Zone: One area, about 1.2 ha in size, was found where *Bolboschoenus fluviatilis* was the dominant and obvious species with an IV of 109.7 and mean cover of 69% (Table 9). *Persicaria coccinea* (IV of 47.0) was common under and among the river bulrush as was *Sparganium eurycarpum* (IV of 21.4) and Urtica gracilis (IV of 21.3). Only five species were found in the plots, and no exotic species were encountered. After the 2005 fire, B. fluviatilis had an IV of 1.5 in 2006, increasing to 68.0 and a mean cover of 44% in 2007 (Table 9). Thirteen additional species were recorded in these plots in 2006 while many disappeared by 2007.

Sparganium eurycarpum Vegetation Zone: A few small areas were dominated by *Sparganium euryocarpum*, none exceeding 0.5 ha. In these areas S*parganium euryocarpum* was the dominant and obvious species with an IV of 91.2 and mean cover of 46% (Table 10). *Persicaria coccinea* (IV of 53.8) was

also common followed by Urtica gracilis (IV of 22.3). Only eight species were found in the plots, while the exotic *Phalaris arundinacea* was rarely encountered. After the 2005 fire, *S. eurycarpum* was not found in the plots, and by 2007 was still uncommon (IV of 5.4). In contrast, *Persicaria coccinea* had an IV of 42.9 in 2006, increasing to 90.1 in 2007. Thirteen additional species were recorded in these plots in 2006 while some disappeared by 2007.

Carex lacustris/Persicaria coccinea Vegetation Zone: Located next to the sedge meadow, in the southeastern part of the marsh, this zone covered about 5 to 6 ha, surrounding the sedge meadow. The dominant species, *Carex lacustris* (IV of 75.4 and a mean cover of 43%), *Persicaria coccinea* (IV of 69.1 and a mean cover of 36%), and *Calamagrostis canadensis* (IV of 30.8 and a mean cover of 18%) far exceed the importance of the other species present (Table 11). Thirteen species were encountered in the plots with more than half with IVs below 1.5. Though burned in 2005, no peat fires occurred and the area was not subjected to disking. During the 2006 and 2007 surveys the three top dominant species maintained their importance. Seventeen additional species were found in the plots in 2006, with the native *Ambrosia artemisiifolia* (IV of 37.3) and the exotic *Chenopodium album* (IV of 18.6) the obvious invaders. By 2007 most of these species were lost or greatly reduced in abundance, and the original dominants of 2002 had regained much of their previous importance. By 2007 two native prairie forbs became much more obvious, *Teucrium canadense* (IV of 1.4 in 2002 to 14.6 in 2007), and *Aster praealtus* (IV of 0.8 in 2002 to 12.6 in 2007) (Table 11).

Sand pond: Scattered through the lowlands of the GRSWA were a few small sand ponds, none more than 55 m across. The vegetation surrounding these ponds varied extensively. Most ponds were located where *Phalaris arundinaceae* dominated which covered the pond margins with few other species being encountered. Around a few ponds, however, wet to wet-mesic sand prairie vegetation dominated depending on the steepness of the shoreline. No high quality sand ponds were encountered during this study.

Sand forest: The lowland and upland forests at the GRSWA were similar in composition and structure. The lowland forests (Site 1, 2, 3, and 4) were dominated by *Acer saccharinum* with a few subdominant species

such as *Prunus serotina, Populus deltoides*, *Juglans nigra, Acer negundo, Salix nigra*, and *Fraxinus pennsylvanica* (Table 12). In these forests *Acer saccharinum* consistently had a high importance (IV of 129.7 to 158.4), high densities (225 to 765 stems/ha), and were of relatively large size (average of 22.8 to 35.5 dbh.). In contrast, the upland forests (Sites 5 and 6) where commonly dominated by *Prunus serotina* along with the exotic species *Morus alba* or *Robinia pseudoacacia* along with some of the lowland forest species (Table 12). In both forest types the woody understory was dense, many native and exotic trees and shrubs common. Overall, woody seedling densities averaged between 6000 and 15000 stems/ha, small saplings averaged between 3400 and 6000 stems/ha, while large saplings were not common with an average between 0 and 740 stems/ha. The most abundant understory shrubs were mostly exotic species with *Elaeagnus umbellata, Lonicera maackii, Lonicera x bella, Rhamnus cathartica*, and *Rosa multiflora* common.

The ground layer in these six forest sites was similar (Phillippe et al 2003). In addition to the numerous woody tree seedlings and shrub in the ground layer, many herbaceous species were common. Generally native herbs dominated with *Ageratina altissima, Antenoron virginianum, Boehmeria cylindrica, Cryptotaenia canadensis, Geum canadense, Osmorhiza sp., Phytolacca americana, Solidago canadensis,* and *S. gigantea* the most common taxa. A few exotic herbs sometimes dominated, including *Alliaria petiolata, Bromus inermis, Fallopia convolvulus,* and *Phalaris arundinacea.*

Woody encroachment at the GRSWA has increased dramatically based on the analysis of aerial photographs. In 1939, one year after the initial purchase of the land for the GRSWA, approximately 47.5 ha (4.6% cover) were covered by trees and large shrubs. By 1951 the extent of the forested areas had increased to 72.2 ha (7% cover), increased to 184.9 ha (17.8% cover) in 1970, and 294.6 ha (29.4% cover) in 1988. Woody encroachment was most obvious along many of the original hedge rows and where pine plantations were introduced soon after the site was purchased.

In 2001 most of the forest at the GRSWA were cut including all of the forested areas surveyed during this study. Two of these resulting successional areas, a lowland and an upland site, were surveyed in 2002, 2003, and 2006. On the lowland site *Phalaria arundinacea* was the leading dominant throughout the five years of the study while *Persicaria pensylvanica, Solidago canadensis, Lactuca serriola, Chenopodium album,* and *Conzya canadensis* were among the five most important species (Table 13). In 2002 on the upland site *Phytolacca americana* (IV of 38.8) dominated with *Solanum ptychanthum, Chenopodium album,*

Lonicera maackii, and *Cyperus schweinitzii* following in IV (Table 14). By 2003 *Conyza canadensis* (IV of 51.3) dominated followed by *Lonicera maackii, Verbascum thapsus* and *Cyperus lupulinus*, while in 2006 *Rubus pensylvanicus* (IV of 29.4)*, Verbascum thapsus, Chenopodium album* and *Lonicera maackii* were the dominants. As would be expected many exotic species were found on these successional sites, 28 in the lowland and 21 in the upland. (27% and 31% respectively of all species recorded).

DISCUSSION

Exotic Species: The sand prairie communities at the GRSWA had high species richness, many prairie conservative species, and few exotic taxa. Exotic species were usually present in low number, occurred in restricted areas, and were not major community components. Only three exotic species were consistently encountered in the plots of the upland sand prairies. These species, *Achillea millefolium, Rumex acetosella,* and *Poa pratensis*, were mostly localized, and though sometimes recorded in high frequencies they had low densities (Table 1). In the wet sand prairie the exotic species included *Poa pratensis, Lactuca serriola,* and *Rumex crispus,* all with very low numbers. In the sedge meadows four exotic species were recorded with *Mentha arvensis* the most common (IV of 15.0) (Table 2 and 3). *Phalaris arundinaceae* was the dominant species throughout most of the GRSWA lowlands, particularly the marsh. The abundance of *Phalaris arundinacea* at the GRSWA is an indication of past disturbances, particularly the fluctuation of water levels due to attempts to drain these lowlands. Water table fluctuations resulting from large amounts of ground water being removed for irrigation has exasperated the problem.

Endangered Species: Few endangered and threatened species were encountered in the GRSWA, probably the result of poor management prior to 1993. *Botrychium matricariifolium* was the only endangered species found at the GRSWA, occurring at the edge of a mesic sand prairie beneath individuals of *Lonicera maackii.* Three threatened species were found, Lechea intermedia, *Orobanche ludoviciana*, and *Platanthera flava* var. *helbiola* (Herkert and Ebinger 2002, Illinois Endangered Species Protection Board 2005)

Dry Sand Prairie: The dry sand prairie at the GRSWA is similar to the dry sand prairie at Foley Nature Preserve (McFall and Karnes 1995). Located in the extreme western part of Lee County (SW1/4 S7 T20N

R8E), this preserve covers the entire ridge and slopes of a small dune, and contains a 2.8 ha dry to dry-mesic sand prairie remnant. Like the dry sand prairie at the GRSWA, vegetation management at Foley Nature Preserve consisted of fairly frequent burns. *Schizachyrium scoparium* dominated both areas and many forbs were common to both sites. Common forbs at the Foley Nature Preserve were *Euphorbia corollata, Aster ericoides, Echinacea pallida, Coreopsis palmata* and *Ambosia psilostachya* while *Amorpha canescens* was the common shrub. Species diversity at Foley Nature Preserve was higher than at the GRSWA, however, and more conservative prairie species were present as indicated by an FQI of 52.98 and a mean CC of 3.96 (McClain et al. 2003) compared to and FQI of 36.16 and a mean CC of 3.73 at GRSWA. This may be the result of a more aggressive management program for a longer period of time, though disturbance prior to being acquired was probably more important. The low numbers of exotic taxa, along with the native and conservative prairie taxa indicate that both sites are recovering from past disturbances.

The dry sand prairie at GRSWA is also similar to a small prairie remnant at the Richardson Wildlife Foundation (RWF). Located about 13 km east of Amboy, Lee County, Illinois (S13, S14, S3, S24, T20N R11E). The RWF is located near the southwestern edge of what was the Great Inlet Swamp (Killey 1998, Handel et al. 2003). This swamp covered approximately 12,000 ha, and existed because of the Dewey Dam, a natural limestone obstruction 8 km northeast of the town of Amboy, which prevented down-cutting and channel formation by the Green River (Lyman 1901). In the late 1880s, work began to drain this extensive swamp. Efforts to save the swamp and keep it as a wildlife sanctuary failed, and by 1901 the swamp was gone (McClain 1992, McClain and Ebinger 2000). After drainage most of the Great Inlet Swamp was farmed, but many smaller tracts were left for cattle grazing. As of 1999, 15 ha of sand prairie and sedge meadow remnants existed on the RWF.

This dry sand prairie remnant at RWF was wetter than the dry sand prairie at the GRSWA since the dunes in this part of the Green River Lowlands are smaller and the water table is closer to the surface. On this dry sand prairie *Sorgastrum nutans* dominated with an IV of 44.3 and a mean cover of 23.16. The common forb *Euthamia graminiifolia* was second in IV (28.4), while *Schizachyrium scoparium* (IV of 18.5) was third followed by *Soilidago nemoralis, Liatris aspera,* and *Viola sagittata*. Diversity was low with only 46 species being observed while *Rumex acetosella* (IV of 7.8), *Poa pratensis* (IV of 7.5), and *Achillea*

millefolium (IV of 1.2) were the exotic species recorded (Handel et al. 2003). The FQI of this dry sand prairie was 29.28 and a mean CC of 4.18 (FQI of 36.16, mean CC of 3.73 at GRSWA).

Dry-mesic Sand Prairie: *Sorghastrum nutans* was the dominant native grass in the dry-mesic sand prairies at the GRSWA and the RWF (Handel et al. 2003). *Andropogon gerardii*, in contrast, was important at GRSWA, but nearly absent at the RWF. *Dichanthelium villosissimum*, a low-growing bunch grass, was fifth in IV at GRSWA but was not encountered at RWF. The dominant forbs on the RWF were *Solidago nemoralis, Parthenium integrifolium* and *Euthamia graminifolia*. Only about half of the species were common to both sites, however, the RWF was relatively rich in conservative species that were not found at GRSWA. The FQI was 41.88 and the mean CC was 4.44 at the RWF (FQI of 37.77, mean CC of 3.74 at GRSWA).

Mesic Sand Prairie: The mesic to wet-mesic sand prairies at RWF and GRSWA were not similar in species composition (Handel et al. 2003). On both sites *Sorghastrum nutans* and *Andropogon gerardii* were the dominant tall grasses. Also, at both sites forb diversity was high, but few of the species encountered at the GRSWA were found at RWF, and except for the dominant tall grasses there was almost no similarity between the two sites. The mesic sand prairie at RWF had an FQI of 52.10 and the mean CC was 4.59 (FQI of 45.21, mean CC of 4.06 at GRSWA). Overall, there were fewer native prairie species at the GRSWA and most were not conservative species. Past destructive management practices at the GRSWA prior to 1993 were probably responsible for these differences.

Wet Sand Prairie: The only wet sand prairie examined in the Green River Lowlands was associated with a sedge meadow/mesic prairie area at the GRSWA. This plant community is similar in species composition to wet “black soil” prairies with *Spartina pectinatus, Calamagrostis canadensis, Thelypteris palustris* and various *Carex* species common (White and Madany 1978). At the GRSWA the wet sand prairie had the highest species diversity of all communities encountered with 102 taxa. Many were conservative species, some of which were very common throughout the wet prairie.

Sedge Meadow: Sedge meadows are relatively common in the preserves in the Green River Lowlands. Two were studied at the GRSWA while earlier three had been examined at the RWF (Handel et al. 2003). All were similar in having *Carex haydenii* as the dominant species that produced extensive hummocks. At the RWF the common species encountered included *Onoclea sensibilis, Thelypteris palustris, Calamagrostis canadensis, Helanthus grosseserratus, Boehmeria cylindrica*, *Solidago gigantea*, and *Galium obtusum*. At the GRSWA sedge meadows many of the same species were encountered (Table 2 and 3). The sedge meadows at RWF averaged between 39 and 54 species in the plots, the mean CC varied from 4.42 to 4.86, while the FQI ranged from 30.28 to 34.30. At the GRSWA, in contrast, the plots contained 25 to 29 taxa, the mean CC was from 3.31 to 4.57 while the FQI ranged from 21.49 to 30.30. The reason for the lower species diversity at the GRSWA is not known, but is undoubtedly related to past disturbances, and more active management, including water table manipulation at the RWF.

