



**ILLINOIS NATURAL  
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Results from 2011 Vegetation Monitoring  
in Prairie and Old Field Habitats Following Shrub Removal  
at the North Chicago Wetland Mitigation Site,  
Lake County, Illinois

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## INTRODUCTION

A vegetation monitoring program was established in 2009 at the North Chicago Wetland Mitigation Site in Lake County, Illinois (Figure 1). The principal goals of the monitoring are to assess habitat quality in terrestrial plant communities throughout the site and to document and interpret vegetation changes resulting from habitat management. Prior to 2011 monitoring, habitat management has included removal of invasive shrubs and trees, localized seeding of native prairie and wetland species, mowing, and limited applications of fire to a marsh. Future management includes proposed applications of prescribed fire in terrestrial communities and control of invasive species in terrestrial and wetland habitats. Objectives for 2011 monitoring were to collect and analyze data on species composition, diversity, and structure from permanent vegetation sample plots and to compare results among vegetation types to the 2009 baseline samples and 2010 monitoring results. Removal of invasive shrubs, saplings, and small trees was completed throughout the approximately 160-acre site prior to the 2011 field survey. Because shrub removal had not been completed by the end of the sampling period in 2010, the 2011 samples represent the first complete analysis following this treatment. Previous work at this site includes extensive botanical surveys (e.g., Taft 1996 and 2006), wetland mapping that identified 29 wetland acres (Olson et al. 1991; Plocher et al. 1996, Plocher and Ketzner 2006a, and Plocher and Ketzner 2006b), and monitoring results from the 2009 baseline and 2010 sample data (Taft et al. 2010, Taft and Kron 2011).

2011 Study Questions - This report focuses exclusively on results from vegetation monitoring in treated terrestrial plant communities during 2011. No vegetation sample data were collected from wetlands during 2011 (Plocher, pers. comm.). This report will examine differences in composition, species richness, diversity, and vegetation cover between 2009 and 2011 sample data among prairie and old field vegetation types identified in the baseline samples.

## METHODS

Sample Design - As reported previously (Taft et al. 2010), a stratified vegetation sampling design was utilized with 10 parallel transects running west to east, each separated by intervals of 500-ft (152 m). Five sample points were established on each transect separated by 250 ft (76 m) with the exception of the transect furthest to the north which had four sample points. This array provided

49 sampling stations including 37 in non-wetland terrestrial vegetation and 12 in areas previously determined (Plocher et al. 1996) to be jurisdictional wetlands. In addition, eight reference plots were established in prairie remnants in the far southern portion of the study area and five plots were placed in selected wetland communities, mostly in the southern half of the study area (Figure 2). Specific plot locations for targeted sampling of reference habitats were determined randomly. It was determined following delineation of property boundary and habitat management that one of the reference prairie plots (Prairie Plot 8) occurred outside of the property and treatment area and was dropped from further analysis. This yields a total of 44 terrestrial vegetation sample plots examined in the current study.

Vegetation Sampling - Vegetation was sampled using 25-m<sup>2</sup> (5m x 5m) sampling plots with ground layer quadrats (1-m<sup>2</sup> [1 m x 1 m]) nested within. The baseline point for all sample plots was the southwest corner of the shrub/sapling plots, corresponding to the geographic coordinates associated with plot locations (Figure 2). Steel posts, 15 inches in length, were placed at the SW corner during 2010, replacing plastic posts established in 2009 (intended to avoid damage to shrub-removal equipment), to permanently mark each plot with fire-resistant markers. Plot sides were oriented along cardinal directions (the southern boundary runs W-E at 90°). Mowing activities during 2001 that occurred prior to 2011 vegetation sampling resulted in damage to many plot markers; one marker (Plot 5D [Figure 2]) was destroyed and removed from the ground and could only be re-located approximately. Short posts were selected to avoid attracting attention and to limit the number of proliferating tall angle-iron posts on site. For monitoring accuracy, it is essential that plots can be relocated precisely. If future mowing is practiced, it is strongly urged to be limited to areas between transects.

Composition and density of shrubs and saplings (all woody stems  $\geq$  1-m tall and  $<$  10 cm diameter-at-breast-height [dbh]) were recorded within the 25-m<sup>2</sup> plots. Stems and clumps of stems from root crowns when joined above soil level were treated as separate individuals. For terrestrial vegetation plots, percent shrub cover was determined using digital photography with a hemi-view lens oriented vertically in the plot center on a tripod (about 45 cm above the ground) to photograph the canopy of the plot area (narrowed to the approximate plot area with a lens tube). Percent visible sky and leaf area index (LAI) were calculated from these images using HemiView Canopy Analysis Software, ver. 2.1. Percent canopy cover was calculated as 100 - % visible sky.

A horizontal habitat image also was taken of each plot oriented from the southwest to the northeast corners. Trees (woody stems  $\geq 10$  cm dbh) were sampled in 200-m<sup>2</sup> (14.14 m x 14.14 m) sample plots anchored at the SW corner of the shrub plot.

Ground layer vegetation in terrestrial plots was sampled with 3 quadrats nested within each shrub plot, with quadrats placed in the southwest and northeast corners and one in the plot center. Data collected from each quadrat includes species presence and percent cover for individual species estimated with a modified Daubenmire cover-class scale (0-1 %, 1-5%, 5-25%, 25-50%, 50-75%, 75-95%, 95-100%). All species rooted within quadrat frames were recorded including woody species < 1-m tall. Sample dates during 2011 were from 28 June to 14 July, corresponding to previous sample periods.

Data Analysis - Species abundance is measured by frequency, percent cover, and Importance Value (IV 200). IV 200 for ground-layer samples was calculated as the sum of relative frequency and relative cover. For the shrub/sapling stratum, IV is calculated as the sum of relative frequency and relative density. For trees, IV is calculated as the sum of relative density and relative basal area. With the baseline data, cluster analysis was utilized to produce a hierarchical classification of sites from the quantitative ground-layer sample data, based on the Sørensen similarity distance measure and flexible Beta linkage method ( $\beta = -0.25$ ). This procedure yielded 29 plots classified as old field/shrubland (now “old field”, following shrub removal management) and 16 plots classified as prairie, including eight from the stratified array of plots and eight (now seven) from the targeted reference prairie sampling effort (Taft et al. 2010). This classification was used as a framework for 2011 comparisons.

Ground layer vegetation parameters were calculated at both quadrat and plot spatial scales. Quadrat means include the average among the 3 quadrats in each plot and the plot sum combines data from all 3 quadrats. Vegetation parameters include native and non-native species richness (termed species density at the quadrat scale), Shannon-Wiener Index of diversity ( $H'$  [native species only]), Simpson's Index of Dominance (including all species), percent cover and bare ground, and metrics for Floristic Quality Assessment (FQA) including calculations based on native and total species. FQA metrics include Mean Coefficient of Conservatism and the Floristic Quality Index (Taft et al. 1997). These parameters, following Whittaker (1975) and Taft et al. (2006), were calculated as follows:

### Ground Layer Vegetation Diversity Measures

**Native Species Density:** Mean number of native species/quadrate (1 m<sup>2</sup>)

**Non-Native Species Density:** Mean number of non-native species/quadrate (1 m<sup>2</sup>)

**Native Species Richness:** Total number of native species/plot (sum of three quadrats)

**Non-native Species Richness:** Total number of non-native species/plot (sum of three quadrats)

**Shannon-Wiener Index of Diversity (H')**:  $-\sum [p_i \ln(p_i)]$ , where  $p_i$  is the relative abundance of each native species (based on importance values [IV200] calculated as the sum of relative cover and relative frequency),

**Simpson's Dominance Index:**  $\sum p_i^2$ , where  $p_i$  is the relative importance value for each species in the sample area (transect),

### Ground Layer Structure

**Percent Cover:** Sum of the average cover for each species in sample area

**Percent Bare Ground:** Average estimate of bare ground for each quadrate

### Floristic Quality Assessment (using ground-layer vegetation data)

**Mean Coefficient of Conservatism (Mean C):**  $\sum CC/S$ , where CC = Coefficient of Conservatism and S = total species richness, and

**Floristic Quality Index (FQI):** Mean C ( $\sqrt{N}$ ) where N = native species richness

**Mean C<sub>n</sub>** and **FQI<sub>n</sub>** are calculated using only native species.

### Shrub Layer

**Shrub Density:** Total stem number per plot (sum of all species)

**Shrub Canopy Cover:** 100 - % visible sky, as determined from analysis of digital canopy photos with Hemi-View Canopy Analysis Software (ver. 2.1).

**Leaf Area Index (LAI):** The amount of leaf surface area per unit ground area as determined from analysis of digital canopy photos with Hemi-View Canopy Analysis Software (ver. 2.1).

Botanical nomenclature follows Mohlenbrock (1986). Non-native species in the report will be indicated with an asterisk (\*).

Statistical Analysis - Comparisons of vegetation parameters and attributes among old field and prairie vegetation types were examined with means comparison tests (t-tests). Comparisons between 2011 and baseline data were examined with paired t-tests; comparisons between vegetation types in 2011 were examined with two-sample t-tests. Trends among vegetation types from 2009 to 2011 were examined with repeat-measures analysis of variance (RM ANOVA). Probability (*P*) values for RM ANOVA were taken from univariate tests of differences for year x vegetation type within-subject interactions using the Huynh-Feldt adjustment. The multiple comparison family-wise probability error rate was adjusted with the Bonferroni correction ( $p = 0.05/n$  [number of attribute comparisons in each dataset]). In this case, family-wise refers to groups of relatively discrete attributes (e.g., species richness attributes [including species density, diversity, and dominance], vegetation structure [% cover and % bare ground], and Floristic Quality Assessment indices [FQI and Mean C]). Highly correlated metrics, such as Mean C and Mean Cn and Shrub Canopy Cover and LAI, were not considered distinct attributes and not configured as multiple comparisons. Statistical tests were performed with Systat ver. 10 (SPSS 2000).

## RESULTS AND DISCUSSION

### ***TERRESTRIAL VEGETATION***

#### **Ground-Layer**

##### Site Summary

*Site Species Richness* - A total of 248 taxa of vascular plants, 32 more than in 2010, were recorded from the combined ground-layer samples (44 plots, 132 quadrats) including 194 native and 54 non-native species (Appendix 1). There were 48 new species recorded in 2011 (28 newly recorded for the site) and 18 previously recorded species that were not found in 2011. Of the 18 taxa recorded in 2010 not recorded in 2011 sample plots, all but one were scarce (5 occurrences or less) in the 2010 sample. *Liatris spicata* declined by 8 occurrences but sterile individuals of *Liatris* (particularly *L. spicata* and *L. pycnostrachya*) cannot be determined to species in the field with certainty; *Hypericum punctatum* appears to have been misidentified in previous samples and can be attributed to the non-native *H. perforatum*. *Allium canadense* and *A. cernuum* and *Geum allepicum* and *G. canadense* are difficult to distinguish based on vegetative material (basal

rosettes) and are combined for some analyses.

New species recorded in sample plots during 2011 mostly were infrequent, occurring in up to 5 quadrats. The most abundant (greater than 5 occurrences) include the following (with total number of occurrences out of 132 quadrats in parentheses): *Lolium multiflorum*\* (96), *Erechtites hieracifolia* (38), *Triticum aestivum*\* (18), *Setaria glauca*\* (12), *Digitaria ischaemum*\* (6), *Physalis subglabrata* (6), *Echinacea pallida* (6), *Sonchus oleracea*\* (6), *Acalypha rhomboidea* (6), *Poa trivialis*\* (6), *Eupatorium maculatum* (6), *Rumex crispus*\* (6), and *Conyza canadensis* (6). The first four species account for 75% of the new occurrences. *Lolium multiflorum*\* and *Triticum aestivum*\* were among species included in seed mixes along with the prairie species *Echinacea pallida* and the wetland species *Eupatorium maculatum*. The remaining novel species listed above are ruderal taxa that likely became established with soil disturbances following site management activities.

Combining results from general surveys and the 2009-2011 monitoring efforts, a total of 393 vascular plant species (about 12.5% of the total known flora of the state) have been recorded from the North Chicago Wetland Mitigation Site including three state threatened (*Elymus trachycaulus*, *Oenothera perennis*, and *Veronica scutellata*) and one state endangered (*Amelanchier sanguinea*) plant species.