Marsh: The only marsh examined in the Green River Lowlands was the extensive area at the western edge of the GRSWA that was surveyed in 2002 and burned in 2005. These same areas were surveyed in late summer of 2006 and 2007 using the same transects. During the 2002 survey species diversity was very low, only 36 species being encountered in the plots. Most of these species were common, being found in many marshes throughout most of Illinois (White and Madany 1978).

The general trend observed when 2002 data was compared with that of 2006 and 2007 was that the first year after the fire many native weedy species became important while the 2002 species were present in low numbers. By 2007 many of these native weedy species were in very reduced numbers or were absent altogether, while many of the species recorded in 2002 were recovering, sometimes back to their original IV's (Tables 4, 5, 7, 9, and 11). Many of the species with very low number in 2002, however, were not found in the later surveys as they were never important stand components. One major exception was the *Sparganium eurycarpum* dominated vegetation zone (Table 10). It appears that this species does not do well after hot fires, many of the rhizomes not surviving.

In areas that had been repeatedly disked and flooded after the 2005 fire, very little of the original vegetation was encountered in the 2006 and 2007 surveys. At one site, where *Phalaris arundinacea* dominated before the fire, native and exotic weedy species dominated in 2006, with no *P. undinaceae* being

recorded. *Phalaris arundinacea* was found in low numbers in 2007 with a mean cover of 1% and an IV of 9.9 (Table 6). At a site dominated by Typha latifolia before the fire, the IV of this species in 2006 was 4.6, and in 2007 was 41.6 but with a cover of only 12% (Table 8).

Sand Forest: Based on General Land Office (GLO) survey notes and plats, the sand deposits of the Green River Lowlands were dominated by sand prairies and marshes. The dominant tree on sand dunes was *Quercus velutina*, mostly occurring as scattered individuals on dune ridges and protected sites. These savannas consisted of open-grown trees, and a ground cover dominated by sand prairie grasses and forbs (Curtis 1959, Bray 1960, Nuzzo 1986, White and Madany 1978). In dry sand savannas the soil lacked a dark A horizon and the ground cover was composed of many prairie species with the dominant bunch-grasses mostly less than 1 m tall. The savanna canopy was dominated by *Quercus velutina* with a canopy cover that averaged between 10 and 80%. These dry sand savannas and occasionally dry sand forests were associated with dune and swale topography which probably limited the severity of fires. Post-settlement fire exclusion had increased the acreage of sand forest at the expense of sand savannas (White and Madany 1978, Anderson and Brown 1986, Anderson 1991, Abrams 1992).

The present forests of the GRSWA were of recent origin and in 2001 most were removed. Fire suppression and pine plantations had resulted in closed forest communities. These forests with 80 to 100% canopy cover had eliminated the common prairie and marsh plants associated with the dune and swale topography typical of Illinois sand deposits. The fast growing tree species of these mesic to wet mesic forests were commonly kept from covering large areas of the wetland and lower dune slopes by frequent prairie fires (McClain and Elzinga 1994). Common lowland species of the Green River Lowland, particularly along the major rivers and stream in pre-settlement times, were probably *Acer saccharinum, Celtis occidentalis, Fraxinus pennsylvanica, Populus deltoides, Prunus serotina,* and *Salix nigra.* These fast-growing, fire-sensitive, shaded-intolerant taxa were all common forest components at the GRSWA.

Management: The management of prairie and marsh communities at GRSWA since 1993 has been important in restoring these high quality natural areas. The use of fire on a regular basis has undoubtedly increased the quality of all the prairie and marsh areas. Also, active removal of brush and tree throughout

the GRSWA will greatly increase the number of areas that will revert back to prairie vegetation. The high importance values of some exotic species, particularly *Phalaris arundinacea*, indicated that these areas were not recovering rapidly from past disturbances. The presence of the native and conservative prairie taxa, however, indicated that the management practices had, in part, been successful, particularly in the prairie communities. The use of fire yearly is imperative if the upland sand prairie communities are going to increase in quality and species diversity (Bowles et al. 2003).

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Table 1. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2006 in a dry sand prairie, a dry-mesic sand prairie, and a mesic sand prairie, Green River State Wildlife Area, Lee County, Illinois. (n = 50) (*exotic species)

	Dry Sand Prairie			Dry-mesic Sand Prairie			Mesic Sand Prairie		
Species	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.
Schizachyrium scoparium	100	26.00	48.7	96	6.32	15.1	2	0.06	0.1
Ambrosia psilostachya	100	10.58	25.2	--	--	--	--	--	--
Amorpha canescens	64	5.91	14.8	--	--	--	--	--	--
Chrysopsis camporum	38	4.61	10.5	--	--	--	--	--	--
Solidago nemoralis	48	3.59	9.9	14	0.17	1.1	10	0.25	0.8
Coreopsis lanceolata	54	3.14	9.7	--	--	--	--	--	--
Cyperus lupulinus	86	0.53	8.7	44	0.27	3.2	--	--	--
Rosa carolina	46	1.75	6.9	28	0.93	3.1	--	--	--
**Achillea millefolium*	60	0.45	6.2	22	0.21	1.7	50	0.75	3.6
Koeleria macrantha	46	0.53	5.0	--	--	--	--	--	--
Tephrosia virginiana	14	2.31	4.8	--	--	--	--	--	--
Dichanthelium villosissimum	44	0.47	4.7	88	1.28	7.3	--	--	--
Leptoloma cognatum	42	0.41	4.4	52	1.00	4.7	--	--	--
Liatris aspera	22	0.89	3.4	100	8.80	18.9	--	--	--
Polygala polygama	32	0.16	3.1	100	0.55	7.0	--	--	--
Asclepias verticillata	30	0.15	2.9	4	0.02	0.3	--	--	--
**Poa pratensis*	30	0.15	2.9	38	0.19	2.7	46	2.61	4.5
Rhus aromatica	10	1.02	2.5	--	--	--	--	--	--
**Rumex acetosella*	24	0.12	2.4	62	0.76	5.0	--	--	--
Vulpia octoflora	20	0.10	2.0	--	--	--	--	--	--
Carex muhlenbergii	18	0.14	1.9	16	0.08	1.1	--	--	--
Polygonum tenue	18	0.14	1.9	--	--	--	--	--	--
Ionactis linariifolius	6	0.87	1.8	--	--	--	--	--	--
Dichanthelium oligosanthes	16	0.08	1.6	80	0.75	6.1	--	--	--
Paspalum bushii	14	0.17	1.6	6	0.03	0.4	--	--	--
Sporobolus heterolepis	4	0.60	1.3	--	--	--	--	--	--
Physalis virginiana	12	0.06	1.2	--	--	--	--	--	--
Sporobolus cryptandrus	12	0.06	1.2	--	--	--	--	--	--
Hieracium longipilum	10	0.10	1.1	8	0.09	0.6	12	0.21	0.9
Eragrostis spectabilis	10	0.05	1.0	--	--	--	--	--	--
Penstemon pallidus	8	0.04	0.8	20	0.10	1.5	--	--	--
Potentilla simplex	6	0.13	0.7	--	--	--	--	--	--
Lithospermum croceum	6	0.08	0.6	--	--	--	--	--	--
Conyza canadensis	6	0.03	0.5	2	0.01	0.1	--	--	--
Phlox bifida	6	0.03	0.5	--	--	--	--	--	--
Sorghastrum nutans	6	0.03	0.5	98	8.32	18.1	100	28.22	23.7
Dichanthelium depauperatum	4	0.02	0.4	--	--	--	--	--	--
**Poa compressa*	4	0.02	0.4	--	--	--	--	--	--
Antennaria plantaginifolia	2	0.06	0.3	88	16.45	29.2	6	0.08	0.4
Helianthemum bicknellii	2	0.06	0.3	--	--	--	--	--	--
Lespedeza capitata	2	0.06	0.3	74	2.34	8.0	4	0.02	0.3
Asclepias hirtella	2	0.01	0.2	--	--	--	--	--	--
Bouteloua hirsuta	2	0.01	0.2	--	--	--	--	--	--
Erigeron strigosus	2	0.01	0.2	--	--	--	6	0.37	0.6
Euphorbia corollata	2	0.01	0.2	96	5.26	13.6	--	--	--
Euthamia gymnospermoides	2	0.01	0.2	96	7.54	16.9	100	7.56	11.0
Helianthus occidentalis	2	0.01	0.2	--	--	--	--	--	--
Juncus dudleyi	2	0.01	0.2	2	0.01	0.1	2	0.01	0.1

Carex tonsa	--	--	--	100	1.70	8.7	--	--	--
Rubus flagellaris	--	--	--	56	2.63	7.3	22	2.00	2.6
Dichanthelium perlongum	--	--	--	66	1.42	6.2	--	--	--
Aristida basiramea	--	--	--	62	0.31	4.4	--	--	--
Andropogon gerardii	--	--	--	14	0.85	2.1	70	6.39	8.4
Chamaecrista fasciculata	--	--	--	20	0.10	1.5	2	0.01	0.1
Agrostis gigantea	--	--	--	14	0.07	1.0	54	3.69	5.7
Parthenium integrifolium	--	--	--	8	0.36	1.0	100	34.31	27.5
Viola sagittata	--	--	--	4	0.31	0.8	98	7.05	10.5
Eragrostis spectabilis	--	--	--	6	0.08	0.5	6	0.08	0.4
Hypericum gentianoides	--	--	--	4	0.02	0.3	--	--	--
Oxalis stricta	--	--	--	4	0.02	0.3	2	0.01	0.1
Juncus greenei	--	--	--	2	0.01	0.1	2	0.01	0.1
Fragaria virginiana	--	--	--	--	--	--	100	16.63	16.6
Liatris pycnostachya	--	--	--	--	--	--	98	13.04	14.2
Dichanthelium acuminatum	--	--	--	--	--	--	98	8.50	11.4
Desmodium illinoense	--	--	--	--	--	--	94	8.62	11.2
Rudbeckia subtomentosa	--	--	--	--	--	--	68	6.47	8.3
Antennaria neglecta	--	--	--	--	--	--	44	6.59	6.9
Panicum virgatum	--	--	--	--	--	--	46	3.00	4.8
Acalypha gracilens	--	--	--	--	--	--	64	0.61	4.4
Polygala sanguinea	--	--	--	--	--	--	60	0.30	4.0
Hypericum punctatum	--	--	--	--	--	--	50	0.55	3.4
Solidago canadensis	--	--	--	--	--	--	32	1.38	2.9
Solidago missouriensis	--	--	--	--	--	--	28	0.34	2.0
Solidago gigantea	--	--	--	--	--	--	26	0.38	1.8
Prenanthes racemosa	--	--	--	--	--	--	22	0.46	1.7
Agrostis hyemalis	--	--	--	--	--	--	24	0.12	1.6
Rubus allegheniensis	--	--	--	--	--	--	8	0.48	0.8
Aster lanceolatus	--	--	--	--	--	--	8	0.04	0.5
Lobelia spicata	--	--	--	--	--	--	8	0.04	0.5
Equisteum arvense	--	--	--	--	--	--	6	0.03	0.4
Eryngium yuccifolium	--	--	--	--	--	--	4	0.12	0.4
Aster pilosus	--	--	--	--	--	--	4	0.02	0.3
Thalictrum dasycarpum	--	--	--	--	--	--	2	0.30	0.3
Ambrosia artemisiifolia	--	--	--	--	--	--	2	0.01	0.1
**Trifolium repens*	--	--	--	--	--	--	2	0.01	0.1
Totals		65.77	200.0		69.36	200.0		161.73	200.0
Bare ground and litter		28.71			25.35			13.03	

Table 2. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2006 in a wet sand prairie and an adjacent sedge meadow (sedge meadow East), Green River State Wildlife Area, Lee County, Illinois. (n = 50) (*exotic species)

Species	Wet Sand Prairie			Sedge Meadow East		
	Freq. %	Mean Cover	I.V.	Freq. %	Mean Cover	I.V.
Spartina pectinata	50	23.75	18.8	--	--	--
Helianthus grosseserratus	96	13.57	14.9	--	--	--
Solidago canadensis	72	15.03	14.3	--	--	--
Carex haydenii	100	8.23	11.6	52	36.21	38.9
Onoclea sensibilis	66	8.46	9.6	66	7.01	16.5
Galium obtusum	82	4.95	8.3	2	0.01	0.3
Hypericum sphaerocarpum	78	5.15	8.3	--	--	--
Silphium integrifolium	48	7.59	8.0	--	--	--
Viola pratincola	64	5.90	7.9	--	--	--
Stachys pilosa	92	2.62	7.4	--	--	--
Thalictrum dasycarpum	52	6.12	7.2	--	--	--
Euthamia gymnospermoides	42	5.10	5.9	--	--	--
Rudbeckia subtomentosa	38	5.19	5.8	--	--	--
Solidago gigantea	56	2.96	5.4	--	--	--
Aster praealtus	44	3.81	5.2	48	5.71	12.6
Pycnanthemum virginianum	42	3.46	4.9	--	--	--
Cirsium discolor	38	3.20	4.5	--	--	--
Comandra umbellate	26	3.90	4.2	--	--	--
Calystegia sepium	38	2.29	3.9	--	--	--
Thelypteris palustris	24	3.31	3.7	50	13.85	19.8
Calamagrostis canadensis	40	1.71	3.6	--	--	--
Rubus pensilvanicus	30	1.62	3.0	--	--	--
Campanula aparinoides	44	0.32	2.9	16	0.08	2.7
Muhlenbergia Mexicana	32	1.24	2.8	6	0.08	1.1
Asclepias syriaca	22	1.14	2.1	--	--	--
Aster puniceus	20	1.08	2.0	--	--	--
Potentilla simplex	24	0.56	1.9	--	--	--
Persicaria amphibium	24	0.46	1.8	50	4.95	12.3
Veronicastrum virginicum	16	0.86	1.6	--	--	--
Amphicarpaea bracteata	8	1.65	1.6	--	--	--
**Poa pratensis*	18	0.19	1.2	--	--	--
Agrimonia parviflora	10	0.49	0.9	--	--	--
Bolboschoenus fluviatilis	10	0.44	0.9	50	42.51	44.3
Erigeon annuus	8	0.48	0.8	--	--	--
Fragaria virginiana	8	0.43	0.8	--	--	--
**Lactuca serriola*	8	0.48	0.8	--	--	--
Rosa Carolina	8	0.43	0.8	--	--	--
Saxifraga pensylvanica	8	0.43	0.8	2	0.01	0.3
Lycopus uniflorus	10	0.15	0.7	36	0.38	6.1
Acalypha rhomboidea	10	0.05	0.6	--	--	--
Allium canadense	10	0.05	0.6	--	--	--
Ambrosia trifida	8	0.19	0.6	--	--	--
Rudbeckia hirta	4	0.60	0.6	--	--	--
Vitis riparia	4	0.60	0.6	--	--	--
Zizia aurea	6	0.37	0.6	--	--	--
Ambrosia artemisiifolia	6	0.13	0.5	--	--	--
Heuchera richardsonii	6	0.13	0.5	--	--	--
Rubus occidentalis	6	0.18	0.5	--	--	--
Scleria triglomerata	6	0.08	0.5	--	--	--

Liatris pycnostachya	4	0.36	0.4	--	--	--
Parthenocissus quinquefolia	4	0.31	0.4	--	--	--
Prenanthes racemosa	4	0.31	0.4	--	--	--
Sambucus canadensis	4	0.36	0.4	--	--	--
Oenothera biennis	2	0.30	0.3	--	--	--
Prunus virginiana	4	0.03	0.3	--	--	--
Dichanthelium acuminatum	4	0.02	0.2	--	--	--
Agrostis gigantea	2	0.01	0.1	--	--	--
Desmodium canadense	2	0.06	0.1	--	--	--
Gentiana andrewsii	2	0.06	0.1	--	--	--
Rhus glabra	2	0.06	0.1	--	--	--
Sorghastrum nutans	2	0.01	0.1	--	--	--
Verbena hastata	2	0.06	0.1	42	0.66	7.4
Solidago nemoralis	2	0.01	0.1	--	--	--
Boehmeria cylindrical	2	0.01	0.1	60	2.59	12.0
Lobelia siphilitica	2	0.01	0.1	--	--	--
Lysimachia quadriflora	2	0.01	0.1	--	--	--
Ranunculus abortivus	2	0.01	0.1	--	--	--
**Rumex crispus*	2	0.01	0.1	--	--	--
Scutellaria galericulata	--	--	--	26	0.13	4.3
**Solanum dulcamara*	--	--	--	18	0.82	3.6
Triadenum fraseri	--	--	--	18	.078	3.5
**Phalaris arundinacea*	--	--	--	14	1.23	3.3
Bidens coronata	--	--	--	14	0.22	2.5
Caltha palustris	--	--	--	12	0.26	2.1
Leersia oryzoides	--	--	--	10	0.10	1.7
Lysimachia thyrsiflora	--	--	--	8	0.43	1.7
Impatiens pallida	--	--	--	6	0.08	1.1
Iris shrevei	--	--	--	4	0.36	0.9
Ludwigia alternifolia	--	--	--	4	0.07	0.7
Pilea pumila	--	--	--	2	0.01	0.3
Totals		153.14	200.0		118.54	200.0
Bare ground and litter		1.50			1.88	

Table 3. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2002 and again in 2006 and 2007 in a sedge meadow (sedge meadow West) at the western edge of the Green River State Wildlife Area, Lee County, Illinois. (n=50) (*exotic species)

Species	Summer 2002			Summer 2006			Summer 2007		
	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I.V.
Carex haydenii	100	30.93	43.7	100	43.09	38.9	96	43.85	43.9
Calamagrostis canadensis	100	29.88	42.7	96	29.32	29.3	100	52.80	50.4
Persicaria coccinea	52	17.27	24.0	34	9.01	9.4	56	16.92	19.8
**Mentha arvensis*	72	5.18	15.0	38	1.08	4.5	20	1.12	3.8
Eupatoriadelphus maculatus	56	7.06	14.6	28	1.56	3.9	10	0.73	2.1
Persicaria punctata	72	1.40	11.3	64	1.11	7.0	44	0.62	7.2
Lycopus uniflorus	58	2.31	10.3	62	1.36	7.0	22	0.75	3.9
Verbena hastata	28	2.04	5.9	2	0.01	0.2	16	0.23	2.7
Scutellaria galericulata	24	0.76	4.1	10	0.10	1.1	10	0.15	1.6
Helianthus grosseserratus	20	1.27	4.0	84	17.40	20.0	16	0.18	2.6
Teucrium canadense	22	0.60	3.7	82	6.15	12.3	42	0.95	7.1
Lycopus americanus	16	0.67	2.8	18	0.44	2.1	8	0.48	1.5
Polygonum ramosissimum	14	0.46	2.5	40	2.20	5.5	20	0.10	3.2
Aster puniceus	12	0.60	2.3	36	2.47	5.3	14	0.56	2.6
Ambrosia artemisiifolia	10	0.49	1.9	50	11.47	12.6	10	0.10	1.6
Stachys pilosa	8	0.48	1.6	28	4.62	5.9	--	--	--
Rumex orbiculatus	8	0.43	1.5	4	0.02	0.4	2	0.30	0.5
Asclepias incarnata	8	0.14	1.2	--	--	--	2	0.01	0.3
Galium obtusum	6	0.42	1.2	4	0.60	0.8	2	0.01	0.3
Aster praealtus	4	0.36	0.9	40	5.86	7.9	86	26.43	30.8
Epilobium coloratum	4	0.36	0.9	--	--	--	--	--	--
Solidago gigantea	4	0.31	0.9	50	6.96	9.6	8	0.24	1.4
Cardamine pensylvanica	6	0.03	0.8	2	0.01	0.2	8	0.04	1.2
Acalypha rhomboidea	2	0.06	0.4	2	0.01	0.2	2	0.01	0.3
Eleocharis verrucosa	2	0.06	0.4	--	--	--	--	--	--
Geum laciniatum	2	0.06	0.4	--	--	--	--	--	--
Lathyrus palustris	2	0.06	0.4	--	--	--	12	1.03	2.7
**Chenopodium album*	2	0.01	0.3	44	1.21	5.1	--	--	--
**Persicaria vulgaris*	2	0.01	0.3	--	--	--	--	--	--
**Potentilla norvegica*	--	--	--	38	0.24	4.0	4	0.02	0.6
Cirsium discolor	--	--	--	20	0.35	2.2	2	0.01	0.3
Solidago canadensis	--	--	--	4	1.50	1.4	4	0.07	0.6
Lactuca canadensis	--	--	--	10	0.10	1.1	--	--	--
**Cirsium arvense*	--	--	--	4	0.12	0.5	--	--	--
Persicaria pensylvanica	--	--	--	4	0.02	0.4	--	--	--
**Trifolium repens*	--	--	--	4	0.02	0.4	--	--	--
Hackelia virginiana	--	--	--	2	0.06	0.2	--	--	--
Helenium autumnale	--	--	--	2	0.06	0.2	--	--	--
Solanum ptychanthum	--	--	--	2	0.01	0.2	--	--	--
Typha latifolia	--	--	--	2	0.01	0.2	16	0.96	3.1
**Phalaris arundinacea*	--	--	--	--	--	--	12	1.77	3.0
Eupatorium perfoliatum	--	--	--	--	--	--	2	0.01	0.3
Iris shrevei	--	--	--	--	--	--	2	0.01	0.3
Lysimachia thrysiflora	--	--	--	--	--	--	2	0.06	0.3
Totals		103.71	200.0		148.55	200.0		150.52	200.0
Bare ground and litter		1.20			3.65			2.13	

Table 4. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2002 and again in 2006 and 2007 in a *Phalaris arundinacea* vegetation zone that is not shaded in the marsh at the western edge of the Green River State Wildlife Area, Lee County, Illinois. (n=50) (*exotic species)

Species	Summer 2002			Summer 2006			Summer 2007		
	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I.V.
**Phalaris arundinacea*	100	79.05	130.1	100	84.55	117.1	100	83.30	142.4
Persicaria coccinea	80	8.17	44.3	66	7.45	28.5	60	7.27	40.2
Leersia oryzoides	20	1.94	10.9	--	--	--	--	--	--
Iris shrevei	16	1.63	8.9	4	0.07	1.4	8	1.41	5.8
Typha latifolia	4	0.12	1.9	--	--	--	--	--	--
Hibiscus laevis	2	0.75	1.7	--	--	--	--	--	--
Sium suave	2	0.30	1.2	--	--	--	--	--	--
**Cirsium arvense*	2	0.06	1.0	4	0.02	1.3	--	--	--
Ambrosia artemisiifolia	--	--	--	84	4.99	31.8	--	--	--
Rubus pensilvanicus	--	--	--	12	1.56	5.4	10	1.95	7.5
Scirpus cyperinus	--	--	--	6	0.08	2.0	--	--	--
Persicaria punctata	--	--	--	6	0.03	1.9	2	0.01	1.1
**Sida spinosa*	--	--	--	6	0.03	1.9	--	--	--
Stachys pilosa	--	--	--	4	0.07	1.4	--	--	--
Teucrium canadense	--	--	--	4	0.12	1.4	--	--	--
Verbena hastata	--	--	--	4	0.02	1.3	--	--	--
Calamgrostis canadensis	--	--	--	2	0.30	0.9	2	0.75	1.9
Ambrosia trifida	--	--	--	2	0.06	0.7	--	--	--
Carex lacustris	--	--	--	2	0.01	0.6	2	0.01	1.1
Hackelia virginiana	--	--	--	2	0.01	0.6	--	--	--
Solanum ptychanthum	--	--	--	2	0.01	0.6	--	--	--
**Verbascum thapsus*	--	--	--	2	0.01	0.6	--	--	--
Vitis riparia	--	--	--	2	0.01	0.6	--	--	--
Totals		92.02	200.0		99.40	200.0		94.70	200.0
Bare ground and litter		10.61			5.76			6.08	

Table 5. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2002 and again in 2006 and 2007 in a *Phalaris arundinacea* vegetation zone community that is shaded under a thicket of *Salix interior* in the marsh at the western edge of the Green River State Wildlife Area, Lee County, Illinois. (n=50)
(*exotic species)

Species	Summer 2002			Summer 2006			Summer 2007		
	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I.V.
**Phalaris arundinacea*	100	59.10	146.3	100	73.77	136.9	100	48.05	97.2
Persicaria punctata	48	1.24	26.5	14	1.38	9.3	50	6.56	23.4
Urtica gracilis	14	0.12	7.3	38	7.71	29.6	42	3.24	16.4
Persicaria coccinea	10	0.78	6.4	--	--	--	2	0.30	1.0
Carex lacustris	10	0.54	6.0	--	--	--	--	--	--
Scutellaria lateriflora	6	0.13	3.3	--	--	--	--	--	--
Pilea pumila	4	0.02	2.1	--	--	--	24	2.51	10.3
Vitis riparia	2	0.06	1.1	--	--	--	2	0.06	0.7
Phytolacca americana	2	0.01	1.0	4	1.05	3.4	6	0.08	1.8
Fallopia scandens	--	--	--	16	6.05	15.6	12	2.01	6.2
Persicaria pensylvanica	--	--	--	2	0.30	1.4	40	3.07	15.4
Rubus occidentalis	--	--	--	2	0.30	1.4	--	--	--
**Silene pratensis*	--	--	--	2	0.06	1.2	--	--	--
Solanum ptychanthum	--	--	--	2	0.06	1.2	6	0.03	1.8
Lemna minor	--	--	--	--	--	--	32	1.34	10.9
Salix nigra	--	--	--	--	--	--	10	0.34	3.3
**Alliaria petiolata*	--	--	--	--	--	--	8	0.67	3.2
Boehmeria cylindrica	--	--	--	--	--	--	8	0.14	2.4
Cuscuta gronovii	--	--	--	--	--	--	4	0.07	1.1
Rorippa palustris	--	--	--	--	--	--	4	0.07	1.1
Aster puniceus	--	--	--	--	--	--	2	0.30	1.0
Typha latifolia	--	--	--	--	--	--	2	0.30	1.0
Cirsium discolor	--	--	--	--	--	--	2	0.01	0.6
Geum canadense	--	--	--	--	--	--	2	0.01	0.6
**Persicaria vulgaris*	--	--	--	--	--	--	2	0.01	0.6
Totals		62.00	200.0		90.68	200.0		69.17	200.0
Bare ground and litter		34.02			4.42			34.20	

Table 6. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2006 and 2007 in a marsh that had been dominated by *Phalaris arundinacea* prior to a fire in late 2004, Green River State Wildlife Area, Lee County, Illinois. (n=50) (*exotic species)

Species	Summer 2006			Summer 2007		
	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.
**Cirsium arvense*	100	63.00	123.8	2	0.01	0.9
Oenothera biennis	20	3.45	13.5	--	--	--
**Chenopodium album*	20	3.00	12.9	--	--	--
Verbena hastata	18	2.41	11.2	--	--	--
Persicaria punctata	16	2.85	10.8	78	11.93	91.0
Amaranthus tuberculatus	12	2.70	8.8	--	--	--
Cycloloma atriplicifolium	8	0.96	4.9	--	--	--
Calamagrostis canadensis	6	0.90	3.9	14	4.74	28.8
Solanum ptychanthum	6	0.03	2.8	--	--	--
Ambrosia artemisiifolia	2	0.30	1.3	--	--	--
Aster praealtus	2	0.30	1.3	22	0.50	12.0
Euthamia graminifolia	2	0.30	1.3	--	--	--
Persicaria pensylvanica	2	0.30	1.3	40	1.33	23.8
Solidago canadensis	2	0.30	1.3	--	--	--
Carex haydenii	2	0.06	0.9	--	--	--
**Phalaris arundinacea*	--	--	--	8	1.33	9.9
Persicaria lapathifolia	--	--	--	6	0.18	3.5
Typha latifolia	--	--	--	14	0.17	6.9
Salix nigra	--	--	--	12	0.06	5.5
Carex lacustris	--	--	--	6	0.42	4.6
**Mentha arvensis*	--	--	--	6	0.03	2.7
Persicaria amphibium	--	--	--	4	0.07	2.0
Cardamine pensylvanica	--	--	--	4	0.02	1.8
**Persicaria vulgaris*	--	--	--	4	0.02	1.8
Salix interior	--	--	--	4	0.02	1.8
**Setaria faberi*	--	--	--	2	0.06	1.2
Populus deltoids	--	--	--	2	0.01	0.9
**Potentilla norvegica*	--	--	--	2	0.01	0.9
Totals		80.86	200.0		20.91	200.0
Bare ground and litter		22.12			71.52	