*Dominant Species* - The top-10 dominant species in descending rank order overall in 2011, accounting for 38% of the total importance, were *Lolium multiflorum*\*, *Rhamnus cathartica*\*, *Allium cernuum/canadense*, *Agrostis alba*, *Poa pratensis*\*, *Poa compressa*\*, *Rudbeckia hirta*, *Carex granularis*, *Prunella vulgaris* var. *elongata*, and *Andropogon gerardii*. Only half these species (underlined) also were among top-ranking dominants in 2010. *Lolium multiflorum*\* is an annual used as a cover crop and may not persist. Four of the five former dominants had noteworthy declines in abundance: *Cornus racemosa*, *Solidago juncea*, *Schizachyrium scoparium*, and *Daucus carota*\*. *Schizachyrium scoparium* (little bluestem), a warm-season grass, typically is a dominant in tallgrass prairie communities in the Midwest. Warm-season grasses do not persist in soil seed banks, in general and from seed bank analysis at this site (Kron 2011), and can be slow to re-establish in habitats where once abundant (Taft 2003).

*Overall Trends in Species Density, Diversity, and Percent Cover* - Throughout the study area

there was an average species density per quadrat (1-m<sup>2</sup>) of 15.59 native and 5.98 non-native species. Native species density continually has declined and non-native species have increased since 2009. Repeated Measures Analysis of Variance (RM ANOVA), examining data from 2009-2011, indicate that the increase in non-native species is significant while the declining trend for native species is not (Figure 3a). Native species density is highly correlated to total native richness per plot, summing species from all 3 quadrats (Pearson product-moment correlation coefficient  $r = 0.97$ ); consequently, results from species density are emphasized in this report. Average diversity index (Shannon-Wiener Index [H'], using native species only) is 2.36 (se 0.69) and average dominance (Simpson's Index, using all species) is 0.25 (se = 0.03). RM ANOVA indicate no significant trends for diversity; however, dominance has changed significantly, first declining in 2010 and then increasing in 2011 (Figures 3b and 3c). Average vegetation cover was 130.1%, first decreasing in 2010 and increasing in 2011; RM ANOVA indicates an overall significant change; percent bare ground first increased in 2010 to 34%, then declined in 2011 to 19%, also with an overall significant change (Figure 3d).

*Floristic Quality Assessment* - The overall mean coefficient of conservatism (Mean C) among quadrats was 1.89 (se = 0.13) in 2011 and the native Mean C was 2.7 (se = 0.13). Both values have declined since the 2009 baseline and the trends, as measured with RM ANOVA, are highly significant (Figure 4a). The overall Floristic Quality Index (FQI) among quadrats was 8.05 (se 0.86) in 2011 and the native FQI (FQIn) was 10.92 (se 0.95). Both values also have declined since the 2009 baseline and the trends are highly significant (Figure 4b). There are major differences among habitats, particularly when examining separately the results from the reference and transect prairie plots (see below).

## **2011 Habitat Differences**

Species Composition - The top ranking species from the old field habitat, accounting for 44.3% of the total importance value (IV 200) were *Lolium multiflorum*\*, *Rhamnus cathartica*\*, *Allium cernuum/canadense*, *Poa compressa*\*, *Rudbeckia hirta*, *Prunella vulgaris* var. *elongata*, *Oxalis stricta*, *Dichanthelium villosissimum*, *Agrostis alba*, and *Poa pratensis*\*. Only the three underlined species ranked among the top 10 dominant species in 2010. The top-ranking species from the prairie habitat, combining species from the transect and reference plots and accounting

for 33.9% of the total importance, were *Rhamnus cathartica*\*, *Lolium multiflorum*\*, *Sorghastrum nutans*, *Agrostis alba*, *Andropogon gerardii*, *Parthenium integrifolium*, *Poa pratensis*\*, *Schizachyrium scoparium*, *Allium cernuum/canadense*, and *Silphium terebinthinaceum*. The underlined species also ranked among the top-10 dominant species in 2010. During 2011 samples, many were found primarily in the reference prairie plots.

Despite completion of shrub removal, *Rhamnus cathartica*\* remains among the most dominant species in both old field and prairie habitats in the ground layer. *Cornus racemosa*, another target of removal and formerly a co-dominant with *R. cathartica*\*, was among the greatest declining species in both frequency and percent cover (Tables 1a and 1b). It declined from about 80% frequency among quadrats in the 2009 samples to 41% in 2011. *Rhamnus cathartica*\* demonstrated a major decline in total percent cover in the ground-layer sample; however, it declined only 31% in frequency from the baseline sample. It produces an abundance of fruits that fall to the ground or are dispersed only short distances by birds (it has a purgative effect). Additional management, including applications of prescribed fire, will be required to reverse its abundance and potential for re-establishment into the shrub stratum.

Increasing and Decreasing Species - Compared to the 2009 baseline, species increasing and decreasing greatest in frequency and percent cover differ greatly between the old field and prairie habitats. Despite the increasing overall species richness in 2011, there were many more species decreasing in abundance (frequency and percent cover) than increasing (Tables 1a and 1b).

*Old Field Habitat* - Thirty species increased in frequency by 5 or more occurrences (Table 1a). Species increasing greatest in frequency ( $\geq 10$  occurrences) were *Lolium multiflorum*\*, *Erechtites hieracifolia*, *Rudbeckia hirta*, *Cirsium arvense*\*, *Chemopodium albidum*\*, *Setaria glauca*\*, *Plantago rugelii*, *Triticum aestivum*\*, and *Verbena hastata*. *Lolium multiflorum*\* and *Triticum aestivum*\* are annual grasses that, as noted previously, were among species added in seed mixes. Eight species increased in percent cover greater than 1%. Species increasing greatest in percent cover ( $> 2\%$ ) were *Lolium multiflorum*\* and *Agrostis alba*.

Ninety (90) species decreased by 5 or more occurrences in old field habitat (Table 1a). Thirty species decreased by more than 20 occurrences. The greatest decreasing species ( $\geq 30$  occurrences) were *Vitis riparia*, *Cornus racemosa*, *Anemone virginiana*, *Aster drummondii*,

*Geum* species (*G. canadense* and *G. allepicum* combined due to difficulty distinguishing non-flowering basal rosettes), *Solidago canadensis*, *Lonicera X bella*, *Crataegus* seedlings, *Fragaria virginiana*, *Rubus pensylvanicus*, *Aster simplex*, *Carex granularis*, and *Aster lateriflorus*. An additional 17 species decreased by more than 20 occurrences. Fifteen species declined in cover more than 1%; species decreasing greatest in percent cover ( $> 2\%$ ) were *Rhamnus cathartica*\*, *Cornus racemosa*, *Lonicera X bella*\*, *Aster drummondii*, *Aster lateriflorus*, *Circaea lutetiana*, *Solidago juncea*, and *Carex stricta* (Table 1a).

*Prairie Habitat* (combining transect and reference prairie plots) - Five species increased in frequency by 5 or more occurrences: *Lolium multiflorum*\*, *Allium canadense/cernuum*, *Liatris pycnostachya*, *Carex pensylvanica*, and *Triticum aestivum*\* (Table 1b). Fourteen species increased in percent cover greater than 1%. Species increasing greatest in percent cover ( $> 2\%$ ) were *Lolium multiflorum*\*, *Allium canadense/cernuum*, *Agrostis alba*, *Carex granularis*, *Parthenium integrifolium*, *Poa pratensis*\*, and *Poa compressa*\*.

Eighty-seven (87) species decreased by 5 or more occurrences in the prairie habitat (Table 1b). Seventeen species decreased by more than 20 occurrences. The greatest decreasing species (e.g.,  $\geq 25$  occurrences) were *Geum* species (combined), *Solidago nemoralis*, *Vitis riparia*, and *Aster ericoides*. Twenty-seven species declined in cover more than 1%; species decreasing greatest in percent cover ( $> 2\%$ ) were *Solidago juncea*, *Cornus racemosa*, *Rhamnus cathartica*\*, *Schizachyrium scoparium*, *Carex pellita*, *Daucus carota*\*, *Antennaria neglecta*, *Agrostis alba* var. *palustris*, *Fragaria virginiana*, *Carex buxbaumii*, *Solidago gigantea*, *Zanthoxylum americanum*, *Zizia aurea*, *Solidago canadensis*, *Rosa carolina*, and *Helianthus grosseserratus*.

In summary, in old field habitats, species decreasing in frequency ( $\geq 5$  occurrences) outnumbered increasers by 60 species in 87 sample quadrats. In prairie habitats, species decreasing in frequency ( $\geq 5$  occurrences) outnumbered increasers by 82 species in 45 sample quadrats.

*Structure, Species Richness and Diversity* – As in previous samples (Taft et al. 2010 and Taft and Kron 2011), prairie habitat in 2011 had greater native species density, richness, diversity, and percent vegetative cover compared to the old field habitat and lower percent bare ground and

dominance. For example, native species density/m<sup>2</sup> averaged 20.9 in prairie habitat and 12.8 in old field habitat and vegetation cover was 168.5% compared to 85.8% in prairie and old field habitats, respectively (Table 2). Although native species density, native richness, diversity, dominance, percent cover, and percent bare ground differed significantly between prairie and old field habitats in past comparisons (2009 and 2010), these differences have diminished in 2011 and are no longer statistically significant with the Bonferroni correction for comparisons of multiple variables, although differences in native species richness per plot were nearly significant (Table 3). However, significant differences were found between reference prairie and old field habitats for parameters of native species richness and diversity (Table 4) and between transect and reference prairie plots (Table 5). The diminishing differences between combined prairie and old field samples are the result of a precipitous decline in native species density and richness in transect prairie plots. In a paired comparison with 2010 sample data, average native species density in the 8 transect prairie plots declined from 19.5 to 12.1 (t stat = 3.0,  $P = 0.02$ ) while increasing in reference prairie (28 to 30.9) and declining only slightly (13.6 to 12.8) in old field habitat; the latter differences were not significant.

Comparative trends since the 2009 baseline sample for old field, transect prairie, and reference prairie habitats are illustrated in the different trajectories among these habitat types in mean native species density, mean non-native species density, diversity, and dominance (Figure 5a-d) and percent vegetation cover and bare ground (Figure 5e-f). Some differences are quite distinct but the year x vegetation type interactions are not statistically significant (e.g., diversity and dominance) due to wide variance among transect prairie plots in 2011. While there has been variation in diversity and structural variables for old field and reference prairie habitats, transect prairie plots have changed most dramatically. An exception is non-native species density where the old field habitat has shown gradual increase while levels in the other habitats have been less variable (Figure 5b).

*Floristic Quality Assessment* – FQA scores remain greater in the prairie habitat (combined data) compared to the old field habitat (Table 2); however, in 2011 the differences are significant only for FQI and FQIn (Table 3). Differences are much greater between reference prairie and old field habitats with significant differences ( $P < 0.0001$ ) for Mean C (and Mean Cn) and FQI (and FQIn) (Table 4). Comparison in FQA metrics between reference prairie and transect prairie

samples are similar (i.e.,  $P < 0.0001$ ) to reference prairie and old field habitat comparisons (Table 5).

Comparative trends since the 2009 baseline sample for old field, transect prairie, and reference prairie habitats are illustrated in the different trajectories among these habitat types in Mean C and FQI. While the reference prairie has been stable, the old field and particularly the transect prairie habitats have shown dramatic declines in habitat integrity as measured by FQA indices (Figure 6a-b). Although between-group differences are highly significant for Mean C ( $P < 0.000001$ ), the year x vegetation type interaction is not significant with the correction for multiple comparisons (i.e., Mean C and FQI), evidently due to the strongly parallel decline in transect and old field habitats (Figure 6a). However, the year x vegetation type interaction with FQI was significant (Figure 6b).