Table 7. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2002 and again in 2006 and 2007 in a *Typha latifolia* vegetation zone in the marsh at the western edge of the Green River State Wildlife Area, Lee County, Illinois. (n=50) (*exotic species)

	Summer 2002			Summer 2006			Summer 2007		
Species	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I.V.
Typha latifolia	100	56.15	86.7	6	0.08	0.9	42	4.33	16.1
Persicaria coccinea	88	10.99	32.0	86	8.26	18.9	92	16.36	42.3
Carex lacustris	44	15.68	27.8	44	7.67	12.4	46	14.75	27.6
Rorippa palustris	44	1.06	10.9	--	--	--	--	--	--
**Phalaris arundinacea*	34	1.82	9.6	92	80.11	77.8	94	62.07	88.4
**Potentilla norvegica*	32	0.16	7.2	28	0.29	4.2	--	--	--
Urtica gracilis	32	0.16	7.2	26	1.69	5.1	--	--	--
Cardamine pensylvanica	22	0.16	5.1	14	0.12	2.1	--	--	--
Amaranthus hybridus	16	0.08	3.6	2	0.01	0.3	--	--	--
**Mentha arvensis*	14	0.12	3.3	62	4.06	12.1	4	0.02	1.0
Sparganium eurycarpum	12	0.16	2.8	--	--	--	--	--	--
Solanum ptycanthum	6	0.03	1.3	6	0.3	0.8	--	--	--
**Persicaria vulgaris*	4	0.02	0.9	4	0.07	0.7	2	0.06	0.7
Celtis occidentalis	2	0.01	0.4	--	--	--	--	--	--
Erechtites hieracifolia	2	0.01	0.4	--	--	--	--	--	--
Phytolacca americana	2	0.01	0.4	--	--	--	--	--	--
Persicaria punctata	2	0.01	0.4	80	2.16	13.0	28	0.73	8.6
**Chenopodium album*	--	--	--	78	2.54	13.2	--	--	--
Ambrosia artemisiifolia	--	--	--	48	6.03	11.7	--	--	--
Aster praealtus	--	--	--	28	5.28	8.3	6	0.08	1.8
**Cirsium arvense*	--	--	--	36	1.60	6.4	--	--	--
Persicaria pensylvanica	--	--	--	30	2.20	6.1	16	0.62	5.1
Cirsium discolor	--	--	--	8	0.33	1.4	--	--	--
Hackelia virginiana	--	--	--	6	0.37	1.1	18	1.26	6.4
Bolboschoenus fluviatilis	--	--	--	4	0.12	0.7	--	--	--
Cuscuta gronovii	--	--	--	4	0.12	0.7	--	--	--
Parietaria pensylvanica	--	--	--	4	0.12	0.7	--	--	--
Solidago gigantea	--	--	--	2	0.30	0.5	--	--	--
Alliaria petiolata	--	--	--	2	0.01	0.3	--	--	--
Solidago canadensis	--	--	--	2	0.06	0.3	--	--	--
Stachys pilosa	--	--	--	2	0.01	0.3	--	--	--
Cicuta maculata	--	--	--	--	--	--	2	0.06	0.7
Persicaria lapathifolia	--	--	--	--	--	--	2	0.06	0.7
Sium suave	--	--	--	--	--	--	2	0.01	0.6
Totals		86.63	200.0		123.64	200.0		100.41	200.0
Bare ground and litter		11.26			1.49			13.37	

Table 8. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2006 and 2007 in a marsh area that had been dominated by *Typha latifolia* prior to a fire in late 2005, Green River State Wildlife Area, Lee County, Illinois. (n=50) (*exotic species)

Species	Summer 2006			Summer 2007		
	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.
**Phalaris arundinacea*	100	80.25	132.5	92	18.27	65.5
Persicaria pensylvanica	40	7.31	26.8	32	0.78	9.8
Persicaria punctata	38	3.78	22.1	76	4.66	29.8
**Cirsium arvense*	8	0.96	4.8	--	--	--
Ambrosia artemisiifolia	8	0.72	4.6	--	--	--
Typha latifolia	8	0.72	4.6	58	11.64	41.6
Cuscuta gronvii	4	0.36	2.3	--	--	--
Persicaria lapathifolia	4	0.36	2.3	8	0.04	2.1
Bolboschoenus fluviatilis	--	--	--	24	5.48	18.7
Lemna minor	--	--	--	60	0.30	15.7
Persicaria amphibium	--	--	--	40	0.49	11.1
Typha angustifolia	--	--	--	4	1.05	3.5
Schoenoplectus tabernaemontani	--	--	--	2	0.30	1.2
Cardamine pensylvanica	--	--	--	2	0.01	0.5
**Mentha arvensis*	--	--	--	2	0.01	0.5
Totals		94.46	200.0		43.03	200.0
Bare ground and litter		6.97			47.55	

Table 9. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2002 and again in 2006 and 2007 in a *Bolboschoenus fluviatilis* vegetation zone in the marsh at the western edge of the Green River State Wildlife Area, Lee County, Illinois. (n=50) (*exotic species)

Species	Summer 2002			Summer 2006			Summer 2007		
	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I.V.
Bolboschoenus fluviatilis	100	69.15	109.7	6	0.42	1.5	100	43.95	68.0
Persicaria coccinea	98	14.91	47.0	68	12.85	24.6	98	26.40	50.0
Sparganium eurycarpum	62	2.18	21.4	--	--	--	26	1.11	7.4
Urtica gracilis	66	1.08	21.3	42	17.02	23.4	--	--	--
Rorippa palustris	2	0.01	0.6	4	0.02	0.8	--	--	--
**Persicaria vulgaris*	--	--	--	68	29.04	39.3	2	0.01	0.5
**Chenopodium albidum*	--	--	--	90	5.25	21.8	--	--	--
Persicaria pensylvanica	--	--	--	34	13.86	19.0	70	4.01	21.0
Cuscuta gronovii	--	--	--	62	6.27	17.4	--	--	--
Persicaria punctata	--	--	--	60	6.04	16.9	92	18.76	40.9
**Mentha arvensis*	--	--	--	40	9.91	16.6	--	--	--
Persicaria lapathifolia	--	--	--	12	4.41	6.3	--	--	--
Ambrosia artemisiifolia	--	--	--	18	2.70	5.9	--	--	--
**Phalaris arundinacea*	--	--	--	10	1.23	3.0	14	6.30	9.7
Amaranthus tuberculatus	--	--	--	6	0.42	1.5	--	--	--
Erechtites hieracifolia	--	--	--	4	0.12	0.8	--	--	--
Aster praealtus	--	--	--	2	0.30	0.7	--	--	--
Cirsium discolor	--	--	--	2	0.06	0.5	--	--	--
Cicuta maculata	--	--	--	--	--	--	2	0.01	0.5
Teucrium canadense	--	--	--	--	--	--	8	0.14	2.0
Totals		87.33	200.0		109.92	200.0		100.69	200.0
Bare ground and litter		11.24			6.60			10.10	

Table 10. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2002 and again in 2006 and 2007 in a *Sparganium eurycarpum* vegetation zone in the marsh at the western edge of the Green River State Wildlife Area, Lee County, Illinois. (n=50) (*exotic species)

Species	Summer 2002			Summer 2006			Summer 2007		
	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I.V.
Sparganium eurycarpum	100	45.55	91.2	--	--	--	14	0.56	5.4
Persicaria coccinea	100	19.54	53.8	96	33.31	42.9	100	48.73	90.1
Urtica gracilis	84	0.47	22.3	74	18.45	27.2	--	--	--
Schoenoplectus acutus	40	2.25	13.5	--	--	--	--	--	--
Rorippa palustris	44	1.35	13.3	12	0.26	2.2	--	--	--
**Phalaris arundinacea*	10	0.05	2.7	2	0.06	0.4	8	1.12	4.0
Amaranthus hybridus	8	0.04	2.1	2	0.01	0.3	--	--	--
**Potentilla norvegica*	4	0.02	1.1	6	0.42	1.3	--	--	--
Persicaria pensylvanica	--	--	--	80	24.35	32.9	22	0.70	8.3
**Chenopodium album*	--	--	--	94	9.29	22.9	--	--	--
Persicaria punctata	--	--	--	56	9.06	16.6	78	12.70	41.0
**Mentha arvensis*	--	--	--	44	6.78	12.7	4	0.02	1.5
Aster praealtus	--	--	--	32	8.05	11.7	2	0.01	0.7
Cuscuta gronovii	--	--	--	38	2.96	8.6	--	--	--
Ambrosia artemisiifolia	--	--	--	24	4.55	7.6	--	--	--
**Cirsium arvense*	--	--	--	20	1.80	4.8	--	--	--
Persicaria lapathifolia	--	--	--	12	1.56	3.3	2	0.01	0.7
**Persicaria vulgaris*	--	--	--	10	1.26	2.6	4	0.12	1.5
Bolboschoenus fluviatilis	--	--	--	4	0.36	1.0	60	22.95	46.8
Lycopus americanus	--	--	--	2	0.30	0.5	--	--	--
Solidago gigantea	--	--	--	2	0.30	0.5	--	--	--
Totals		69.27	200.0		123.13	200.0		86.92	200.0
Bare ground and litter		25.74			6.75			23.90	

Table 11. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in late summer of 2002 and again in 2006 and 2007 in a *Carex lacustris* vegetation zone in the marsh at the western edge of the Green River State Wildlife Area, Lee County, Illinois. (n=50) (*exotic species)

Species	Summer 2002			Summer 2006			Summer 2007		
	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I.V.
Carex lacustris	100	42.80	75.4	100	29.95	32.4	100	38.85	51.7
Persicaria coccinea	100	36.45	69.1	100	55.40	47.8	100	51.20	61.4
Calamagrostis canadensis	38	18.35	30.8	46	8.10	11.5	42	20.40	24.9
Lysimachia thyrsiflora	18	0.82	6.7	4	0.07	0.6	10	0.05	2.1
Lycopus uniflorus	16	0.52	5.7	6	0.08	0.9	4	0.31	1.1
Pericaria punctata	16	0.23	5.4	16	0.13	2.4	16	0.38	3.7
Scutellaria galericulata	4	0.07	1.4	6	0.08	0.9	--	--	--
Teucrium canadense	4	0.07	1.4	32	1.43	5.5	54	4.06	14.6
Rumex orbuculatus	2	0.30	1.0	--	--	--	2	0.30	0.6
Aster praealtus	2	0.06	0.8	22	4.83	6.0	30	7.94	12.6
Lycopus americanus	2	0.06	0.8	14	1.09	2.7	2	0.06	0.5
Polygonum ramosissimum	2	0.06	0.8	34	1.05	5.5	44	0.57	9.8
**Mentha arvensis*	2	0.01	0.7	20	2.25	4.3	8	0.43	2.0
Ambrosia artemisiifolia	--	--	--	100	38.16	37.3	4	0.02	0.9
**Chenopodium album*	--	--	--	84	10.83	18.6	--	--	--
Cirsium discolor	--	--	--	26	1.25	4.5	2	0.01	0.4
Galium obtusum	--	--	--	10	3.56	3.6	--	--	--
Solidago gigantea	--	--	--	10	2.21	2.7	4	0.02	0.9
Ambrosia trifida	--	--	--	10	1.71	2.4	--	--	--
Stachys pilosa	--	--	--	12	1.03	2.3	10	0.10	2.2
Oenothera biennis	--	--	--	10	0.44	1.7	--	--	--
**Potentilla norvegica*	--	--	--	10	0.15	1.5	4	0.07	1.0
Physalis subglabrata	--	--	--	6	0.42	1.2	--	--	--
Lathyrus palustris	--	--	--	6	0.13	1.0	2	0.06	0.5
Verbena hastata	--	--	--	4	0.31	0.8	--	--	--
Lactuca canadensis	--	--	--	4	0.12	0.7	2	0.01	0.4
Hackelia virginiana	--	--	--	2	0.01	0.3	--	--	--
**Nepeta cataria*	--	--	--	2	0.01	0.3	--	--	--
Solidago canadensis	--	--	--	2	0.06	0.3	--	--	--
**Taraxacum officinale*	--	--	--	2	0.01	0.3	--	--	--
Carex haydenii	--	--	--	--	--	--	18	2.46	5.7
Iris shrevei	--	--	--	--	--	--	2	0.06	0.5
**Phalaris arundinacea*	--	--	--	--	--	--	2	0.06	0.5
Asclepias incarnata	--	--	--	--	--	--	2	0.01	0.4
Euthamia graminifolia	--	--	--	--	--	--	2	0.01	0.4
**Morus alba*	--	--	--	--	--	--	2	0.01	0.4
Persicaria vulgaris	--	--	--	--	--	--	2	0.01	0.4
Cardamine parviflora	--	--	--	--	--	--	2	0.01	0.4
Totals		99.80	200.0		164.87	200.0		127.47	200.0
Bare ground and litter		1.60			5.14			12.38	

Table 12. Density (stems/ha) of seedlings, saplings, and trees, basal area (m^2/ha); relative values, importance values, and average diameters (cm) of the woody species encountered in six wooded areas, Green River State Wildlife Area, Lee County, Illinois. (*exotic species)

Species	Seed-lings	Saplings		Trees	Basal Area	Rel.	Rel.		Av. Diam
		Small	Large	#/ha	m^2/ha	Den.	Dom.	I.V.	cm
Site # 1									
Acer saccharinum	1500	700	640	765	38.085	89.5	68.9	158.4	22.8
Populus deltoides	--	--	--	30	10.735	3.5	19.4	22.9	65.0
Salix nigra	--	--	--	35	6.010	4.1	10.9	15.0	45.5
Acer negundo	--	--	40	20	0.385	2.3	0.7	3.0	15.1
Prunus serotina	--	--	--	5	0.065	0.6	0.1	0.7	12.7
**Morus alba*	500	--	20	--	--	--	--	--	--
Ulmus americana	2000	100	--	--	--	--	--	--	--
Ulmus rubra	--	200	--	--	--	--	--	--	--
Celtis occidentalis	--	50	--	--	--	--	--	--	--
**Lonicera maackii*	2500	1700	--	--	--	--	--	--	--
**Rosa multiflora*	1500	450	--	--	--	--	--	--	--
Sambucus canadensis	500	--	--	--	--	--	--	--	--
Cornus obliqua	--	750	--	--	--	--	--	--	--
Ribes americanum	--	50	--	--	--	--	--	--	--
**Rhamnus cathartica*	--	--	40	--	--	--	--	--	--
Totals	8500	4000	740	855	55.280	100.0	100.0	200.0	
Site # 2									
Acer saccharinum	--	--	--	295	20.365	67.8	73.9	141.7	27.2
Prunus serotina	500	50	40	100	5.590	23.0	20.3	43.3	24.7
Juglans nigra	--	--	--	20	0.820	4.6	3.0	7.6	21.0
Fraxinus pennsylvanica	--	350	--	20	0.775	4.6	2.8	7.4	20.6
**Morus alba*	500	1050	20	--	--	--	--	--	--
Ulmus rubra	2000	500	--	--	--	--	--	--	--
Celtis occidentalis	--	100	--	--	--	--	--	--	--
**Lonicera maackii*	2500	2150	--	--	--	--	--	--	--
**Rosa multiflora*	1500	600	--	--	--	--	--	--	--
**Lonicera x bella*	--	1000	--	--	--	--	--	--	--
**Rhamnus cathartica*	--	200	--	--	--	--	--	--	--
Totals	7000	6000	60	435	27.550	100.0	100.0	200.0	
Site # 3									
Acer saccharinum	2000	--	--	225	26.345	52.3	77.4	129.7	35.5
Prunus serotina	500	50	80	100	4.290	23.3	12.6	35.9	21.9
Fraxinus pennsylvanica	--	200	40	25	0.530	5.8	1.6	7.4	15.2
Populus deltoides	--	--	--	10	1.325	2.3	3.9	6.2	41.1
Quercus velutina	--	--	40	20	0.515	4.7	1.5	6.2	17.5
Acer negundo	--	100	--	20	0.375	4.7	1.1	5.8	15.0
**Maclura pomifera*	--	--	20	10	0.350	2.3	1.0	3.3	21.1
**Morus alba*	--	100	140	10	0.170	2.3	0.5	2.8	14.3
Celtis occidentalis	--	200	20	10	0.120	2.3	0.4	2.7	12.4
Ulmus rubra	2500	50	--	--	--	--	--	--	--
**Catalpa speciosa*	--	100	--	--	--	--	--	--	--
**Lonicera maackii*	6500	3850	--	--	--	--	--	--	--
**Rosa multiflora*	2500	700	--	--	--	--	--	--	--
Sambucus canadensis	1000	400	--	--	--	--	--	--	--
**Lonicera x bella*	1000	300	--	--	--	--	--	--	--
Rubus occidentalis	--	650	--	--	--	--	--	--	--
Rubus allegheniensis	--	50	--	--	--	--	--	--	--
**Rhamnus cathartica*	--	50	--	--	--	--	--	--	--

Ribes americanum	--	50	--	--	--	--	--	--	--
Totals	16000	6850	340	430	34.020	100.0	100.0	200.0	
Site # 4									
Acer saccharinum	--	100	20	345	24.690	75.0	80.8	155.8	28.0
Prunus serotina	1000	--	--	115	5.885	25.0	19.2	44.2	24.5
**Morus alba*	1000	150	--	--	--	--	--	--	--
Ulmus rubra	500	--	--	--	--	--	--	--	--
Celtis occidentalis	--	150	--	--	--	--	--	--	--
Malus ioensis	--	50	--	--	--	--	--	--	--
Ribes missouriense	1000	--	--	--	--	--	--	--	--
**Elaeagnus umbellata*	1000	--	--	--	--	--	--	--	--
**Lonicera x bella*	500	250	--	--	--	--	--	--	--
Sambucus canadensis	500	150	--	--	--	--	--	--	--
**Rhamnus cathartica*	500	--	--	--	--	--	--	--	--
**Lonicera maackii*	--	1950	--	--	--	--	--	--	--
Prunus virginiana	--	450	--	--	--	--	--	--	--
**Rosa multiflora*	--	100	--	--	--	--	--	--	--
Cornus racemosa	--	50	--	--	--	--	--	--	--
Totals	6000	3400	20	460	30.575	100.0	100.0	200.0	
Site # 5									
**Morus alba*	--	50	260	215	4.330	38.4	13.9	52.3	15.3
Prunus serotina	--	50	--	100	9.605	17.9	30.7	48.6	30.7
Populus deltoides	--	--	--	35	8.180	6.2	26.1	32.3	53.7
Celtis occidentalis	500	50	160	105	1.805	18.8	5.8	24.6	14.1
Juglans nigra	500	--	--	55	2.865	9.8	9.2	19.0	29.2
Acer negundo	--	100	20	40	1.675	7.1	5.4	12.5	20.3
Acer saccharinum	--	--	--	5	2.555	0.9	8.2	9.1	80.7
Quercus velutina	1000	--	20	5	0.215	0.9	0.7	1.6	23.5
**Lonicera maackii*	1500	2600	--	--	--	--	--	--	--
**Rosa multiflora*	1000	250	--	--	--	--	--	--	--
Rubus occidentalis	500	1450	--	--	--	--	--	--	--
**Rhamnus cathartica*	500	50	--	--	--	--	--	--	--
Sambucus canadensis	500	--	--	--	--	--	--	--	--
**Lonicera x bella*	--	650	--	--	--	--	--	--	--
Prunus virginiana	--	150	--	--	--	--	--	--	--
Totals	6000	5400	460	560	31.230	100.0	100.0	200.0	
Site # 6									
Prunus serotina	1000	--	--	225	15.680	60.0	76.0	136.0	29.0
**Robinia pseudoacacia*	10000	2200	--	150	4.960	40.0	24.0	64.0	19.9
**Lonicera x bella*	2500	800	--	--	--	--	--	--	--
**Morus alba*	500	50	--	--	--	--	--	--	--
Quercus velutina	500	--	--	--	--	--	--	--	--
Acer saccharinum	--	100	--	--	--	--	--	--	--
Fraxinus pennsylvanica	--	50	--	--	--	--	--	--	--
Sambucus canadensis	500	--	--	--	--	--	--	--	--
Totals	15000	3200	--	375	20.640	100.0	100.0	200.0	

Table 13. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in 2002, 2003, and 2006 in a successional lowland area cleared of trees in the winter of 2001, Green River State Wildlife Area, Lee County, Illinois. (n=100) (*exotic species)

	Summer 2006			Summer 2003			Summer 2002		
Species	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.
**Phalaris arundinacea*	96	28.49	46.0	92	37.49	63.7	76	28.93	52.1
Solidago canadensis	71	15.82	27.6	48	0.89	7.6	--	--	--
Persicaria pensylvanica	71	4.43	13.4	57	4.32	13.5	65	20.52	38.8
**Lactuca serriola*	61	4.48	12.4	9	0.17	1.4	--	--	--
**Chenopodium album*	79	1.18	10.2	17	0.70	3.3	1	0.15	0.4
Carex cristatella	53	2.28	8.7	--	--	--	--	--	--
Cirsium discolor	45	2.64	8.3	1	0.03	0.1	--	--	--
**Verbascum thapsus*	53	0.61	6.7	7	0.16	1.1	3	0.04	0.6
**Cirsium arvense*	28	2.62	6.4	--	--	--	--	--	--
Eupatorium serotinum	40	1.49	6.3	31	1.36	6.0	21	1.20	5.2
Persicaria coccinea	22	2.58	5.7	38	3.48	9.9	26	2.56	7.8
Solidago gigantea	17	2.05	4.5	--	--	--	--	--	--
Ambrosia artemisiifolia	21	1.54	4.2	4	0.59	1.3	--	--	--
Populus deltoides	16	1.95	4.2	40	4.39	11.3	33	2.25	8.6
Oenothera biennis	26	0.62	3.7	--	--	--	1	0.15	0.4
Acalypha rhomboidea	28	0.39	3.6	14	0.15	2.1	--	--	--
**Fallopia convolvulus*	27	0.44	3.5	5	0.08	0.8	--	--	--
Stachys pilosa	13	1.11	2.8	5	0.22	1.0	--	--	--
**Morus tatarica*	13	0.56	2.1	18	1.05	3.9	21	0.43	4.2
Solanum carolinense	11	0.64	2.0	--	--	--	--	--	--
**Achillea millefolium*	11	0.33	1.6	3	0.04	0.4	--	--	--
Aster pilosus	12	0.19	1.5	1	0.03	0.1	--	--	--
Aster praealtus	8	0.43	1.4	--	--	--	--	--	--
Solanum ptychanthum	10	0.05	1.2	9	0.10	1.3	9	0.58	2.4
Ambrosia trifida	4	0.46	1.1	--	--	--	--	--	--
**Poa pratensis*	7	0.26	1.1	--	--	--	--	--	--
Bidens vulgata	5	0.08	0.7	7	1.37	2.8	1	0.15	0.4
Phytolacca americana	1	0.38	0.6	3	0.07	0.5	12	0.84	3.1
Rhus glabra	2	0.30	0.6	1	0.01	0.1	--	--	--
Urtica gracilis	2	0.30	0.6	--	--	--	--	--	--
Lycopus americanus	3	0.19	0.5	--	--	--	--	--	--
Physalis subglabrata	4	0.02	0.5	3	0.02	0.4	3	0.02	0.5
Polygonum ramosissimum	4	0.02	0.5	9	0.27	1.6	4	0.02	0.7
**Daucus carota*	2	0.16	0.4	--	--	--	--	--	--
Geum canadense	2	0.18	0.4	--	--	--	--	--	--
Vitis riparia	2	0.18	0.4	--	--	--	2	0.04	0.4
Lysimachia lanceolata	1	0.15	0.3	--	--	--	--	--	--
Lactuca canadensis	1	0.15	0.3	--	--	--	--	--	--
**Persicaria vulgaris*	3	0.04	0.3	5	0.25	1.1	4	0.24	1.0
**Rumex crispus*	1	0.15	0.3	--	--	--	--	--	--
Rubus flagellaris	3	0.04	0.3	--	--	--	--	--	--
Rubus occidentalis	2	0.06	0.3	--	--	--	--	--	--
Rubus pensilvanicus	1	0.15	0.3	3	0.02	0.4	--	--	--
Ulmus americana	1	0.15	0.3	1	0.01	0.1	1	0.03	0.2
Apocynum sibiricum	2	0.01	0.2	1	0.03	0.1	1	0.03	0.2
Carex sp.	2	0.01	0.2	45	1.98	8.7	--	--	--
Euthamia gymnospermoides	2	0.04	0.2	--	--	--	--	--	--
Muhlenbergia frondosa	2	0.01	0.2	--	--	--	--	--	--
Prunus serotina	2	0.01	0.2	5	0.05	0.8	--	--	--

Sanicula canadensis	2	0.01	0.2	--	--	--	--	--	--
**Setaria faberi*	2	0.01	0.2	15	0.72	3.0	2	0.18	0.6
Verbena hastata	2	0.01	0.2	1	0.15	0.3	--	--	--
Antennaria plantaginifolia	1	0.03	0.1	--	--	--	--	--	--
Aster puniceus	1	0.01	0.1	--	--	--	--	--	--
**Elytrigia repens*	1	0.03	0.1	--	--	--	--	--	--
Oxalis stricta	1	0.01	0.1	1	0.01	0.1	--	--	--
Ribes missouriense	1	0.01	0.1	--	--	--	--	--	--
**Taraxacum officinale*	1	0.03	0.1	3	0.02	0.4	--	--	--
Conyza canadensis	--	--	--	57	4.47	13.8	--	--	--
**Potentilla norvegica*	--	--	--	42	4.97	12.4	26	0.50	5.1
**Persicaria cespitosa*	--	--	--	29	1.29	5.7	30	2.58	8.6
Amaranthus tuberculatus	--	--	--	17	0.11	2.5	--	--	--
**Digitaria sanguinalis*	--	--	--	12	0.36	2.1	11	0.33	2.3
Panicum capillare	--	--	--	11	0.30	1.9	3	0.33	1.0
Erigeron annuus	--	--	--	8	0.12	1.3	--	--	--
Cyperus strigosus	--	--	--	8	0.04	1.2	46	0.48	8.4
Lythrum alatum	--	--	--	7	0.16	1.1	--	--	--
Eleocharis ovata	--	--	--	7	0.04	1.0	35	0.23	6.2
Hypericum punctatum	--	--	--	6	0.03	0.8	--	--	--
**Mollugo verticillata*	--	--	--	5	0.03	0.7	6	0.25	1.3
Setaria glauca	--	--	--	3	0.19	0.7	2	0.18	0.6
**Echinochloa crus-galli*	--	--	--	4	0.10	0.6	--	--	--
Panicum dichotomiflorum	--	--	--	4	0.05	0.6	1	0.15	0.4
Acalypha gracilens	--	--	--	3	0.07	0.5	2	0.06	0.4
Aster ontarionis	--	--	--	3	0.07	0.5	--	--	--
Eragrostis cilianensis	--	--	--	3	0.04	0.5	--	--	--
**Solanum dulcamara*	--	--	--	2	0.16	0.5	1	0.01	0.2
Chamaesyce maculata	--	--	--	3	0.02	0.4	--	--	--
Hackelia virginiana	--	--	--	2	0.06	0.4	--	--	--
Conoclinium coelestinum	--	--	--	2	0.01	0.3	--	--	--
Salix interior	--	--	--	2	0.01	0.3	1	0.01	0.2
**Abutilon theophrastii*	--	--	--	1	0.01	0.1	--	--	--
Agalinis tenuifolia	--	--	--	1	0.01	0.1	--	--	--
Aster lanceolatus	--	--	--	1	0.01	0.1	3	0.31	0.9
Bulbostylis capillaris	--	--	--	1	0.03	0.1	--	--	--
Pseudognaphalium obtusifolium	--	--	--	1	0.01	0.1	--	--	--
Juncus interior	--	--	--	1	0.01	0.1	--	--	--
Plantago rugelii	--	--	--	1	0.03	0.1	--	--	--
Polygala polygama	-	-	--	1	0.01	0.1	--	--	--
Persicaria punctata	--	--	--	1	0.03	0.1	4	0.34	1.2
**Trifolium campestre*	--	--	--	1	0.01	0.1	--	--	--
Lindernia anagallidea	--	--	--	--	--	--	50	2.49	11.9
Rorippa palustris	--	--	--	--	--	--	23	1.19	6.5
Amaranthus albus	--	--	--	--	--	--	14	2.29	5.5
**Amaranthus hybridus*	--	--	--	--	--	--	9	1.80	3.9
Rotala ramosior	--	--	--	--	--	--	13	0.55	2.9
**Lythrum salicaria*	--	--	--	--	--	--	7	0.06	1.3
**Polygonum arenastrum*	--	--	--	--	--	--	5	0.25	1.1
Teucrium canadense	--	--	--	--	--	--	3	0.19	0.8
Erechtites hieracifolia	--	--	--	--	--	--	1	0.15	0.4
Bolboschoenus fluviatilis	--	--	--	--	--	--	2	0.04	0.4
**Sonchus asper*	--	--	--	--	--	--	2	0.01	0.3
Celtis occidentalis	--	--	--	--	--	--	1	0.03	0.2
Dichanthelium acuminatum	--	--	--	--	--	--	1	0.01	0.2
**Setaria viridis*	--	--	--	--	--	--	1	0.01	0.2