### **Shrub/Sapling Stratum**

Site Summary – Vegetation management involving shrub removal was completed prior to collection of 2011 sample data. Mean shrub density throughout the study area was 0.84 stems per plot (25-m<sup>2</sup>), a major decline compared to 58.5 stems per plot in the baseline data (Table 2). Based on sample data, estimated stem density was 336.4/ha (135.1/acre), compared to the 2009 baseline shrub/sapling stem density of 22,898/ha (9,266.7/acre). Mean percent canopy cover was about 16% (visible sky 84%), with persisting cover attributable primarily to overhang from remaining trees and native shrub species. Leaf area index was 0.2. All variables represent significant changes from baseline and 2010 samples indicating trends significantly different ( $P < 0.00001$ ) from the null expectation of no change (Figure 7).

Ten species were recorded in the sampling compared to 24 in the baseline sample. Dominant species in the combined old field and prairie plots, in descending rank order, were *Rhamnus cathartica\**, *Viburnum lentago*, *Viburnum recognitum\**, and *Cornus racemosa* accounting for about 70% of the total importance value (IV200 [sum of relative frequency and relative density]). *Rhamnus cathartica\** is still the dominant species with 25.8% of the IV and 24% of the total stems, although its dominance has declined from the baseline level of 37% of the IV. Species with the greatest total density also were *R. cathartica\**, *V. recognitum\**, and *V. lentago*. *Viburnum recognitum\** is native to Illinois but is considered to be adventive and increasing in the Chicago region (Swink and Wilhelm 1994). Eighteen species had declines in

stem density greater than 90% with 14 of these declining 100% (Table 6).

### Plant Communities

Comparative trends since the 2009 baseline sample for old field, transect prairie, and reference prairie habitats are illustrated in the trajectories among habitat types for shrub/sapling density, leaf area index, and percent canopy cover (percent visible sky is the inverse of canopy cover). By 2011, all variables reach similar levels and each year x vegetation interaction is highly significant (Figure 8a-d). The shrub removal treatment was very thorough. However, *Rhamnus cathartica*\* was present in 89% of ground-layer samples in prairie and 82% in old field samples, so continued management, such as with prescribed fire, will be required to prevent its re-establishment into the shrub stratum.

### **Tree Stratum**

Ten of 44 plots in the stratified transect samples included trees (woody stems > 10 cm dbh). Tree density has declined from approximately 22.7 stems/ha and basal area of 1.1 m<sup>2</sup>/ha to 19 stems/ha and 0.52 m<sup>2</sup>/ha. Four species were recorded in the tree sample plots and *Crataegus pruinosa/coccinea* (combined due to sterile condition of most individuals) was the dominant with about 54% of the IV for all species (Table 7). The 2011 and previous data were corrected for site-wide reference (previous estimates focused only on plots containing trees).

### **Threatened and Endangered Species**

Three state threatened (*Elymus trachycaulus*, *Oenothera perennis*, and *Veronica scutellata*) and one state endangered (*Amelanchier sanguinea*) species have been reported from the North Chicago Wetland Mitigation Site, with all but *V. scutellata* found in sample plots (Taft and Kron 2011). Only *E. trachycaulus* and *Amelanchier sanguinea* were found in sample plots during 2011. *Oenothera perennis*, an annual species formerly abundant locally in the northern half and locally scarce in the southern half of the study area, was absent in 2011, presumably due to suppression by straw that was dispersed extensively over much of the site. *Amelanchier sanguinea* formerly had three stems but in 2011 only a single tree was found with two stems now exposed above the soil level (counted as a single shrub; whereas, previously it may have been counted as two stems). In the baseline sample, 33 *Amelanchier* seedlings were recorded;

however, only 1 was recorded in 2011. A determination to species can be difficult with flowering and fruiting material of *Amelanchier* and not impossible in the field with sterile seedlings; these seedlings may have represented two or three species: *A. sanguinea*, *A. arborea*, and possibly *A. laevis*. *Elymus trachycaulus* was recorded in 6 quadrats in 2011 (4 in prairie plots and 2 in old field plots) and remains occasional in the southern half of the study area. *Veronica scutellata* is a marsh species, has always been scarce at this site, and has not been recorded in vegetation sample plots.

Basal leaves of an orchid were observed in 2 reference prairie sample quadrats (reference prairie plot 1) and may be a species of *Platanthera* or *Spiranthes*. *Platanthera leucophaea* (Eastern prairie fringed orchid), a state endangered and federally threatened species, is known from several Lake County stations including localities nearby this study site.

It appears that outside of the reference prairie plots, management activities suppressed or eliminated *O. perennis* and *Amelanchier* seedlings. Continued monitoring may yield a determination to species for the orchid and determine whether *O. perennis* and *Amelanchier* species recover.

## SUMMARY AND CONCLUSIONS

Total species richness increased somewhat during 2011, presumably due to seeding activities and soil disturbances resulting from habitat management that increased the number of recorded ruderal (weedy, disturbance tolerant) species. However, species declining in total number of occurrences outnumbered increasing species, particularly in old field and transect prairie habitats. Specifically, native species density declined in old field and particularly transect prairie plots but, in sharp contrast, increased in reference prairie plots. Non-native species density increased slightly in all habitats, but the increase was greatest in the old field habitat. Diversity increased slightly in old field plots but declined sharply in transect prairie plots. Indicators of habitat integrity, the Floristic Quality Index and Mean Coefficient of Conservatism, declined throughout the study area but the decline was greatest in the old field and particularly the transect prairie habitat. The trajectory of habitat quality indices for old field, transect prairie and reference prairie plots is significantly different since the baseline sample primarily due to a sharp decline in transect prairie plots. Percent vegetation cover returned to near baseline levels overall, increased somewhat in old field habitat but declined sharply in

transect prairie plots. Shrub density and percent cover has declined greatly from the baseline sample and has reached a similar level throughout all habitat terrestrial types.

Results from 2011 monitoring suggest that sample plots on transects formerly aligned with reference prairie samples (i.e., transect prairie plots) were disturbed by management activities somewhat disproportionate to disturbances in old field plots. The reference prairie plots retain outstanding examples of mesic tallgrass prairie habitat and with shrub removal have the opportunity to expand and be sustained. The disturbances to the 8 transect prairie plots may simply be a coincidence of where shrub removal activities were staged, brush piles located and burned, and other activities that greatly disturbed the vegetation. Continued monitoring will determine whether these plots recover.

## REFERENCES

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Table 1a. Species from old field habitat that in 2011 increased and decreased in frequency ( $\geq 5$  quadrats) and in % cover ( $> 1\%$ ), compared to baseline (2009) levels at the North Chicago Wetland Mitigation Site, Lake County, Illinois.

| -----OLD FIELD INCREASERS-----   |            |                                      |            | -----OLD FIELD DECREASERS-----       |            |   |            |
|----------------------------------|------------|--------------------------------------|------------|--------------------------------------|------------|---|------------|
| SPP INCREASING BY > 5 QUADRATS   | # Increase | SPP INCREASING BY > 1.0% COVER       | % Increase | SPP DECREASING BY > 5 QUADRATS       | # Decrease | SPP DECREASING BY > 0.5% COVER            | % Decrease |
| <i>Lolium multiflorum</i> *+     | 74         | <i>Lolium multiflorum</i> *+         | 39.22      | <i>Vitis riparia</i>                 | -60        | <i>Rhamnus cathartica</i>                 | -53.81     |
| <i>Erechtites hieracifolia</i> + | 36         | <i>Agrostis alba</i>                 | 2.42       | <i>Cornus racemosa</i>               | -56        | <i>Cornus racemosa</i>                    | -9.53      |
| <i>Allium cernuum</i>            | 30         | <i>Prunella vulgaris v. elongata</i> | 1.93       | <i>Anemone virginiana</i>            | -52        | <i>Lonicera X bella</i>                   | -3.88      |
| <i>Rudbeckia hirta</i>           | 19         | <i>Leucanthemum vulgare</i>          | 1.67       | <i>Aster drummondii</i>              | -47        | <i>Aster drummondii</i>                   | -2.79      |
| <i>Cirsium arvense</i> *         | 16         | <i>Cirsium arvense</i>               | 1.55       | <i>Geum Spp combined</i>             | -45        | <i>Aster lateriflorus</i>                 | -2.28      |
| <i>Chemopodium albidum</i> *     | 12         | <i>Poa compressa</i>                 | 1.17       | <i>Solidago canadensis</i>           | -42        | <i>Circaea lutetiana canadensis</i>       | -2.22      |
| <i>Setaria glauca</i> *+         | 11         | <i>Dichanthelium villosissimum</i>   | 1.15       | <i>Lonicera X bella</i>              | -42        | <i>Solidago juncea</i>                    | -2.22      |
| <i>Plantago rugelii</i>          | 10         | <i>Digitaria ischaemum</i> *+        | 1.14       | <i>Crataegus seedlings</i>           | -40        | <i>Carex stricta</i>                      | -2.03      |
| <i>Triticum aestivum</i> *+      | 10         |                                      |            | <i>Fragaria virginiana</i>           | -38        | <i>Potentilla simplex</i>                 | -1.95      |
| <i>Verbena hastata</i>           | 10         |                                      |            | <i>Rubus pensilvanicus</i>           | -37        | <i>Rhamnus frangula</i>                   | -1.87      |
| <i>Epilobium coloratum</i>       | 9          |                                      |            | <i>Aster simplex</i>                 | -35        | <i>Parthenocissus quinquefolia</i>        | -1.81      |
| <i>Lactuca canadensis</i>        | 9          |                                      |            | <i>Carex granularis</i>              | -32        | <i>Anemone virginiana</i>                 | -1.71      |
| <i>Cirsium vulgare</i> *         | 8          |                                      |            | <i>Aster lateriflorus</i>            | -30        | <i>Vitis riparia</i>                      | -1.70      |
| <i>Senecio paperculus</i>        | 8          |                                      |            | <i>Potentilla simplex</i>            | -29        | <i>Viburnum lentago</i>                   | -1.63      |
| <i>Centaureum pulchellum</i> *   | 7          |                                      |            | <i>Rosa carolina</i>                 | -28        | <i>Fragaria virginiana</i>                | -1.07      |
| <i>Solanum americanum</i>        | 7          |                                      |            | <i>Circaea lutetiana canadensis</i>  | -28        |   |            |
| <i>Acalypha rhomboidea</i> +     | 6          |                                      |            | <i>Dichanthelium implicatum</i>      | -27        |   |            |
| <i>Conyza canadensis</i>         | 6          |                                      |            | <i>Rhamnus frangula</i>              | -27        |   |            |
| <i>Digitaria ischaemum</i> *+    | 6          |                                      |            | <i>Viburnum lentago</i>              | -26        |   |            |
| <i>Echinacea pallida</i>         | 6          |                                      |            | <i>Sanicula canadensis</i>           | -24        |   |            |
| <i>Eupatorium maculatum</i>      | 6          |                                      |            | <i>Carex umbellata</i>               | -22        |   |            |
| <i>Physalis subglabrata</i>      | 6          |                                      |            | <i>Prunus serotina</i>               | -21        |   |            |
| <i>Poa trivialis</i> *+          | 6          |                                      |            | <i>Taraxicum officinale</i>          | -21        |   |            |
| <i>Ratibida pinnata</i>          | 6          |                                      |            | <i>Viburnum opulus</i>               | -21        |   |            |
| <i>Sonchus oleracea</i> *+       | 6          |                                      |            | <i>Zizia aptera</i>                  | -21        |   |            |
| <i>Andropogon gerardii</i>       | 5          |                                      |            | <i>Viola pratensis</i>               | -21        |   |            |
| <i>Lythrum alatum</i>            | 5          |                                      |            | <i>Parthenocissus quinquefolia</i>   | -21        |   |            |
| <i>Oxalis stricta</i>            | 5          |                                      |            | <i>Solidago juncea</i>               | -21        |   |            |
| <i>Rumex crispus</i> *+          | 5          |                                      |            | <i>Amelanchier cf. sanguinea</i>     | -20        |   |            |
|                                  |            |                                      |            | <i>Solidago nemoralis</i>            | -20        |   |            |
|                                  |            |                                      |            | <i>Poa compressa</i>                 | -19        |   |            |
|                                  |            |                                      |            | <i>Rosa multiflora</i>               | -19        |   |            |
|                                  |            |                                      |            | <i>Monarda fistulosa</i>             | -18        |   |            |
|                                  |            |                                      |            | <i>Solidago missouriensis</i>        | -18        | <b>Decreasing &gt; 5 Quads. Continued</b> |            |
|                                  |            |                                      |            | <i>Daucus carota</i>                 | -17        | <i>Penstemon digitalis</i>                | -9         |
|                                  |            |                                      |            | <i>Rhamnus cathartica</i>            | -16        | <i>Viburnum prunifolium</i>               | -9         |
|                                  |            |                                      |            | <i>Crataegus cf pruinosa</i>         | -15        | <i>Toxicodendron radicans</i>             | -9         |
|                                  |            |                                      |            | <i>Galium triflorum</i>              | -15        | <i>Dichanthelium oligosanthes</i>         | -8         |
|                                  |            |                                      |            | <i>Lobelia spicata</i>               | -14        | <i>Scutellaria leonardii</i>              | -8         |
|                                  |            |                                      |            | <i>Aster ericoides</i>               | -14        | <i>Carex hirsutella</i>                   | -8         |
|                                  |            |                                      |            | <i>Erigeron philadelphicus</i>       | -14        | <i>Aster praealtus</i>                    | -7         |
|                                  |            |                                      |            | <i>Crataegus crus-galli</i>          | -13        | <i>Danthonia spicata</i>                  | -7         |
|                                  |            |                                      |            | <i>Antennaria neglecta</i>           | -13        | <i>Tradescantia ohioensis</i>             | -7         |
|                                  |            |                                      |            | <i>Poa pratensis</i>                 | -13        | <i>Anemone cylindrica</i>                 | -7         |
|                                  |            |                                      |            | <i>Acer negundo</i>                  | -12        | <i>Carex blanda</i>                       | -7         |
|                                  |            |                                      |            | <i>Allium canadense</i>              | -12        | <i>Prunus americana</i>                   | -7         |
|                                  |            |                                      |            | <i>Carex stricta</i>                 | -12        | <i>Glyceria striata</i>                   | -6         |
|                                  |            |                                      |            | <i>Viola sororia</i>                 | -12        | <i>Melilotus alba</i>                     | -6         |
|                                  |            |                                      |            | <i>Agrostis alba</i>                 | -11        | <i>Lactuca sp</i>                         | -6         |
|                                  |            |                                      |            | <i>Leucanthemum vulgare</i>          | -11        | <i>Quercus palustris</i>                  | -6         |
|                                  |            |                                      |            | <i>Juniperis virginiana</i>          | -11        | <i>Solanum dulcamara</i>                  | -6         |
|                                  |            |                                      |            | <i>Erigeron annuus</i>               | -11        | <i>Crataegus cf coccinea</i>              | -6         |
|                                  |            |                                      |            | <i>Achillea millefolium</i>          | -10        | <i>Galium obtusum</i>                     | -6         |
|                                  |            |                                      |            | <i>Cerastium vulgatum</i>            | -10        | <i>Carex cristatella</i>                  | -6         |
|                                  |            |                                      |            | <i>Rubus flagellaris</i>             | -10        | <i>Sphenopholis intermedia</i>            | -5         |
|                                  |            |                                      |            | <i>Equisetum arvense</i>             | -10        | <i>Veronicastrum virginicum</i>           | -5         |
|                                  |            |                                      |            | <i>Solidago gigantea</i>             | -9         | <i>Fraxinus pennsylvanica subim</i>       | -5         |
|                                  |            |                                      |            | <i>Prunella vulgaris v. elongata</i> | -9         | <i>Polygonatum commutatum</i>             | -5         |
|                                  |            |                                      |            | <i>Dichanthelium villosissimum</i>   | -9         | <i>Prunus virginiana</i>                  | -5         |
|                                  |            |                                      |            | <i>Juncus tenuis</i>                 | -9         | <i>Viola pedatifida</i>                   | -5         |
|                                  |            |                                      |            | <i>Acer saccharinum</i>              | -9         | <i>Oxypolis rigidor</i>                   | -5         |
|                                  |            |                                      |            | <i>Viburnum recognitum</i>           | -9         | <i>Hieracium caespitosum</i>              | -5         |

Table 1b. Species from prairie habitat that in 2011 increased and decreased in frequency (> 5 quadrats) and in % cover (> 1%), compared to baseline (2009) levels at the North Chicago Wetland Mitigation Site, Lake County, Illinois.

| -----PRAIRIE INCREASERS-----    |            |                                 |            | -----PRAIRIE DECREASERS-----                  |            |  |            |
|---------------------------------|------------|---------------------------------|------------|---|------------|--|------------|
| SPP INCREASING BY > 5 QUADRATS  | # Increase | SPP INCREASING BY > 1.0% COVER  | % Increase | SPP DECREASING BY > 5 QUADRATS                | # Decrease | SPP DECREASING BY > 0.5% COVER             | % Decrease |
| <i>Lolium multiflorum</i> *+    | 22         | <i>Lolium multiflorum</i> *+    | 15.14      | <i>Geum</i> spp combined                      | -30        | <i>Solidago juncea</i>                     | -16.43     |
| <i>Allium canadense/cernuum</i> | 17         | <i>Allium canadense/cernuum</i> | 5.81       | <i>Solidago nemoralis</i>                     | -28        | <i>Cornus racemosa</i>                     | -9.77      |
| <i>Liatris pycnostachya</i>     | 10         | <i>Agrostis alba</i>            | 5.75       | <i>Vitis riparia</i>                          | -28        | <i>Rhamnus cathartica</i> *                | -8.06      |
| <i>Carex pensylvanica</i>       | 8          | <i>Carex granularis</i>         | 2.44       | <i>Aster ericoides</i>                        | -25        | <i>Schizachyrium scoparium</i>             | -6.61      |
| <i>Triticum aestivum</i> *+     | 8          | <i>Parthenium integrifolium</i> | 2.37       | <i>Liatris spicata</i>                        | -24        | <i>Carex pellita</i>                       | -6.57      |
|                                 |            | <i>Poa pratensis</i>            | 2.20       | <i>Taraxacum officinale</i> *                 | -24        | <i>Daucus carota</i> *                     | -4.16      |
|                                 |            | <i>Poa compressa</i>            | 2.18       | <i>Cerastium vulgatum</i> *                   | -23        | <i>Antennaria neglecta</i>                 | -3.58      |
|                                 |            | <i>Sorghastrum nutans</i>       | 1.86       | <i>Erigeron strigosus</i>                     | -23        | <i>Agrostis alba</i> var. <i>palustris</i> | -3.35      |
|                                 |            | <i>Leucanthemum vulgare</i>     | 1.64       | <i>Monarda fistulosa</i>                      | -23        | <i>Fragaria virginiana</i>                 | -2.76      |
|                                 |            | <i>Scirpus pendulus</i>         | 1.60       | <i>Rosa carolina</i>                          | -23        | <i>Carex buxbaumii</i>                     | -2.63      |
|                                 |            | <i>Erigeron strigosus</i>       | 1.41       | <i>Solidago juncea</i>                        | -22        | <i>Solidago gigantea</i>                   | -2.36      |
|                                 |            | <i>Achillea millefolium</i>     | 1.32       | <i>Anemone virginiana</i>                     | -21        | <i>Zanthoxylum americanum</i>              | -2.33      |
|                                 |            | <i>Juncus tenuis</i>            | 1.08       | <i>Ratibida pinnata</i>                       | -21        | <i>Zizia aurea</i>                         | -2.32      |
|                                 |            | <i>Liatris pycnostachya</i>     | 1.06       | <i>Rubus pensylvanicus</i>                    | -21        | <i>Solidago canadensis</i>                 | -2.22      |
|                                 |            |                                 |            | <i>Solidago canadensis</i>                    | -21        | <i>Rosa carolina</i>                       | -2.13      |
|                                 |            |                                 |            | <i>Crataegus</i> seedlings                    | -20        | <i>Helianthus grosseserratus</i>           | -2.05      |
|                                 |            |                                 |            | <i>Lobelia spicata</i>                        | -18        | <i>Silphium terebinthinaceum</i>           | -1.88      |
|                                 |            |                                 |            | <i>Sisyrinchium albidum</i>                   | -18        | <i>Aster drummondii</i>                    | -1.78      |
|                                 |            |                                 |            | <i>Aster drummondii</i>                       | -17        | <i>Potentilla simplex</i>                  | -1.52      |
|                                 |            |                                 |            | <i>Poa compressa</i> *                        | -17        | <i>Hieracium caespitosum</i> *             | -1.48      |
|                                 |            |                                 |            | <i>Aster simplex</i>                          | -16        | <i>Aster ericoides</i>                     | -1.43      |
|                                 |            |                                 |            | <i>Cornus racemosa</i>                        | -16        | <i>Solidago rigida</i>                     | -1.28      |
|                                 |            |                                 |            | <i>Helianthus grosseserratus</i>              | -16        | <i>Ratibida pinnata</i>                    | -1.20      |
|                                 |            |                                 |            | <i>Potentilla simplex</i>                     | -16        | <i>Pycnanthemum virginianum</i>            | -1.18      |
|                                 |            |                                 |            | <i>Achillea millefolium</i> *                 | -15        | <i>Liatris spicata</i>                     | -1.13      |
|                                 |            |                                 |            | <i>Crataegus</i> cf <i>pruinosa</i>           | -15        | <i>Zizia aptera</i>                        | -1.06      |
|                                 |            |                                 |            | <i>Dichanthelium implicatum</i>               | -15        | <i>Rubus pensylvanicus</i>                 | -1.03      |
|                                 |            |                                 |            | <i>Euthamia graminifolia</i>                  | -15        |  |            |
|                                 |            |                                 |            | <i>Hypericum punctatum</i>                    | -15        |  |            |
|                                 |            |                                 |            | <i>Viburnum lentago</i>                       | -15        |  |            |
|                                 |            |                                 |            | <i>Viola pratensis</i>                        | -15        |  |            |
|                                 |            |                                 |            | <i>Zizia aptera</i>                           | -15        |  |            |
|                                 |            |                                 |            | <i>Aster novae-angliae</i>                    | -14        |  |            |
|                                 |            |                                 |            | <i>Dichanthelium villosissimum</i>            | -14        |  |            |
|                                 |            |                                 |            | <i>Erigeron annuus</i>                        | -14        |  |            |
|                                 |            |                                 |            | <i>Fragaria virginiana</i>                    | -14        |  |            |
|                                 |            |                                 |            | <i>Prunella vulgaris</i> var. <i>elongata</i> | -14        |  |            |
|                                 |            |                                 |            | <i>Aster lateriflorus</i>                     | -13        |  |            |
|                                 |            |                                 |            | <i>Daucus carota</i> *                        | -13        |  |            |
|                                 |            |                                 |            | <i>Hieracium caespitosum</i> *                | -13        | <b>Decreasing &gt; 5 Quads. Continued</b>  |            |
|                                 |            |                                 |            | <i>Lonicera</i> X <i>bella</i>                | -13        | <i>Glyceria striata</i>                    | -8         |
|                                 |            |                                 |            | <i>Amelanchier</i> spp.                       | -12        | <i>Helianthus rigidus</i>                  | -8         |
|                                 |            |                                 |            | <i>Antennaria neglecta</i>                    | -12        | <i>Juniperis virginiana</i>                | -8         |
|                                 |            |                                 |            | <i>Gentiana alba</i>                          | -12        | <i>Prunus americana</i>                    | -8         |
|                                 |            |                                 |            | <i>Leucanthemum vulgare</i> *                 | -12        | <i>Prunus serotina</i>                     | -8         |
|                                 |            |                                 |            | <i>Rhamnus frangula</i> *                     | -11        | <i>Scutellaria leonardii</i>               | -7         |
|                                 |            |                                 |            | <i>Gentianella quinquefolia</i>               | -10        | <i>Sorghastrum nutans</i>                  | -7         |
|                                 |            |                                 |            | <i>Juncus interior</i>                        | -10        | <i>Ulmus americana</i>                     | -7         |
|                                 |            |                                 |            | <i>Lithospermum canescens</i>                 | -10        | <i>Vicia americana</i>                     | -7         |
|                                 |            |                                 |            | <i>Asclepias tuberosa</i>                     | -9         | <i>Agrostis alba</i>                       | -6         |
|                                 |            |                                 |            | <i>Carex hirsutella</i>                       | -9         | <i>Aster azureus</i>                       | -6         |
|                                 |            |                                 |            | <i>Comandra umbellata</i>                     | -9         | <i>Castilleja coccinea</i>                 | -6         |
|                                 |            |                                 |            | <i>Juncus tenuis</i>                          | -9         | <i>Fraxinus pennsylvanica</i>              | -6         |
|                                 |            |                                 |            | <i>Melilotus alba</i> *                       | -9         | <i>Sanicula canadensis</i>                 | -6         |
|                                 |            |                                 |            | <i>Rudbeckia hirta</i>                        | -9         | <i>Schizachyrium scoparium</i>             | -6         |
|                                 |            |                                 |            | <i>Solidago rigida</i>                        | -9         | <i>Solidago missouriensis</i>              | -6         |
|                                 |            |                                 |            | <i>Viola pedatifida</i>                       | -9         | <i>Sphenopholis intermedia</i>             | -6         |
|                                 |            |                                 |            | <i>Acer saccharinum</i>                       | -8         | <i>Thalictrum dasycarpum</i>               | -6         |
|                                 |            |                                 |            | <i>Agrimonia gryposepala</i>                  | -8         | <i>Cacalia tuberosa</i>                    | -5         |
|                                 |            |                                 |            | <i>Andropogon gerardii</i>                    | -8         | <i>Carex blanda</i>                        | -5         |
|                                 |            |                                 |            | <i>Aster pilosus</i>                          | -8         | <i>Galium triflorum</i>                    | -5         |
|                                 |            |                                 |            | <i>Carex pellita</i>                          | -8         | <i>Liatris aspera</i>                      | -5         |
|                                 |            |                                 |            | <i>Gentiana andrewsii</i>                     | -8         | <i>Rhamnus cathartica</i> *                | -5         |