Totals	--	80.57	200.0	--	73.09	200.0	--	73.19	200.0
Average bare ground and litter	--	16.11	--	--	36.44	--	--	30.44	--

Table 14. Frequency (%), mean cover (% of total cover), and importance value (I.V.) of the ground layer species encountered in 2002, 2003, and 2006 in a successional upland area cleared of trees in the winter of 2001, Green River State Wildlife Area, Lee County, Illinois. (n=100)
(*exotic species)

	Summer 2006			Summer 2003			Summer 2002		
Species	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.	Freq. %	Mean Cover	I. V.
Rubus pensilvanicus	55	14.30	29.4	36	2.67	8.5	25	0.82	6.0
**Verbascum thapsus*	62	5.89	17.4	78	5.57	17.9	27	2.96	11.1
**Chenopodium album*	65	3.65	14.5	32	0.41	4.6	44	6.12	21.0
**Lonicera maackii*	39	5.93	14.4	88	11.02	27.3	60	4.28	19.6
Prunus serotina	29	5.22	11.9	68	1.91	11.3	22	0.31	4.6
Rubus occidentalis	30	4.78	11.4	16	1.20	3.9	3	0.45	1.4
Ambrosia artemisiifolia	43	3.47	11.1	26	1.44	5.3	4	0.60	2.1
**Robinia pseudoacacia*	36	3.11	9.7	30	2.20	7.0	23	0.87	5.8
Conyza canadensis	45	2.10	9.3	96	26.50	51.3	5	0.37	1.6
Lactuca canadensis	44	1.04	7.6	--	--	--	3	0.07	0.5
Solidago canadensis	26	2.64	7.6	4	0.07	0.6	2	0.06	0.4
Cyperus lupulinus	44	0.98	7.5	68	3.09	13.0	3	0.04	0.5
**Alliaria petiolata*	41	0.87	6.9	--	--	--	41	2.18	11.8
Phytolacca americana	14	2.52	5.8	24	1.29	4.9	83	11.16	38.8
Prunus virginiana	15	2.46	5.8	8	0.33	1.5	17	0.53	4.0
Smilacina stellata	20	0.50	3.4	2	0.06	0.4	2	0.02	0.4
Dichanthelium villosissimum	14	0.54	2.7	4	0.12	0.7	4	0.10	0.9
**Phalaris arundinacea*	10	0.64	2.4	8	0.67	2.0	2	0.18	0.7
Solanum carolinense	9	0.73	2.3	8	0.19	1.3	--	--	--
Oxalis stricta	14	0.07	2.0	10	0.05	1.3	1	0.01	0.2
Parthenocissus quinquefolia	8	0.43	1.8	8	0.67	2.0	6	0.30	1.7
Rubus flagellaris	7	0.57	1.8	2	0.01	0.3	--	--	--
**Setaria faberi*	12	0.11	1.8	4	0.31	1.0	3	0.07	0.5
Carex molesta	5	0.39	1.3	14	1.09	3.3	--	--	--
**Poa pratensis*	5	0.34	1.2	2	0.01	0.3	--	--	--
Quercus velutina	3	0.45	1.1	14	0.22	2.0	1	0.03	0.3
**Nepeta cataria*	5	0.20	1.0	--	--	--	2	0.18	0.7
Rhus glabra	3	0.33	0.9	--	--	--	--	--	--
Dichanthelium oligosanthes	5	0.08	0.8	28	2.29	6.9	7	0.28	1.7
Aster pilosus	3	0.09	0.5	--	--	--	--	--	--
Carex muhlenbergii	3	0.07	0.5	--	--	--	--	--	--
Cirsium discolor	2	0.16	0.5	2	0.01	0.3	1	0.03	0.3
**Mollugo verticillata*	2	0.06	0.4	4	0.07	0.6	7	0.14	1.4
Muhlenbergia frondosa	2	0.06	0.4	--	--	--	--	--	--
Muhlenbergia schreberi	3	0.02	0.4	12	1.00	3.0	7	0.51	2.2
**Lonicera x bella*	1	0.15	0.3	--	--	--	--	--	--
Persicaria pensylvanica	2	0.01	0.3	--	--	--	1	0.15	0.5
Solanum ptychanthum	2	0.01	0.3	14	0.17	2.0	67	8.88	31.0
Celtis occidentalis	1	0.03	0.2	2	0.01	0.3	1	0.01	0.2
Chenopodium standleyanum	1	0.03	0.2	--	--	--	11	1.23	4.5
Leptoloma cognatum	1	0.03	0.2	--	--	--	--	--	--
Oenothera biennis	1	0.03	0.2	--	--	--	--	--	--
**Rumex acetosella*	1	0.03	0.2	4	0.07	0.6	2	0.04	0.4
Sambucus canadensis	1	0.03	0.2	--	--	--	--	--	--
**Fallopia convolvulus*	1	0.01	0.1	6	0.37	1.2	--	--	--
Panicum capillare	1	0.01	0.1	--	--	--	--	--	--
Physalis subglabrata	1	0.01	0.1	--	--	--	--	--	--
**Taraxacum officinale*	1	0.01	0.1	--	--	--	1	0.03	0.3

Polygala polygama	--	--	--	20	0.54	3.3	10	0.05	1.8
Dichanthelium acuminatum	--	--	--	14	0.80	2.9	6	0.06	1.1
Acalypha gracilens	--	--	--	14	0.12	1.9	6	0.13	1.3
Cyperus schweinitzii	--	--	--	8	0.38	1.6	64	1.36	13.7
Geum canadense	--	--	--	8	0.24	1.4	4	0.07	0.9
**Lactuca serriola*	--	--	--	8	0.04	1.1	--	--	--
Pseudognaphalium obtusifolium	--	--	--	4	0.07	0.6	--	--	--
**Cirsium arvense*	--	--	--	2	0.01	0.3	--	--	--
Fragaria virginiana	--	--	--	2	0.01	0.3	--	--	--
Osmorhiza longistylis	--	--	--	--	--	--	9	0.07	1.7
**Amaranthus retroflexus*	--	--	--	--	--	--	1	0.03	0.3
**Cirsium vulgare*	--	--	--	--	--	--	1	0.03	0.3
Erigeron annuus	--	--	--	--	--	--	1	0.03	0.3
**Morus tartarica*	--	--	--	--	--	--	2	0.01	0.3
Plantago rugelii	--	--	--	--	--	--	1	0.03	0.3
**Rhamnus cathartica*	--	--	--	--	--	--	1	0.03	0.3
**Digitaria sanguinalis*	--	--	--	--	--	--	1	0.01	0.2
Elymus virginicus	--	--	--	--	--	--	1	0.01	0.2
Parietaria pensylvanica	--	--	--	--	--	--	1	0.01	0.2
Totals	--	65.19	200.0	--	67.30	200.0	--	44.94	200.0
Average bare ground and litter	--	26.68	--	--	31.68	--	--	51.40	--

Table 15. Similarity Index of the sand prairies and sedge meadows at the GRSWA.

AREAS	Dry Sand Prairie	Dry-mesic Sand Prairie	Mesic Sand Prairie	Wet Sand Prairie	Sedge Meadow (1)
Dry-mesic Sand Prairie	58.82				
Mesic Sand Prairie	26.09	49.38			
Wet Sand Prairie	10.34	11.43	25.00		
Sedge Meadow (1)	00.00	00.00	00.00	27.96	
Sedge Meadow (2)	00.00	3.03	5.49	22.68	18.52

Appendix I. Vascular plant species encountered at Green River State Wildlife Area, Lee County, Illinois, are listed alphabetically by family under major plant groups. An asterisk indicates non-native species. Collecting numbers preceded by an E (John E. Ebinger) are deposited in the Stover-Ebinger Herbarium, Eastern Illinois University, Charleston, Illinois (EIU). Collecting numbers preceded by a P (Loy R. Phillippe) are deposited in the Illinois Natural History Survey Herbarium, Champaign, Illinois (ILLS).

FERN AND FERN-ALLIES

Aspleniaceae
Asplenium platyneuron (L.) Oakes: P32588

Dryopteridaceae
Athyrium filix-femina (L.) Martens ssp. *angustum* (Willd.) R.T. Clausen: P32587
Dryopteris carthusiana (Villars) H.P. Fuchs: P32576
Dryopteris cristata (L.) Gray: P31662

Equisetaceae
Equisetum arvense L.: P31501
Equisetum x *ferrissii* Clute: P31638
Equisetum hyemale L.: P32602
Equisetum laevigatum A. Br.: P31644

Onocleaceae
Onoclea sensibilis L.: P32370

Ophioglossaceae
Botrychium dissectum Spreng.: P32530
Botrychium matricariifolium (Doll.) A. Br.: P31628
Botrychium virginianum (L.) Sw.: P31608

Osmundaceae
Osmunda claytoniana L.: P31483
Osmunda regalis L.: P31577

Thelypteridaceae
Thelypteris palustris Schott: P32451

GYMNOSPERMS

Cupressaceae
Juniperus virginiana L.: P31530

Pinaceae
**Larix decidua* Mill.: P31551
**Pinus banksiana* Lamb.: P31529
**Pinus echinata* Mill.: P32494
**Pinus strobus* L.: P32606
**Pinus sylvestris* L.: P32619
**Pseudotsuga taxifolia* Britt.: P32675

Taxodiaceae
**Taxodium distichum* (L.) Rich.: P32622

MONOCOTS

Alismataceae
Alisma subcordatum Raf.: P32411
Alisma triviale Pursh: P32625
Sagittaria latifolia Willd.: P32365

Amaryllidaceae
Hypoxis hirsuta (L.) Coville: P31507

Commelinaceae
**Commelina communis* L.: P32678
Tradescantia ohiensis Raf.: P31474

Cyperaceae
Bolboschoenus fluviatilis (Torr.) Sojak: P31593
Bulbostylis capillaris (L.) C.B. Clarke: P36135
Carex bicknellii Britt.: P31682
Carex brevior (Dewey) Mack.: P31564
Carex buxbaumii Wahl.: P31613
Carex conoidea Schk.: P31504
Carex cristatella Britt.: P31653
Carex davisii Schwein. & Torr.: P31579
Carex festucacea Schk.: P31589
Carex haydenii Dewey: P31587
Carex lacustris Willd.: P34952
Carex molesta Mack.: observed
Carex muhlenbergii Schk.: P31562
Carex normalis Mack.: P31713
Carex pellita Willd.: P31633
Carex pensylvanica Lam.: P32641
Carex scoparia Schk.: P36143
Carex stipata Muhl.: P31592
Carex suberecta (Olney) Britt.: P31697
Carex swanii (Fern.) Mack.: P31611
Carex tonsa (Fern.) Bickn.: P31513
Carex tribuloides Vahl: P34684
Carex vesicaria L.: P31508
Carex vulpinoidea Michx.: P31687
Cyperus esculentus L.: P32489
Cyperus lupulinus (Spreng.) Marcks var. *macilentus* (Fern.) Marcks: P32486
Cyperus schweinitzii Torr.: P32608
Cyperus squarrosus L.: P34699
Cyperus strigosus L.: P32412
Eleocharis acicularis (L.) Roem. & Schultes: P32417
Eleocharis compressa Sull.: P31614
Eleocharis ovata (Roth) Roem. & Schultes var. *detonsa* (Gray) Mohlenbr.: P32596
Eleocharis ovata (Roth) Roem. & Schultes var. *obtusa* (Willd.) Kukenth: P32415
Eleocharis verrucosa (Svenson) Harms: P31673
Eleocharis wolfii Gray: P31615
Fimbristylis autumnalis (L.) Roem. & Schultes: P32687
Schoenoplectus acutus (Muhl.) A. Love & D. Love: P32501
Schoenoplectus heterochaetus (Chase) Sojak: P31683

Scirpus atrovirens Willd.: P32623
Scirpus cyperinus (L.) Kunth: P32373
Scirpus pendulus Muhl.: P31704
Scleria triglomerata Michx.: P31671

Iridaceae
**Iris flavescens* DC.: P35672
Iris shrevei Small: P31581
Sisyrinchium campestre Bickn.: P31511

Juncaceae
Juncus acuminatus Michx.: P32413
Juncus dudleyi Wieg.: E28953
Juncus effusus L.: P32473
Juncus greenei Oakes & Tuckerm.: P31678
Juncus interior Wieg.: P31695
Juncus marginatus Rostk.: P32477
Juncus tenuis Willd.: P31696
Juncus torreyi Coville: P32476