Table 2. Summary variables for the North Chicago Wetland Mitigation Site from terrestrial (non-wetland) communities presenting data from the 2009 baseline samples to 2011. See Methods section for detailed description of metrics and parameters. PRAIRIE combines data from transects and reference prairie samples. n = sample size (quadrat #); quadrats are 1-m<sup>2</sup>. SE = standard error.

|   | YEAR | TOTAL<br>(n = 132) |       | OLD FIELD<br>(n = 87) |      | PRAIRIE<br>(n = 45) |       | TRANSECT<br>PRAIRIE<br>(n = 24) |       | REFERENCE<br>PRAIRIE<br>(n = 21) |       |
|---|------|--------------------|-------|-----------------------|------|---------------------|-------|---------------------------------|-------|----------------------------------|-------|
|   |      | Mean               | SE    | Mean                  | SE   | Mean                | SE    | Mean                            | SE    | Mean                             | SE    |
| <b>Species Diversity and Structure Attributes</b> |      |                    |       |                       |      |                     |       |                                 |       |                                  |       |
| Native Speceis Density                            | 2009 | 17.28              | 1.23  | 13.66                 | 1.31 | 24.27               | 1.32  | 20.18                           | 0.78  | 28.95                            | 0.58  |
|   | 2010 | 16.97              | 1.20  | 13.61                 | 1.32 | 23.47               | 1.30  | 19.50                           | 0.69  | 28.00                            | 0.94  |
|   | 2011 | 15.53              | 1.41  | 12.77                 | 1.31 | 20.86               | 2.88  | 12.10                           | 1.81  | 30.86                            | 1.43  |
| Non-Native Spp. Density                           | 2009 | 4.75               | 0.34  | 3.93                  | 0.34 | 6.33                | 0.55  | 6.88                            | 0.59  | 5.71                             | 0.74  |
|   | 2010 | 5.42               | 0.37  | 4.67                  | 0.44 | 6.89                | 0.51  | 8.21                            | 0.33  | 5.38                             | 0.58  |
|   | 2011 | 5.97               | 0.32  | 5.56                  | 0.32 | 6.76                | 0.69  | 7.33                            | 0.77  | 6.10                             | 0.86  |
| Native Richness                                   | 2009 | 29.39              | 1.82  | 24.69                 | 2.13 | 38.47               | 1.79  | 33.25                           | 1.08  | 44.43                            | 1.45  |
|   | 2010 | 27.18              | 1.79  | 22.59                 | 1.94 | 36.07               | 2.40  | 28.63                           | 1.07  | 44.57                            | 1.80  |
|   | 2011 | 25.32              | 2.18  | 21.00                 | 2.18 | 33.67               | 4.13  | 20.88                           | 2.55  | 48.29                            | 1.46  |
| Non-Native Richness                               | 2009 | 6.86               | 0.54  | 5.72                  | 0.58 | 9.07                | 0.88  | 10.88                           | 0.65  | 7.00                             | 1.21  |
|   | 2010 | 8.11               | 0.51  | 7.17                  | 0.60 | 9.93                | 0.78  | 12.00                           | 0.31  | 7.57                             | 1.02  |
|   | 2011 | 10.25              | 0.50  | 10.17                 | 0.53 | 10.40               | 1.10  | 12.13                           | 1.17  | 8.43                             | 1.17  |
| C dom 45 (all spp)                                | 2009 | 0.21               | 0.03  | 0.27                  | 0.03 | 0.10                | 0.01  | 0.11                            | 0.01  | 0.09                             | 0.00  |
|   | 2010 | 0.16               | 0.02  | 0.20                  | 0.02 | 0.09                | 0.00  | 0.08                            | 0.00  | 0.10                             | 0.00  |
|   | 2011 | 0.25               | 0.03  | 0.29                  | 0.04 | 0.18                | 0.04  | 0.25                            | 0.05  | 0.09                             | 0.01  |
| Hn 45   | 2009 | 2.43               | 0.09  | 2.30                  | 0.12 | 2.66                | 0.06  | 2.56                            | 0.07  | 2.78                             | 0.06  |
|   | 2010 | 2.46               | 0.08  | 2.33                  | 0.12 | 2.72                | 0.05  | 2.71                            | 0.04  | 2.73                             | 0.09  |
|   | 2011 | 2.36               | 0.10  | 2.35                  | 0.12 | 2.37                | 0.17  | 1.97                            | 0.16  | 2.83                             | 0.08  |
| % Cover   | 2009 | 131.26             | 12.84 | 85.76                 | 6.85 | 219.22              | 21.59 | 154.96                          | 15.24 | 292.67                           | 7.96  |
|   | 2010 | 105.52             | 11.32 | 68.18                 | 7.69 | 177.70              | 19.00 | 126.48                          | 13.29 | 236.24                           | 17.09 |
|   | 2011 | 130.09             | 9.97  | 110.23                | 7.30 | 168.50              | 23.00 | 95.29                           | 8.00  | 252.17                           | 17.26 |
| % BG  | 2009 | 25.91              | 2.90  | 34.34                 | 3.30 | 9.60                | 2.20  | 13.39                           | 2.60  | 5.26                             | 1.21  |
|   | 2010 | 34.07              | 3.92  | 44.93                 | 4.34 | 13.07               | 4.21  | 20.15                           | 4.99  | 4.98                             | 2.41  |
|   | 2011 | 18.98              | 2.58  | 19.50                 | 3.12 | 17.99               | 4.70  | 30.92                           | 4.08  | 3.21                             | 0.68  |
| <b>Floristic Quality Assessment Metrics</b>       |      |                    |       |                       |      |                     |       |                                 |       |                                  |       |
| Native Mean C                                     | 2009 | 3.01               | 0.10  | 2.74                  | 0.10 | 3.53                | 0.18  | 2.95                            | 0.05  | 4.18                             | 0.16  |
|   | 2010 | 2.94               | 0.12  | 2.66                  | 0.13 | 3.49                | 0.20  | 2.86                            | 0.06  | 4.21                             | 0.14  |
|   | 2011 | 2.71               | 0.14  | 2.51                  | 0.12 | 3.08                | 0.31  | 2.23                            | 0.25  | 4.05                             | 0.14  |
| Mean C  | 2009 | 2.33               | 0.11  | 2.09                  | 0.11 | 2.82                | 0.18  | 2.22                            | 0.07  | 3.50                             | 0.12  |
|   | 2010 | 2.25               | 0.12  | 2.00                  | 0.12 | 2.72                | 0.21  | 2.02                            | 0.07  | 3.52                             | 0.10  |
|   | 2011 | 1.89               | 0.13  | 1.67                  | 0.11 | 2.32                | 0.30  | 1.38                            | 0.17  | 3.39                             | 0.09  |
| FQI   | 2009 | 9.98               | 0.75  | 7.86                  | 0.65 | 14.07               | 1.27  | 9.89                            | 0.38  | 18.84                            | 0.74  |
|   | 2010 | 9.51               | 0.74  | 7.49                  | 0.62 | 13.41               | 1.33  | 8.92                            | 0.45  | 18.55                            | 0.34  |
|   | 2011 | 8.05               | 0.86  | 6.23                  | 0.65 | 11.56               | 1.91  | 5.24                            | 0.77  | 18.79                            | 0.66  |
| Native FQI  | 2009 | 12.61              | 0.85  | 10.06                 | 0.73 | 17.53               | 1.35  | 13.16                           | 0.34  | 22.52                            | 1.03  |
|   | 2010 | 12.26              | 0.83  | 9.77                  | 0.71 | 17.06               | 1.33  | 12.61                           | 0.45  | 22.14                            | 0.48  |
|   | 2011 | 10.92              | 0.95  | 8.90                  | 0.74 | 14.82               | 2.10  | 8.14                            | 1.04  | 22.46                            | 1.04  |
| <b>Shrub Density and Percent Cover Attributes</b> |      |                    |       |                       |      |                     |       |                                 |       |                                  |       |
| Shrub Density                                     | 2009 | 58.48              | 5.05  | 55.55                 | 6.03 | 64.13               | 9.25  | 90.00                           | 5.97  | 34.57                            | 8.09  |
|   | 2010 | 14.50              | 3.64  | 11.62                 | 3.51 | 20.07               | 8.25  | 1.38                            | 0.46  | 41.43                            | 14.04 |
|   | 2011 | 0.84               | 0.26  | 0.69                  | 0.30 | 1.13                | 0.49  | 1.00                            | 0.63  | 1.29                             | 0.42  |
| % Visible Sky                                     | 2009 | 32.38              | 0.03  | 23.97                 | 0.02 | 48.62               | 0.07  | 30.95                           | 0.05  | 68.81                            | 0.06  |
|   | 2010 | 66.96              | 0.04  | 61.59                 | 0.05 | 77.34               | 0.05  | 87.91                           | 0.02  | 65.26                            | 0.08  |
|   | 2011 | 84.05              | 0.03  | 84.41                 | 0.03 | 83.36               | 0.05  | 82.73                           | 0.05  | 84.09                            | 0.06  |
| % Canopy Cover                                    | 2009 | 67.63              | 3.08  | 76.03                 | 1.78 | 51.38               | 6.67  | 69.05                           | 4.67  | 31.19                            | 6.38  |
|   | 2010 | 33.04              | 3.79  | 38.41                 | 4.97 | 22.66               | 4.76  | 12.09                           | 2.12  | 34.74                            | 7.50  |
|   | 2011 | 15.95              | 2.71  | 15.59                 | 3.44 | 16.64               | 4.52  | 17.28                           | 5.26  | 15.91                            | 5.72  |
| Leaf Area Index (LAI)                             | 2009 | 1.24               | 0.09  | 1.46                  | 0.07 | 0.81                | 0.17  | 1.24                            | 0.14  | 0.31                             | 0.09  |
|   | 2010 | 0.49               | 0.09  | 0.63                  | 0.13 | 0.24                | 0.07  | 0.11                            | 0.03  | 0.40                             | 0.12  |
|   | 2011 | 0.20               | 0.05  | 0.20                  | 0.07 | 0.20                | 0.06  | 0.21                            | 0.07  | 0.18                             | 0.07  |

Table 3. Results from two-sample t-tests comparing 2011 sample data attributes from old field and prairie habitats at the North Chicago Wetland Mitigation Site, Lake County, IL. Alpha was determined based on family-wise multiple comparison error rates following the Bonferroni adjustment ( $0.05/n$ ; related, highly correlated attributes were not considered as multiple comparisons). Significant Prob. levels shown in bold.

| 2011 SAMPLES                                   | Old Field |      | Prairie |       | Means Comparison Test Results |      |                         |
|--|-----------|------|---------|-------|-------------------------------|------|-------------------------|
|  | Mean      | SE   | Mean    | SE    | t-stat                        | df   | Prob.                   |
| <b>Grd-Layer Spp Diversity &amp; Structure</b> |           |      |         |       |                               |      | <b>(alpha = 0.0125)</b> |
| Native Spp. Density/Quadrat                    | 12.77     | 1.31 | 20.86   | 2.88  | -2.56                         | 19.9 | 0.019                   |
| Non-Native Sp Density/Quadrat                  | 5.56      | 0.32 | 6.76    | 0.69  | -1.57                         | 20.4 | 0.132                   |
| Native Richness/Plot                           | 21.00     | 2.18 | 33.67   | 4.13  | -2.71                         | 22.0 | 0.013                   |
| Non-Native Richness/Plot                       | 10.17     | 0.53 | 10.40   | 1.10  | -0.19                         | 20.7 | 0.854                   |
| Shannon-Wiener Diversity (natives)             | 2.35      | 0.12 | 2.37    | 0.17  | -0.09                         | 28.2 | 0.926                   |
| Simpson's Dominance Index (all spp.)           | 0.29      | 0.04 | 0.18    | 0.04  | 1.90                          | 37.5 | 0.065                   |
| <b>Vegetation Structure</b>                    |           |      |         |       |                               |      | <b>(alpha = 0.025)</b>  |
| % Vegetation Cover                             | 110.23    | 7.30 | 168.50  | 23.00 | -2.41                         | 16.9 | 0.027                   |
| % Bare Ground                                  | 19.50     | 3.12 | 17.99   | 4.70  | 0.27                          | 26.5 | 0.791                   |
| <b>Floristic Quality Assessment</b>            |           |      |         |       |                               |      | <b>(alpha = 0.05)</b>   |
| Mean C /quadrat (1-m <sup>2</sup> )            | 1.67      | 0.11 | 2.32    | 0.30  | -2.05                         | 17.7 | 0.056                   |
| Mean Cn/quadrat                                | 2.51      | 0.12 | 3.08    | 0.31  | -1.71                         | 18.5 | 0.104                   |
| FQI /quadrat                                   | 6.23      | 0.65 | 11.56   | 1.91  | -2.64                         | 17.3 | <b>0.017</b>            |
| FQIn /quadrat                                  | 8.90      | 0.74 | 14.82   | 2.10  | -2.66                         | 17.6 | <b>0.016</b>            |
| <b>Shrub Stratum</b>                           |           |      |         |       |                               |      | <b>(alpha = 0.025)</b>  |
| Shrub Density/ 25-m <sup>2</sup> plot          | 0.69      | 0.30 | 1.13    | 0.49  | -0.78                         | 24.7 | 0.444                   |
| % Canopy Cover                                 | 15.59     | 3.44 | 16.64   | 4.52  | -0.19                         | 29.9 | 0.854                   |

Table 4. Results from two-sample t-tests comparing 2011 sample data attributes from old field and reference prairie habitats at the North Chicago Wetland Mitigation Site, Lake County, IL. Alpha was determined based on family-wise multiple comparison error rates following the Bonferroni adjustment ( $0.05/n$ ; related, highly correlated attributes were not considered as multiple comparisons). Significant Prob. levels shown in bold.

| 2011 SAMPLES  | Old Field |      | Reference Prairie |       | Means Comparison Test Results |      |                 |
|---|-----------|------|-------------------|-------|-------------------------------|------|-----------------|
|   | Mean      | SE   | Mean              | SE    | t-stat                        | df   | Prob.           |
| <b>Grd-Layer Spp Diversity &amp; Structure</b> (alpha = 0.0125) |           |      |                   |       |                               |      |                 |
| Native Spp. Density/Quadrat                                     | 12.77     | 1.31 | 30.86             | 1.43  | -9.34                         | 17.6 | <0.000001       |
| Non-Native Sp Density/Quadrat                                   | 5.56      | 0.32 | 6.10              | 0.86  | -0.58                         | 7.8  | 0.580130        |
| Native Richness/Plot  | 21.00     | 2.18 | 48.29             | 1.46  | -10.41                        | 30.3 | <0.000001       |
| Non-Native Richness/Plot  | 10.17     | 0.53 | 8.43              | 1.17  | 1.36                          | 8.6  | 0.209683        |
| Shannon-Wiener Diversity (native spp.)                          | 2.35      | 0.12 | 2.83              | 0.08  | -3.29                         | 28.9 | <b>0.002659</b> |
| Simpson's Dominance Index (all spp.)                            | 0.29      | 0.04 | 0.09              | 0.01  | 4.52                          | 29.3 | <b>0.000095</b> |
| <b>Vegetation Structure</b> (alpha = 0.025)                     |           |      |                   |       |                               |      |                 |
| % Vegetation Cover  | 110.23    | 7.30 | 252.2             | 17.26 | -7.57                         | 8.3  | <b>0.000054</b> |
| % Bare Ground   | 19.50     | 3.12 | 3.21              | 0.68  | 5.10                          | 30.4 | <b>0.000017</b> |
| <b>Floristic Quality Assessment</b> (alpha = 0.05)              |           |      |                   |       |                               |      |                 |
| Mean C /quadrat (1-m <sup>2</sup> )                             | 1.67      | 0.11 | 3.39              | 0.09  | -12.06                        | 23.3 | <0.000001       |
| Mean Cn/quadrat   | 2.51      | 0.12 | 4.05              | 0.14  | -8.42                         | 17.2 | <0.000001       |
| FQI /quadrat  | 6.23      | 0.65 | 18.79             | 0.66  | -13.61                        | 19.2 | <0.000001       |
| FQIn /quadrat   | 8.90      | 0.74 | 22.46             | 1.04  | -10.59                        | 12.9 | <0.000001       |
| <b>Shrub Stratum</b> (alpha = 0.025)                            |           |      |                   |       |                               |      |                 |
| Shrub Density/ 25-m <sup>2</sup> plot                           | 0.69      | 0.30 | 1.29              | 0.42  | -1.16                         | 12.9 | 0.268656        |
| % Canopy Cover  | 15.59     | 3.44 | 15.91             | 5.72  | -0.05                         | 10.8 | 0.961710        |
| LAI   | 0.20      | 0.07 | 0.18              | 0.07  | 0.21                          | 17.3 | 0.833714        |

Table 5. Results from two-sample t-tests comparing 2011 sample data attributes from transect and reference prairie habitats at the North Chicago Wetland Mitigation Site, Lake County, IL. Alpha was determined based on family-wise multiple comparison error rates following the Bonferroni adjustment ( $0.05/n$ ; related, highly correlated attributes were not considered as multiple comparisons). Significant *Prob.* levels shown in **bold**.

| 2011 SAMPLES                                   | Transect Prairie |       | Reference Prairie |       | Means Comparison Test Results |      |                     |
|--|------------------|-------|-------------------|-------|-------------------------------|------|---------------------|
|  | Mean             | SE    | Mean              | SE    | t-stat                        | df   | <i>Prob.</i>        |
| <b>Grd-Layer Spp Diversity &amp; Structure</b> |                  |       |                   |       |                               |      | (alpha = 0.0125)    |
| Native Spp. Density/Quadrat                    | 12.10            | 2.88  | 30.86             | 1.43  | 6.55                          | 11.0 | <b>0.000042</b>     |
| Non-Native Sp Density/Quadrat                  | 7.33             | 0.69  | 6.10              | 0.86  | -0.91                         | 12.8 | 0.380191            |
| Native Richness/Plot                           | 20.88            | 4.13  | 48.29             | 1.46  | 7.23                          | 9.3  | <b>0.000041</b>     |
| Non-Native Richness/Plot                       | 12.13            | 1.10  | 8.43              | 1.17  | -1.86                         | 12.3 | 0.087282            |
| Shannon-Wiener Diversity (native spp.)         | 1.97             | 0.22  | 2.83              | 0.08  | 3.63                          | 9.0  | <b>0.005577</b>     |
| Simpson's Dominance Index (all spp.)           | 0.25             | 0.07  | 0.09              | 0.01  | -2.10                         | 7.1  | 0.072824            |
| <b>Vegetation Structure</b>                    |                  |       |                   |       |                               |      | (alpha = 0.025)     |
| % Vegetation Cover                             | 95.29            | 10.96 | 252.17            | 17.26 | 7.67                          | 10.4 | <b>0.000014</b>     |
| % Bare Ground                                  | 30.92            | 4.70  | 3.21              | 0.68  | -4.92                         | 7.2  | <b>0.001573</b>     |
| <b>Floristic Quality Assessment</b>            |                  |       |                   |       |                               |      | (alpha = 0.05)      |
| Mean C /quadrat (1-m <sup>2</sup> )            | 1.38             | 0.30  | 3.39              | 0.09  | 8.09                          | 9.2  | <b>0.000018</b>     |
| Mean Cn/quadrat                                | 2.23             | 0.31  | 4.05              | 0.14  | 4.88                          | 9.1  | <b>0.000856</b>     |
| FQI /quadrat                                   | 5.24             | 1.91  | 18.79             | 0.66  | 10.87                         | 11.5 | <b>&lt;0.000001</b> |
| FQIn /quadrat                                  | 8.14             | 2.10  | 22.46             | 1.04  | 8.13                          | 12.4 | <b>0.000003</b>     |
| <b>Shrub Stratum</b>                           |                  |       |                   |       |                               |      | (alpha = 0.025)     |
| Shrub Density/ 25-m <sup>2</sup> plot          | 1.00             | 0.49  | 1.29              | 0.42  | 0.30                          | 10.0 | 0.772690            |
| % Canopy Cover                                 | 17.28            | 4.52  | 15.91             | 5.72  | -0.15                         | 12.7 | 0.884665            |
| LAI  | 0.21             | 0.06  | 0.18              | 0.07  | -0.24                         | 12.4 | 0.817667            |

Table 6. Summary from 2011 sample data in shrub/sapling plots (25-m<sup>2</sup>) with comparison to 2009 baseline data at the North Chicago Wetland Mitigation site, Lake County, Illinois. \* indicates non-native species.

|   | 2011 Shrub/Sapling Data<br>(Overall) |                  |        | Change in Stem<br>Density from 2009<br>Baseline |             |
|---|--------------------------------------|------------------|--------|---|-------------|
|   | % Freq-<br>uency                     | Total<br>Density | IV 200 | Total<br>Decline                                | %<br>Change |
| <i>Amelanchier sanguinea</i>                                | 2.27                                 | 1                | 7.25   | 2   | 66.7        |
| <i>Cornus obliqua</i>                                       | 2.27                                 | 3                | 12.65  | 2   | 40.0        |
| <i>Cornus racemosa</i>                                      | 6.8                                  | 3                | 21.7   | 733   | 99.6        |
| <i>Cornus stolonifera</i>                                   | 0.0                                  | 0                | 0.0    | 20  | 100.0       |
| <i>Crataegus calpodendron</i>                               | 0.0                                  | 0                | 0.0    | 6   | 100.0       |
| <i>Crataegus mollis</i>                                     | 0.0                                  | 0                | 0.0    | 1   | 100.0       |
| <i>Crataegus pruinosa/coccinea</i>                          | 4.5                                  | 3                | 17.2   | 29  | 90.6        |
| <i>Crataegus punctata</i>                                   | 2.3                                  | 1                | 7.2    | 1   | 50.0        |
| <i>Crataegus</i> sp.  | 0.0                                  | 0                | 0.0    | 5   | 100.0       |
| <i>Fraxinus pennsylvanicq</i> var.<br><i>subintegerrima</i> | 0.0                                  | 0                | 0.0    | 1   | 100.0       |
| <i>Juniperus virginiana</i>                                 | 0.0                                  | 0                | 0.0    | 0   | 0.0         |
| <i>Lonicera X bella</i> *                                   | 0.0                                  | 0                | 0.0    | 164   | 100.0       |
| <i>Malus ioensis</i>  | 0.0                                  | 0                | 0.0    | 4   | 100.0       |
| <i>Malus pumila</i>   | 0.0                                  | 0                | 0.0    | 1   | 100.0       |
| <i>Populus tremuloides</i>                                  | 0.0                                  | 0                | 0.0    | 13  | 100.0       |
| <i>Prunus americana</i>                                     | 2.3                                  | 1                | 7.2    | 0   | 0.0         |
| <i>Prunus virginiana</i>                                    | 0.0                                  | 0                | 0.0    | 9   | 100.0       |
| <i>Rhamnus cathartica</i> *                                 | 13.6                                 | 9                | 51.6   | 1350  | 99.3        |
| <i>Rhamnus frangula</i> *                                   | 0.0                                  | 0                | 0.0    | 25  | 100.0       |
| <i>Rhus glabra</i>  | 2.3                                  | 1                | 7.2    | 1   | 50.0        |
| <i>Viburnum lentago</i>                                     | 9.1                                  | 7                | 37.1   | 130   | 94.9        |
| <i>Viburnum opulus</i> *                                    | 0.0                                  | 0                | 0.0    | 3   | 100.0       |
| <i>Viburnum recognitum</i>                                  | 4.5                                  | 8                | 30.7   | -7  | -700.0      |
| <i>Vitis riparea</i>  | 0.0                                  | 0                | 0.0    | 7   | 100.0       |
| <i>Zanthoxylum americanum</i>                               | 0.0                                  | 0                | 0.0    | 39  | 100.0       |
|   |                                      | 37               | 200.0  | 2,539   |             |
| Avg. Density/plot   |                                      | 0.8              |        | 58.5  |             |
| Density/ha  |                                      | 336.4            |        | 22561.6   |             |