Lemnaceae
Lemna minor L.: P32626
Lemna trisulca L.: P31657

Liliaceae
Allium canadense L.: P31685
**Asparagus officinalis* L.: P31618
**Hemerocallis fulva* (L.) L.: P34599
Lilium michiganense Farw.: P35863
Maianthemum canadense Desf. var. *canadense*: P31607
Polygonatum commutatum (Schult.) A. Dietr.: P31605
Smilacina stellata (L.) Desf.: P31500

Orchidaceae
Corallorhiza odontorhiza (Willd.) Nutt.: P32631
Goodyera pubescens (Willd.) R. Br.: P32367
Liparis liliifolia (L.) Rich.: P32418
Liparis loeselii (L.) Rich.: P32577
Platanthera flava (L.) Lindl. var. *herbiola* (R. Br.) Luer: P31654
Spiranthes cernua (L.) Rich.: P32431
Spiranthes ovalis Lindl.: P34968

Poaceae
Agrostis gigantea Roth: P31560
Agrostis hyemalis (Walt.) BSP.: R.Evers 108119
Alopecurus carolinianus Walt.: P35654
Andropogon gerardii Vitman: P32354
Aristida basiramea Engelm.: P32521
Aristida intermedia Scribn. & Ball: P32497
Aristida oligantha Michx.: P32573
Aristida tuberculosa Nutt.: P32560
**Avena sativa* L.: P32663
Bouteloua curtipendula (Michx.) Torr.: E28888
Bouteloua hirsuta Lag.: P32569
**Bromus commutatus* Schrad.: P31718
**Bromus inermis* Leyss.: P31572

**Bromus tectorum* L.: P31540
Calamagrostis canadensis (Michx.) P. Beauv.: P31659
Cenchrus longispinus (Hack.) Fern.: E28917
Cinna arundinacea L.: P32531
**Dactylis glomerata* L.: P31604
Dichanthelium acuminatum (Sw.) Gould & Clark var. *fasciculatum* (Torr.) Freckm.: P31702
Dichanthelium depauperatum (Muhl.) Gould: observed
Dichanthelium oligosanthes (Schult.) Gould var. *scribnerianum* (Nash) Gould: P31475
Dichanthelium perlongum (Nash) Freckm.:31557
Dichanthelium villosissimum (Nash) Freckm.:31569
**Digitaria ischaemum* (Schreb.) Schreb.: P32381
**Digitaria sanguinalis* (L.) Scop.: E28891
**Echinochloa crus-galli* (L.) P. Beauv.: P32414
Echinochloa muricata (Michx.) Fern. var. *muricata*: P32515
Echinochloa walteri (Pursh) Heller: P34977
**Eleusine indica* (L.) Gaertn.: P32648
Elymus canadensis L.: P32572
Elymus villosus Muhl.: P32667
Elymus virginicus L.: P32463
**Elytrigia repens* (L.) Desv.: E28909
**Eragrostis cilianensis* (All.) Vign.: P34696
Eragrostis frankii C.A. Meyer var. *frankii*: P32532
Eragrostis hypnoides (Lam.) BSP.: P36136
Eragrostis pectinacea (Michx.) Nees: P34697
Eragrostis spectabilis (Pursh) Steud.: P32427
**Festuca arundinacea* Schreb.: P35661
**Festuca pratensis* Huds.: E28907
Festuca subverticillata (Pers.) E.B. Alexeev.: P35657
Glyceria septentrionalis Hitchc.: P31652
Glyceria striata (Lam.) Hitchc.: P31656
Heterostipa spartea (Trin.) Barkworth: P31599
Hordeum jubatum L.: P32484
Hordeum pusillum Nutt.: P31583
Koeleria macrantha (Ledeb.) Spreng.: P31602
Leersia oryzoides (L.) Swartz: P32448
Leersia virginica Willd.: P32581
Leptoloma cognatum (Schult.) Chase: E28956
**Lolium perenne* L.: P34695
**Miscanthus sacchariflorus* (Maxim.) Hack.: P37113
Muhlenbergia frondosa (Poir.) Fern.: P32524
Muhlenbergia mexicana (L.) Trin.: P32375
Muhlenbergia schreberi J.F. Gmel.: P32384
Panicum capillare L.: P32534
Panicum dichotomiflorum Michx.: P32533
Panicum virgatum L.: E28947
Paspalum bushii Nash: E28957
**Phalaris arundinacea* L.: P31568
**Phleum pratense* L.: E28906
**Phragmites australis* (Cav.) Trin.: P32506
**Poa annua* L.: P35644
**Poa compressa* L.: P31597
**Poa pratensis* L.: P31494
Schizachyrium scoparium (Michx.) Nash: P34677
**Secale cereale* L.: P35651
**Setaria faberi* R.A.W. Herrm.: P32363
Setaria glauca (L.) P. Beauv.: P32438

**Setaria viridis* (L.) P. Beauv.: E28916
Sorghastum nutans (L.) Nash: P32350
Spartina pectinata Link: P32374
Sporobolus cryptandrus (Torr.) Gray: P32426
Sporobolus heterolepis (Gray) Gray: P32496
Sporobolus vaginiflorus (Torr.) A. Wood: P32491
Tridens flavus (L.) Hitchc.: P32586
Triplasis purpurea (Walt.) Chapm.: P32604
**Triticum aestivum* L.: P35659
Vulpia octoflora (Walt.) Rydb. var. *glauca* (Nutt.) Fern.: P31567
Vulpia octoflora (Walt.) Rydb. var. *tenella* (Willd.) Fern.: P35658

Smilacaceae
Smilax lasioneuron Hook.: P32518
Smilax tamnoides L.: P32582

Sparganiaceae
Sparganium eurycarpum Engelm.: P32504

Typhaceae
Typha angustifolia L.: P34971
Typha latifolia L.: P32595

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Aceraceae
Acer negundo L.: P31545
Acer saccharinum L.: P31368

Amaranthaceae
Amaranthus albus L.: P32593
**Amaranthus hybridus* L.: P32652
**Amaranthus powellii* S. Wats.: P32566
**Amaranthus retroflexus* L.: P32660
Amaranthus tuberculatus (Moq.) J. Sauer: P32565
Froelichia floridana (Nutt.) Moq.: E28940
Froelichia gracilis (Hook.) Moq.: P32487

Anacardiaceae
Rhus aromatica Ait. var. *arenaria* (Greene) Fern.: P31518
Rhus glabra L.: P31710
Toxicodendron radicans (L.) Kuntze: P31723

Apiaceae
Angelica atropurpurea L.: P34607
Cicuta maculata L.: P31655
**Conium maculatum* L.: P35650
Cryptotaenia canadensis (L.) DC.: P31660
**Daucus carota* L.: E28901
Eryngium yuccifolium Michx.: P32544
Osmorhiza claytonii (Michx.) C.B. Clarke: P31612
Osmorhiza longistylis (Torr.) DC.: P31482
Oxypolis rigidior (L.) Raf.: P32467
**Pastinaca sativa* L.: P31570
Polytaenia nuttallii DC.: P31601
Sanicula canadensis L. var. *canadensis*: P31665

Sanicula odorata (Raf.) Pryer & Phillippe: P32645
Sium suave Walt.: P32509
Zizia aurea (L.) Koch: P31512

Apocynaceae
Apocynum cannabinum L.: E28918
Apocynum sibiricum Jacq.: P31686

Ascelpiadaceae
Asclepias amplexicaulis Small: P31582
Asclepias hirtella (Pennell) Woodson: P31670
Asclepias incarnata L.: E28919
Asclepias sullivantii Engelm.: P31690
Asclepias syriaca L.: P31667
Asclepias verticillata L.: E28944
Asclepias viridiflora Raf.: P31647

Asteraceae
**Achillea millefolium* L.: P31563
Ageratina altissima (L.) R.M. King & H. Robins.:28897
Ambrosia artemisiifolia L.: P32353
Ambrosia psilostachya DC.: E28959
Ambrosia trifida L.: P32485
Antennaria neglecta Greene: P31491
Antennaria plantaginifolia (L.) Hook.: P32643
**Arctium minus* Schk.: P36134
Arnoglossum plantagineum Raf.: P34676
Artemisia campestris L.: P32391
Aster ericoides L.: P32551
Aster lanceolatus Willd.: P32540
Aster novae-angliae L.: P32466
Aster oblongifolius Nutt.: P32689
Aster ontarionis Wieg.: P32590
Aster oolentangiensis Riddell: P32638
Aster pilosus Willd.: P32555
Aster praealtus Poir.: P34953
Aster puniceus L.: P32460
Aster sericeus Vent.: P32664
Bidens bipinnata L.: P32629
Bidens cernua L.: P32644
Bidens comosa (Gray) Wieg.: P32539
Bidens coronata (L.) Britt.: P32455
Bidens vulgata Greene: P32526
Boltonia asteroides (L.) L'Hér var. *recognita* (Fern. & Grisc.) Cronq.: P32420
Brickellia eupatorioides (L.) Shinners: E28949
Chrysopsis camporum Greene: P31565
**Cichorium intybus* L.: P34692
**Cirsium arvense* (L.) Scop.: E28914
Cirsium discolor (Muhl.) Spreng.: P32390
**Cirsium vulgare* (Savi) Tenore: P32592
Conoclinium coelestinum (L.) DC.: observed
Conyza canadensis (L.) Cronq.: P32352
Coreopsis lanceolata L.: P31558
Coreopsis palmata Nutt.: P32495
Echinacea pallida (Nutt.) Nutt.: P31706
Erechtites hieracifolia (L.) Raf.: P32358

Erigeron annuus (L.) Pers.: P31715
Erigeron philadelphicus L.: P31584
Erigeron strigosus Muhl.: P31561
Eupatoriadelphus maculatus (L.) R.M. King & H. Robins.: P32456
Eupatoriadelphus purpureus (L.) R.M. King & H. Robins.: P32671
Eupatorium altissimum L.: P32440
Eupatorium perfoliatum L.: P32369
Eupatorium serotinum Michx.: P32446
Euthamia graminifolia (L.) Nutt.: P34949
Euthamia gymnospermoides Greene: P32349
Helenium autumnale L.: P32464
**Helianthus annuus* L.: P34685
Helianthus grosseserratus Martens: E28926
Helianthus occidentalis Riddell: E28943
Helianthus pauciflorus Nutt.: P32428
Helianthus tuberosus L.: P32408
Heliopsis helianthoides (L.) Sweet: P32442
Hieracium longipilum Torr.: E28942
Ionactis linariifolius (L.) Greene: P32570
Krigia virginica (L.) Willd.: P31471
Lactuca canadensis L.: P32366
Lactuca floridana (L.) Gaertn.: P34689
**Lactuca serriola* L.: P32653
**Leucanthemum vulgare* Lam.: P31711
Liatris aspera Michx.: P32421
Liatris pycnostachya Michx.: E28931
**Matricaria discoidea* DC.: P31539
Oligoneuron rigidum (L.) Small: P32424
Parthenium integrifolium L.: P31703
Prenanthes racemosa Michx.: P32610
Pseudognaphalium obtusifolium (L.) Hilliard & Burtt.: P32382
Ratibida pinnata (Vent.) Barnh.: P32441
Rudbeckia hirta L.: P31643
Rudbeckia subtomentosa Pursh: P32377
Senecio plattensis Nutt.: P31492
Silphium integrifolium Michx.: E28928
Silphium laciniatum L.: P32616
Silphium terebinthinaceum Jacq.: P32682
Solidago canadensis L.: P32549
Solidago gigantea Ait.: P32360
Solidago missouriensis Nutt. var. *fasciculata* Holz.: E28950
Solidago nemoralis Ait.: P32557
Solidago speciosa Nutt.: P32522
**Sonchus arvensis* L. var. *glabrescens* Grab. & Wimm.: P32585
**Sonchus asper* (L.) Hill: P34608
**Taraxacum officinale* Weber: P31479
**Tragopogon dubius* Scop.: P31485
**Tragopogon pratensis* L.: P35664
Vernonia fasciculata Michx.: P32434
Xanthium strumarium L. var. *canadense* (Mill.) Torr. & Gray: P32568

Balsamiaceae
Impatiens pallida Nutt.: observed

Bignoniaceae
Campsis radicans (L.) Seem.: E28900

**Catalpa speciosa* Warder: P31708

Boraginaceae
Hackelia virginiana (L.) I.M. Johnston: P32385
Lithospermum croceum Fern: P31473
Lithospermum incisum Lehm.: P32630

Brassicaceae
**Alliaria petiolata* (Bieb.) Cavara & Grande: P31480
**Arabidopsis thaliana* (L.) Heynh.: P35643
Arabis glabra (L.) Bernh.: P31719
**Barbarea vulgaris* R. Br.: P31484
**Berteroa incana* (L.) DC.: P31535
**Capsella bursa-pastoris* (L.) Medic.: P31369
Cardamine bulbosa (Schreb.) BSP.: P31588
Cardamine pensylvanica Willd.: P31610
Draba reptans (Lam.) Fern.: P31516
**Erysimum cheiranthoides* L.: P31527
**Erysimum inconspicuum* (S. Wats.) MacM.: P31642
**Erysimum repandum* L.: P35648
**Hesperis matrionalis* L.: P34610
**Lepidium campestre* (L.) R. Br.: P31525
**Lepidium densiflorum* Schrad.: P31677
Lepidium virginicum L.: P31476
Nasturtium officinale R. Br.: P31609
Rorippa palustris (L.) Besser var. *fernaldiana* (Butters & Abbe) Stuckey: P32600
Rorippa sessiliflora (Nutt.) A. Hitchc.: P32564
**Sisymbrium altissimum* L.: P31536
**Sisymbrium loeselii* L.: E28905
**Thlaspi arvense* L.: P31499

Caesalpiniaceae
Chamaecrista fasciculata Michx.: E28936

Campanulaceae
Campanula aparinoides Pursh: P32457
Campanulastrum americanum (L.) Small: E28896
Lobelia cardinalis L.: P36133
Lobelia siphilitica L.: P32425
Lobelia spicata Lam.: P31575
Triodanis perfoliata (L.) Neiuwl.: P31622