Table 7. Summary of tree plot sample data from the 2009 baseline to 2011 at the North Chicago Wetland Mitigation Site, Lake County, IL. These data are corrected for site-wide reference (previous estimates focused only on plots containing trees). \* In 2010, *Ulmus americana*, unseen during 2009, was discovered to be in a plot following removal of the dense shrub/sapling stratum. Additional *Crataegus* and *Prunus serotina* also have been discovered (2010 and 2011) that formerly were obscured by the dense shrub layer.

|   | TREE PLOT SAMPLE DATA              |                |        |                                    |                |        |                                    |                |        |                |          |
|---|------------------------------------|----------------|--------|------------------------------------|----------------|--------|------------------------------------|----------------|--------|----------------|----------|
|   | 2009                               |                |        | 2010                               |                |        | 2011                               |                |        | Change in Stem |          |
|   | Basal Area<br>(m <sup>2</sup> /ha) | Density/<br>ha | IV200  | Basal Area<br>(m <sup>2</sup> /ha) | Density/<br>ha | IV200  | Basal Area<br>(m <sup>2</sup> /ha) | Density/<br>ha | IV200  | Total Decline  | % Change |
| <i>Acer negundo</i>                     | 0.07                               | 3.41           | 21.61  | 0.00                               | 0.00           | 0.00   | 0.00                               | 0.00           | 0.00   | 3.4            | 100.0    |
| <i>Crataegus pruinosa/<br/>coccinea</i> | 0.05                               | 4.55           | 24.27  | 0.10                               | 10.23          | 45.25  | 0.17                               | 14.77          | 108.71 | -10.2          | -225.0   |
| <i>Populus deltoides</i>                | 0.68                               | 4.55           | 81.66  | 0.73                               | 4.55           | 70.29  | 0.00                               | 0.00           | 0.00   | 4.5            | 100.0    |
| <i>Prunus serotina</i>                  | 0.06                               | 1.14           | 10.40  | 0.16                               | 6.82           | 37.19  | 0.08                               | 2.27           | 26.31  | -1.1           | -100.0   |
| <i>Quercus macrocarpa</i>               | 0.15                               | 2.27           | 23.84  | 0.15                               | 1.14           | 15.49  | 0.16                               | 1.14           | 36.27  | 1.1            | 50.0     |
| <i>Rhamnus cathartica</i>               | 0.09                               | 6.82           | 38.22  | 0.09                               | 3.41           | 19.42  | 0.00                               | 0.00           | 0.00   | 6.8            | 100.0    |
| <i>Ulmus americana</i>                  | 0.00                               | 0.00           | 0.00   | 0.11                               | 1.14           | 12.36  | 0.12                               | 1.14           | 28.70  | 0.0            | 0.0      |
|   | 1.11                               | 22.73          | 200.00 | 1.35                               | 27.27          | 200.00 | 0.52                               | 19.32          | 200.00 | 4.5            |          |

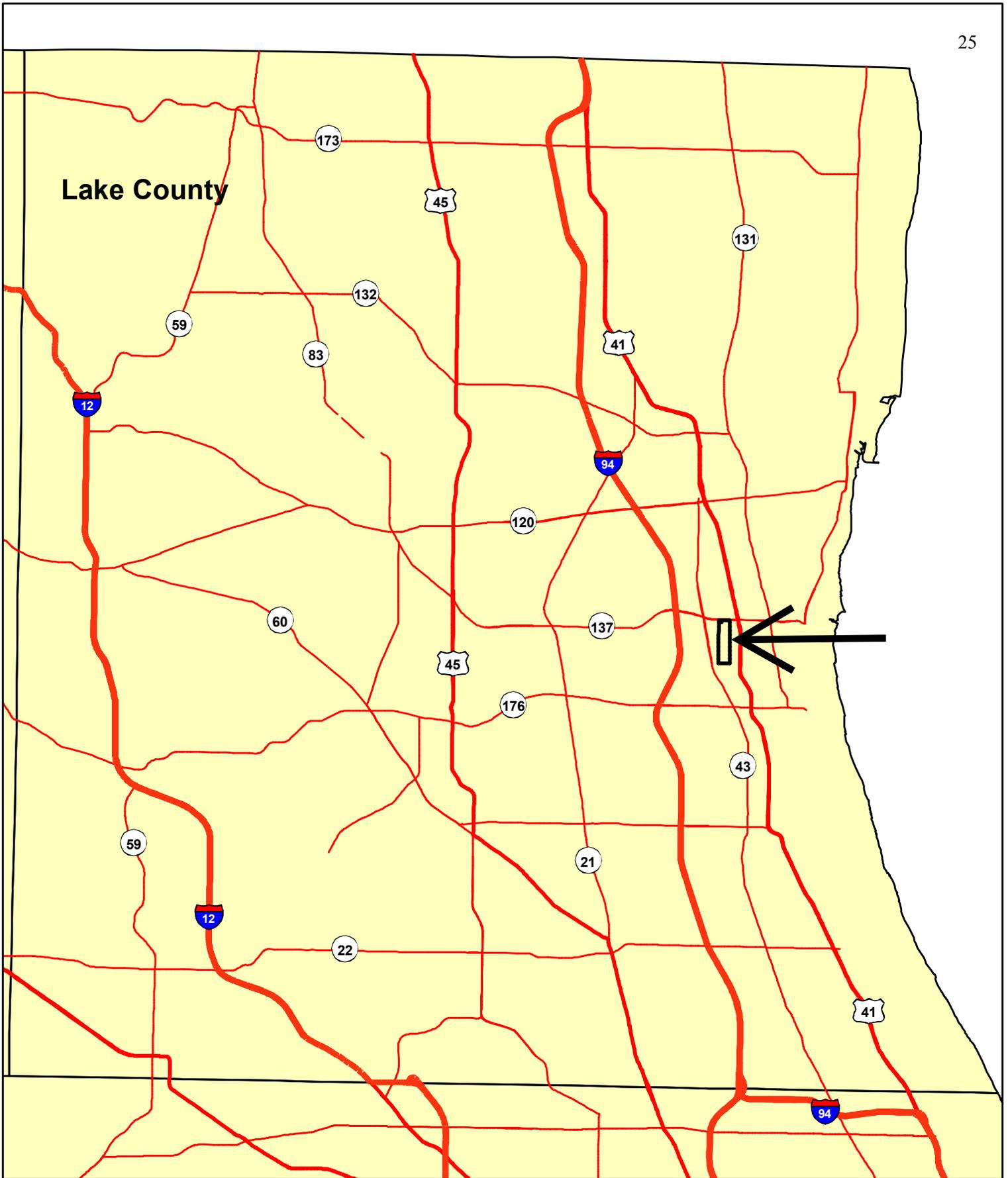


Figure 1. Location of the North Chicago Wetland Mitigation Site in Lake County, Illinois.

- North Chicago Wetland Mitigation Site
- State Route Highway
- US Route Highway
- US Interstate

0 25 50 100  
Meters



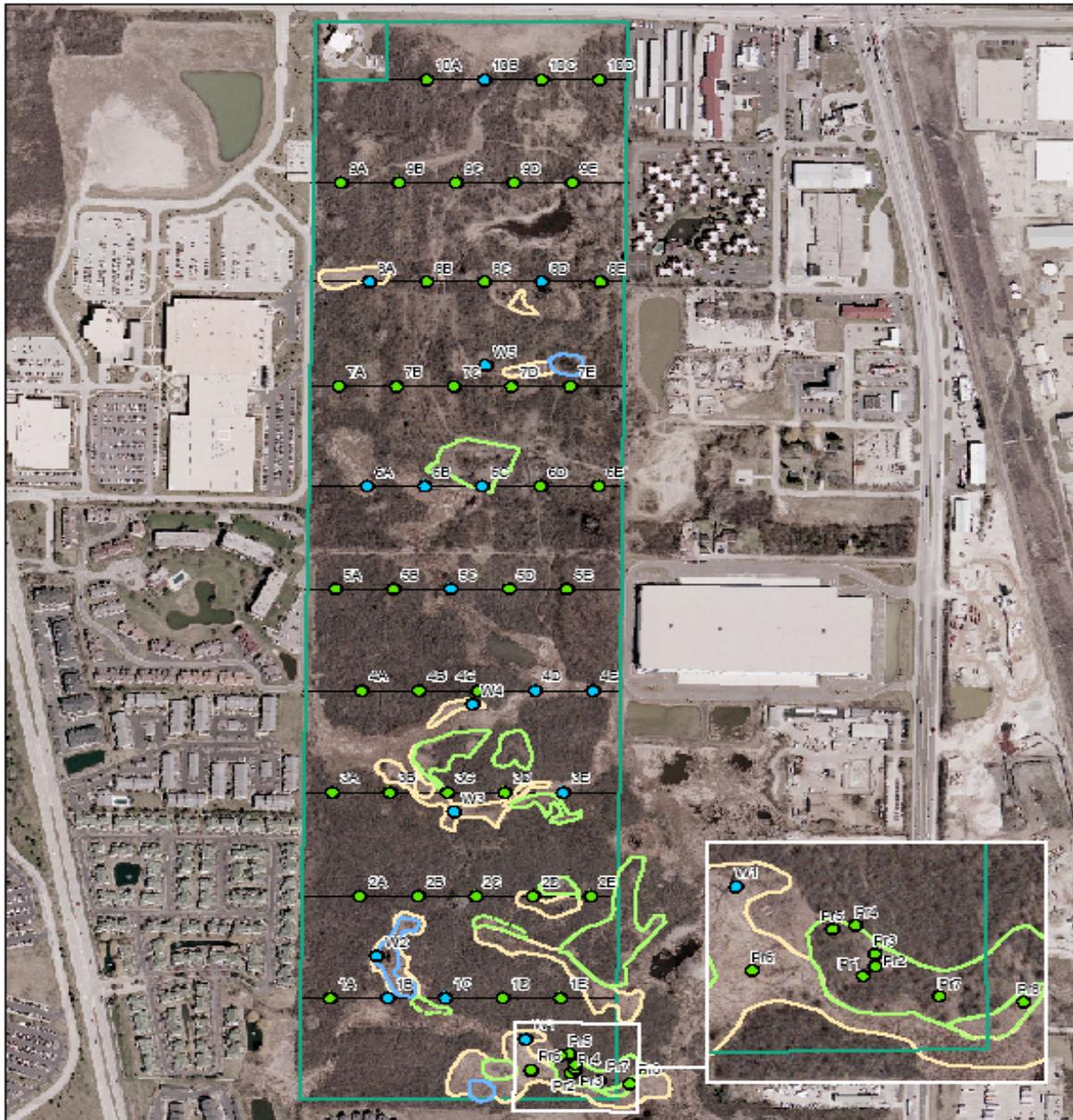


Figure 2. Stratified vegetation sampling grid in upland and wetland habitats with additional targeted prairie and wetland sampling locations at the North Chicago Wetland Mitigation Site in Lake County, Illinois.