Cannabinaceae
**Cannabis sativa* L.: P31646

Capparaceae
Polanisia dodecandra (L.) DC.: P32655

Caprifoliaceae
**Lonicera* x *bella* Zabel: P 31519, P 32520
**Lonicera maackii* (Rupr.) Maxim.: P 31481
**Lonicera morrowii* Gray: P 35649
Sambucus canadensis L.: P 31707
**Viburnum opulus* L.: P 31552
Viburnum prunifolium L.: P 35667

Caryophyllaceae
**Arenaria serpyllifolia* L.: P35647
**Cerastium fontanum* Baum: P31497
Cerastium nutans Raf.: P31526
**Dianthus armeria* L.: P31645
**Holosteum umbellatum* L.: P31541
**Saponaria officinalis* L.: E28915
Silene antirrhina L.: P31641
**Silene pratensis* (Spreng.) Godron & Gren.: P31495
**Stellaria media* (L.) Cyrillo: P31496

Celastraceae
Celastrus scandens L.: P32674

Chenopodiaceae
**Chenopodium album* L.: P32510
Chenopodium standleyanum Aellen: P32393
**Monolepis nuttalliana* (Roem. & Schultes) Greene: P35646

Cistaceae
Helianthemum bicknellii Fern.: P31595
Helianthemum canadense (L.) Michx.: P32668
Lechea intermedia Britt.: P37119
Lechea stricta Leggett: P32603
Lechea tenuifolia Michx.: E28958

Convolvulaceae
Calystegia sepium (L.) R. Br.: P31674

Cornaceae
Cornus obliqua Raf.: P31712
Cornus racemosa Lam.: P31714
Cornus sericea L.: P31544

Corylaceae
Corylus americana Walt.: P32519

Crassulaceae
**Sedum telephium* L.: P36137

Cucurbitaceae
Echinocystis lobata (Michx.) Torr. & Gray: P32436

Cuscutaceae
Cuscuta gronovii Willd. var. *gronovii*: E28960
Cuscuta pentagona Engelm.: P32627

Elaeagnaceae
**Elaeagnus umbellata* Thunb.: P31550

Euphorbiaceae
Acalypha gracilens Gray var. *gracilens*: P32529
Acalypha rhomboidea Raf.: E28899
Chamaesyce maculata (L.) Small: P32517
Chamaesyce nutans (Lag.) Small: P32439
Euphorbia corollata L.: E28945

Poinsettia dentata (Michx.) Kl. & Garcke: P32656

Fabaceae
Amorpha canescens Pursh: E28941
Amorpha fruticosa L.: P31619
Amphicarpaea bracteata (L.) Fern. var. *bracteata*: observed
Apios americana Medic.: P32673
Astragalus canadensis L.: P34602
Baptisia alba (L.) Vent: E28952
Baptisia bracteata Ell. var. *glabrescens* (Larisey) Isely: P31490
Dalea purpurea Vent.: E28948
Desmodium canadense (L.) DC.: E28935
Desmodium illinoense Gray: P32443
**Kummerowia striata* (Thunb.) Schind.: P32387
Lathyrus palustris L. var. *palustris*: P31692
Lespedeza capitata Michx.: P32422
**Lespedeza cuneata* (Dum.-Cours.) G. Don: P32688
**Lotus corniculatus* L.: P34674
**Medicago lupulina* L.: P31498
**Medicago sativa* L.: P31640
**Melilotus albus* Medic.: P31648
**Melilotus officinalis* (L.) Pallas: P31639
**Robinia pseudoacacia* L.: P32575
Tephrosia virginiana (L.) Pers.: P31668
**Trifolium campestre* Schreb.: P31722
**Trifolium hybridum* L.: P31721
**Trifolium pratense* L.: P31573
**Trifolium repens* L.: P31488
**Vicia villosa* Roth: P31636

Fagaceae
Quercus velutina Lam.: P31478

Gentianaceae
Gentiana andrewsii Griseb.: P32545
Gentiana puberulenta J. Pringle: P32640

Grossulariaceae
Ribes americanum Mill.: P31549
Ribes missouriense Nutt.: P34609

Hypericaceae
Hypericum canadense L.: P32599
Hypericum gentianoides (L.) BSP.: P32665
**Hypericum perforatum* L.: E28908
Hypericum punctatum Lam.: E28932
Hypericum sphaerocarpum Michx.: P32611
Triadenum fraseri (Spach) Gl.: P32447

Juglandaceae
Juglans nigra L.: P32618

Lamiaceae
**Chaiturus marrubiastrum* (L.) Reichenb.: P32601
**Glechoma hederacea* L.: P32658
Hedeoma hispida Pursh: P31627

**Lamium amplexicaule* L.: P35645
**Leonurus cardiaca* L.: E28911
Lycopus americanus Muhl.: P32361
Lycopus uniflorus Michx.: P32458
**Mentha arvensis* L.: E28913
Monarda fistulosa L.: E28938
Monarda punctata L.: E28946
**Nepeta cataria* L.: E28895
Physostegia speciosa (Sweet) Sweet: P34976
Physostegia virginiana (L.) Benth.: P32462
**Prunella vulgaris* L.: E28912
Pycnanthemum virginianum (L.) Dur. & B.D. Jacks.: E28925
**Salvia reflexa* Hornem.: P32661
Scutellaria galericulata L.: P32500
Scutellaria lateriflora L.: P32355
Scutellaria leonardii Epling: P35665
Stachys pilosa Nutt. var. *homotricha* (Fern) Mohlenbr.: P31701
Teucrium canadense L.: E28923

Linaceae
Linum sulcatum Riddell: P32397

Lythraceae
Ammannia coccinea Rottb.: P32567
Lythrum alatum Pursh: P31672
**Lythrum salicaria* L.: P32371
Rotala ramosior (L.) Koehne: P32597

Malvaceae
**Abutilon theophrastii* Medic.: P32584
Hibiscus laevis All.: P32503
**Malva neglecta* Wallr.: P31538
**Sida spinosa* L.: P32583

Melastomataceae
Rhexia virginica L.: E28934

Molluginaceae
**Mollugo verticillata* L.: E28890

Moraceae
**Maclura pomifera* (Raf.) Schneider: P32499
**Morus alba* L.: P34606
**Morus tatarica* L.: P34605

Nyctaginaceae
**Mirabilis nyctaginea* (Michx.) MacM.: P31571

Oleaceae
Fraxinus pennsylvanica Marsh.: P31546

Onagraceae
Epilobium coloratum Spreng.: P32511
Epilobium leptophyllum Raf.: P32453
Gaura biennis L.: P32635
Ludwigia alternifolia L.: E28933

Ludwigia palustris (L.) Ell.: P32637
Ludwigia polycarpa Short & Peter: P32356
Oenothera biennis L.: P32348
Oenothera clelandii W. Dietr., Raven, & W.L. Wagner: E28951

Orobanchaceae
Orobanche ludoviciana Nutt.: P32607

Oxalidaceae
Oxalis stricta L.: P31486
Oxalis violacea L.: P31505

Phrymaceae
Phryma leptostachya L.: P32386

Phytolaccaceae
Phytolacca americana L.: E28894

Plantaginaceae
Plantago aristata Michx.: P31684
**Plantago lanceolata* L.: P31576
Plantago patagonica Jacq.: P32445
Plantago rugelii Decne.: P32351

Polemoniaceae
Phlox bifida Beck: P31524
Phlox maculata L.: P31699

Polygalaceae
Polygala polygama Walt.: P31559
Polygala sanguinea L.: E28930
Polygala verticillata L. var. isocycla Fern.: P32392

Polygonaceae
Antenoron virginianum (L.) Roberty & Vautier: P32670
**Fallopia convolvulus* (L.) A. Love: P34601
Fallopia scandens (L.) Holub: P32430
Persicaria amphibium (L.) S.F. Gray: E28922
**Persicaria cespitosa* (Blume) Nakai: P34604
Persicaria coccinea (Muhl.) Greene: P40241
**Persicaria hydropiper* (L.) Opiz: P32624
Persicaria hydropiperoides (Michx.) Small: P31680
Persicaria lapathifolia (L.) S.F. Gray: P32512
Persicaria pensylvanica (L.) Small: P32362
Persicaria punctata (Ell.) Small: P32364
**Persicaria vulgaris* Webb & Moq.: P32651
Polygonum achoreum S.F. Blake: P34688
**Polygonum arenastrum* Boreau: P32657
Polygonum ramosissimum Michx.: P32516
Polygonum tenue Michx.: P32398
**Rumex acetosella* L.: P31533
Rumex altissimus Wood: P31689
**Rumex crispus* L.: P31694
Rumex orbiculatus Gray: P32508
Tracaulon sagittatum (L.) Small: P32376

Portulacaceae
**Portulaca oleracea* L.: E28892
Talinum rugospermum Holz.: P32558

Primulaceae
Lysimachia lanceolata Walt.: P32492
Lysimachia quadriflora Sims: P32465
Lysimachia thyrsiflora L.: P34975

Ranunculaceae
Anemone canadensis L.: P31591
Anemone cylindrica Gray: P32617
Anemone virginiana L.: P34680
Caltha palustris L.: P31590
Ranunculus abortivus L.: P31509
Ranunculus longirostris Godr.: P31658
Ranunculus pensylvanicus L. f.: E28898
Ranunculus sceleratus L.: P32685
Thalictrum dasycarpum Fisch. & Lall. var. *hypoglaucum* (Rydb.) Boivin: P 31556

Rhamnaceae
**Rhamnus cathartica* L.: P32647

Rosaceae
Agrimonia parviflora Sol.: E28893
Crataegus mollis (Torr. & Gray) Scheele: P31631
Fragaria virginiana Duchesne: P31477
Geum canadense Jacq.: P31664
Geum laciniatum Murr.: P31700
Malus ioensis (Wood) Britt.: P31632
**Malus pumila* Mill.: P31502
Physocarpus opulifolius (L.) Maxim.: P31709
**Potentilla argentea* L.: P31517
Potentilla arguta Pursh: E28924
**Potentilla norvegica* L.: P32505
**Potentilla recta* L.: P31649
Potentilla simplex Michx.: P31489
Prunus americana Marsh. var. americana: P31543
Prunus angustifolia Marsh.: P32493
Prunus pensylvanica L. f. P35671
Prunus serotina Ehrh.: P31487
Prunus virginiana L.: P31521
**Rosa arkansana* Porter: P32553
**Rosa damascena* Mill.: P35671
Rosa carolina L.: P31594
**Rosa multiflora* Thunb.: P31606
**Rosa spinosissima* L.: P35670
Rubus allegheniensis Porter: P31623
Rubus flagellaris Willd.: P31600
Rubus occidentalis L. Bailey: P31534
Rubus pensilvanicus Poir.: P32498
Spiraea alba DuRoi: P32432

Rubiaceae
Diodia teres Walt.: E28954
Galium aparine L.: P31493

Galium obtusum Bigel.: P31688
**Galium pedemontanum* (Bellardi) All.: P35653
Galium tinctorium L.: P32452
Galium triflorum Michx.: P31661

Rutaceae
Ptelea trifoliata L.: E28902

Salicaceae
Populus deltoides Marsh.: P31716
Populus grandidentata Michx.: P32677
Populus tremuloides Michx.: P32548
Salix amygdaloides Anderss.: P31548
Salix discolor Muhl.: P32475
**Salix fragilis* L.: P32523
Salix humilis Marsh.: P32550
Salix interior Rowlee: P31547
Salix nigra Marsh.: P32620

Santalaceae
Comandra umbellata (L.) Nutt.: P31510

Saxifragaceae
Heuchera richardsonii R. Br.: P31693
Penthorum sedoides L.: P32359
Saxifraga pensylvanica L.: P31586

Scrophulariaceae
Agalinis purpurea (L.) Pennell: P32470
Agalinis tenuifolia (Vahl) Raf.: P32472
Chelone glabra L.: P32513
Gratiola neglecta Torr.: P35669
Leucospora multifida (Michx.) Nutt.: P32536
Lindernia anagallidea (Michx.) Pennell: P32416
Mimulus ringens L.: P32502
Nuttallanthus canadensis (L.) D. Sutton: P31532
Pedicularis lanceolata Michx.: P32433
Penstemon pallidus Small: P31528
Scrophularia lanceolata Pursh: P31626
**Verbascum thapsus* L.: E28903
**Veronica arvensis* L.: P31514
Veronica peregrina L.: P31515
Veronicastrum virginicum (L.) Farw.: E28927

Solanaceae
**Datura stramonium* L.: P32649
Physalis subglabrata Mack. & Bush: P32659
Physalis virginiana Mill.: P31596
Solanum carolinense L.: P32404
**Solanum dulcamara* L.: P31691
Solanum ptychanthum Dunal: E28889

Ulmaceae
Celtis occidentalis L.: P32388
Ulmus americana L.: P32525
**Ulmus pumila* L.: P32401

Ulmus rubra Muhl.: P31620

Urticaceae
Boehmeria cylindrica (L.) Sw.: E28921
Parietaria pensylvanica Muhl.: P31616
Pilea pumila (L.) Gray: P32528
Urtica gracilis Ait.: E28920

Verbenaceae
Phyla lanceolata (Michx.) Greene: P32535
Verbena bracteata Lag. & Rodr.: P31603
Verbena hastata L.: E28939
Verbena stricta Vent.: E28904
Verbena urticifolia L.: P32547

Violaceae
Viola affinis LeConte: P31503
Viola lanceolata L.: P31506
Viola pedata L.: P31531
Viola pratincola Greene: P32579.1
Viola pubescens Ait.: P34611
**Viola rafinesquei* Greene: P31522
Viola sagittata Ait.: P31472
Viola sororia Willd.: P32579.2

Vitaceae
Parthenocissus inserta (Kern.) K. Fritsch: P32396
Parthenocissus quinquefolia (L.) Planch.: P32543
Vitis riparia Michx.: P31621

Zygophyllaceae
Tribulus terrestris L.: P34693