|                  |                            |
|------------------|----------------------------|
| ● Upland         | High Quality Natural Areas |
| ● Wetland        | □ Marsh                    |
| — Boundary       | □ Prairie                  |
| — Transect Lines | □ Wet Mesic Prairie        |
|                  | □ Sedge Meadow             |

0 25 50 100  
Meters

North Arrow

Jarvis 1/29/10

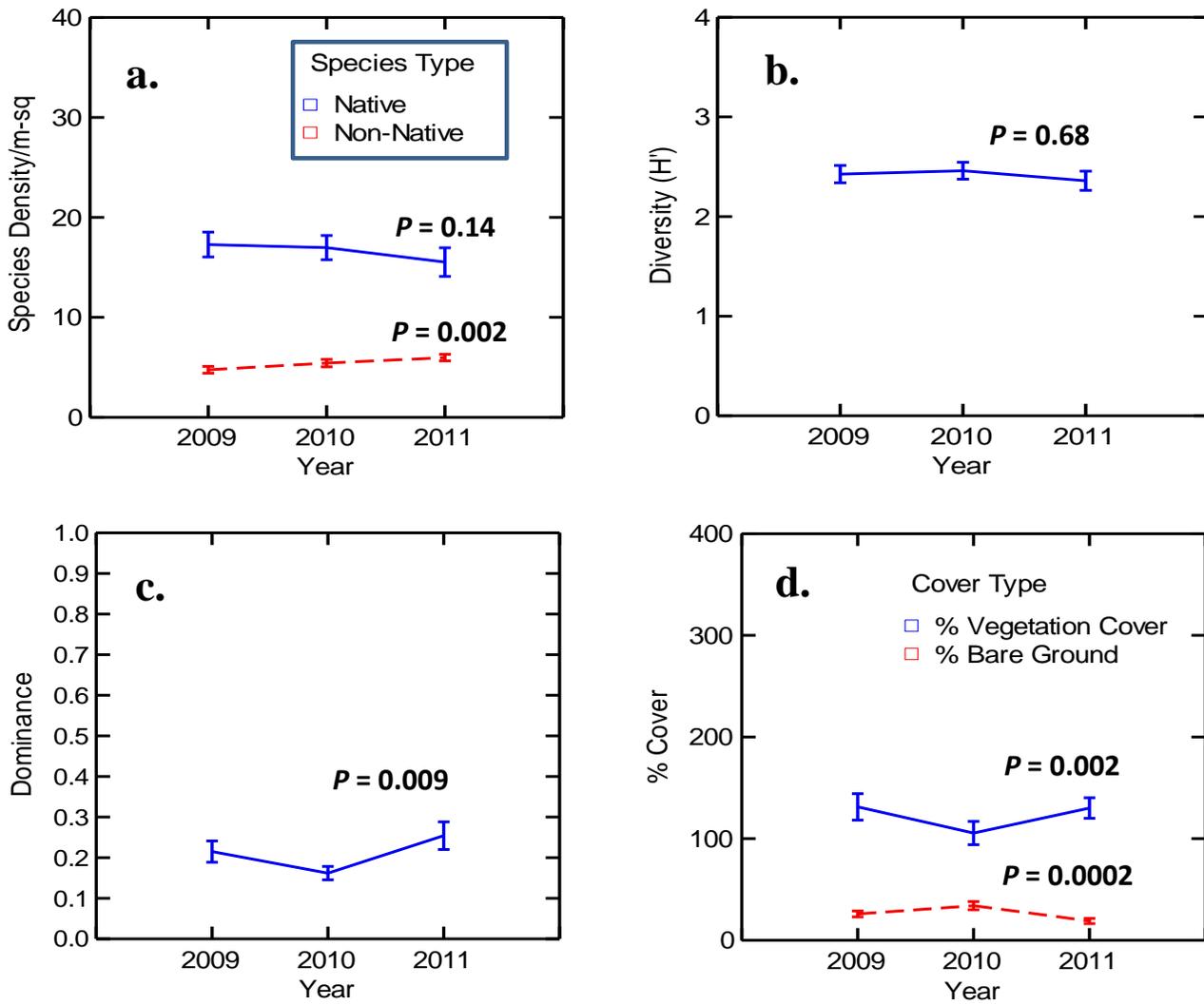


Figure 3. Overall trends for species density, diversity, dominance, and percent cover for ground-layer samples at the North Chicago Wetland Mitigation Site, Lake County, IL.  $P$  = probability results from Repeat Measures Analysis of Variance (within-subjects differences; alpha = 0.0125 for species richness and diversity attribute tests [Bonferroni adj.  $P = 0.05/4$ ] and alpha = 0.025 for % cover [ $P = 0.05/2$ ]). The null expectation is no change over time. Error bars are standard error.

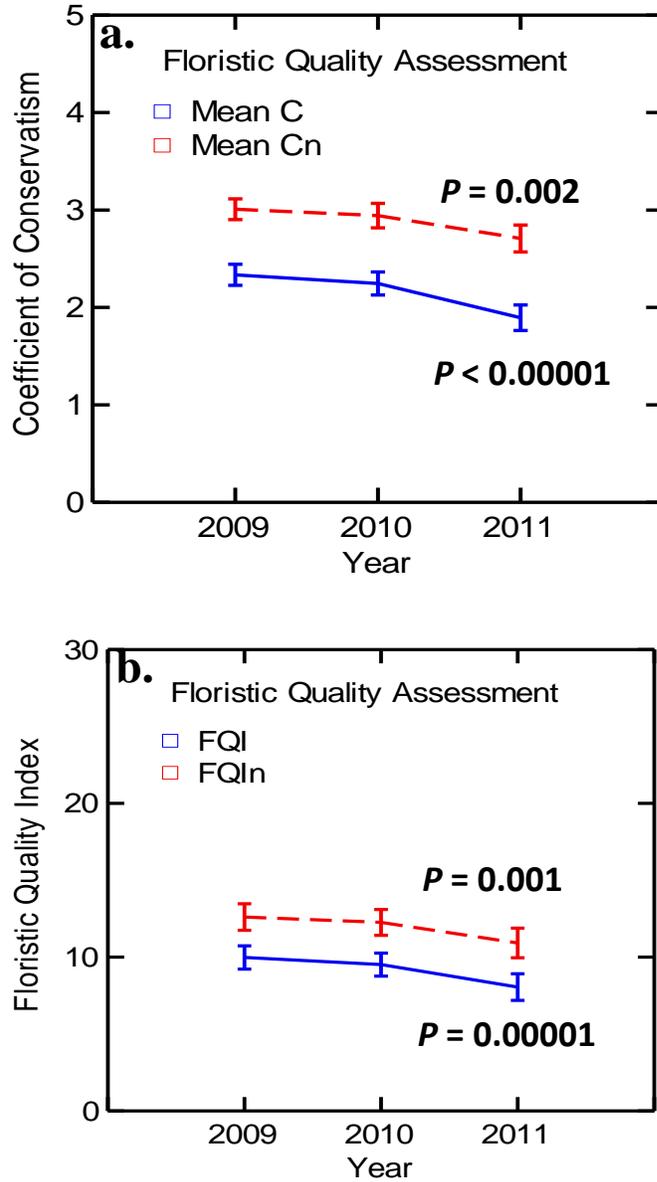


Figure 4. Results from Floristic Quality Assessment from the North Chicago Wetland Mitigation Site, Lake County. P = probability results from Repeat Measures Analysis of Variance (within-subjects differences; alpha = 0.025 [Bonferroni correction = 0.05/2 attributes - Mean C and FQI]). The null expectation is no change over time. Mean C = average coefficient of conservatism; Mean Cn includes only native species. FQI = floristic quality index; FQIn is calculated using only native species. Error bars are standard error.

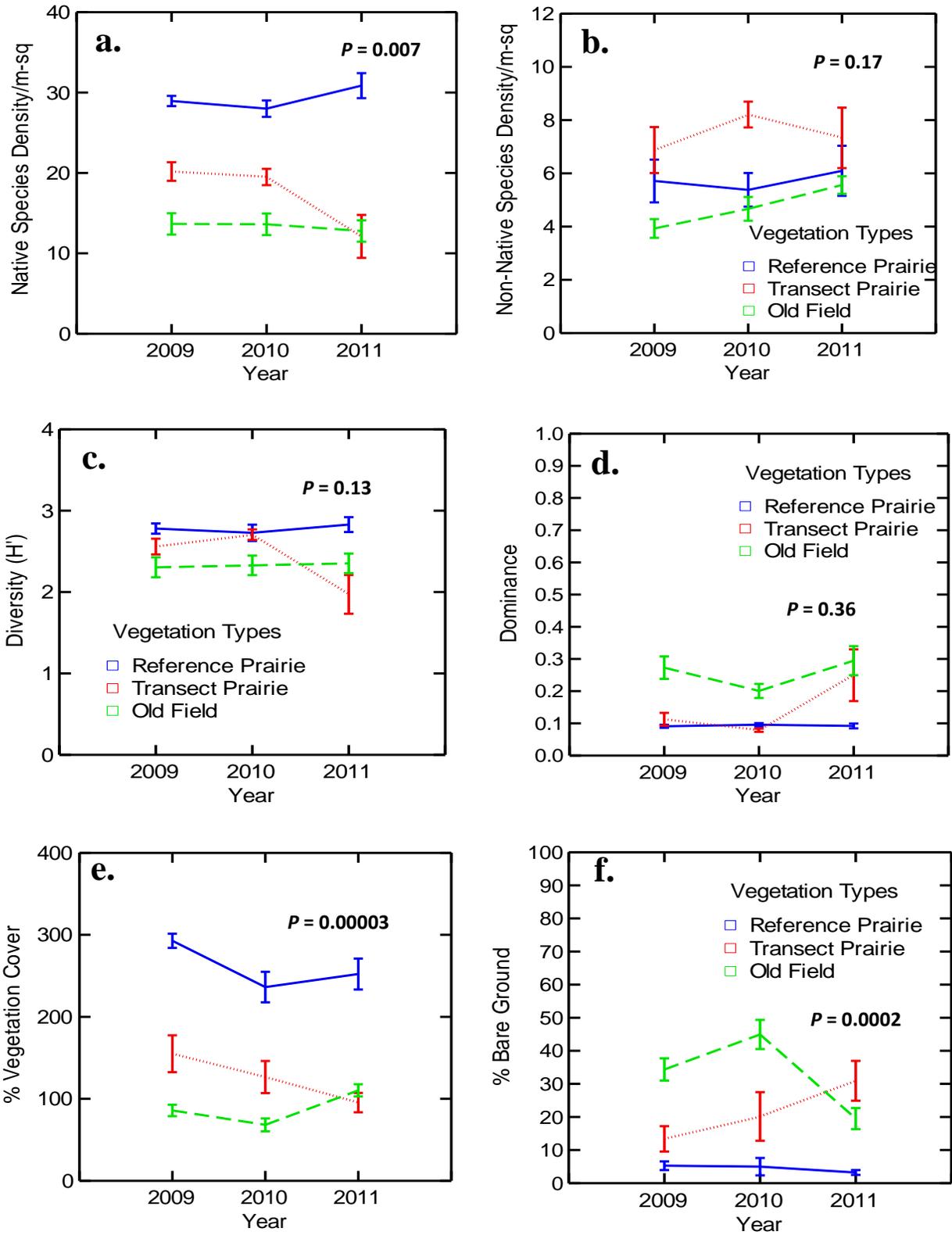


Figure 5. Trends for species density, diversity, dominance, and percent cover for ground-layer samples among old field, transect prairie, and reference prairie plots at the North Chicago Wetland Mitigation Site, Lake County, IL.  $P$  = probability results from Repeat Measures Analysis of Variance (within-subjects differences; alpha = 0.0125 for species richness and diversity attribute tests [Bonferroni adj.  $P = 0.05/4$ ] and alpha = 0.025 for % cover [ $P = 0.05/2$ ]). The null expectation is no change over time. Legend is the same for each figure, but not shown in some cases. Error bars are standard error.

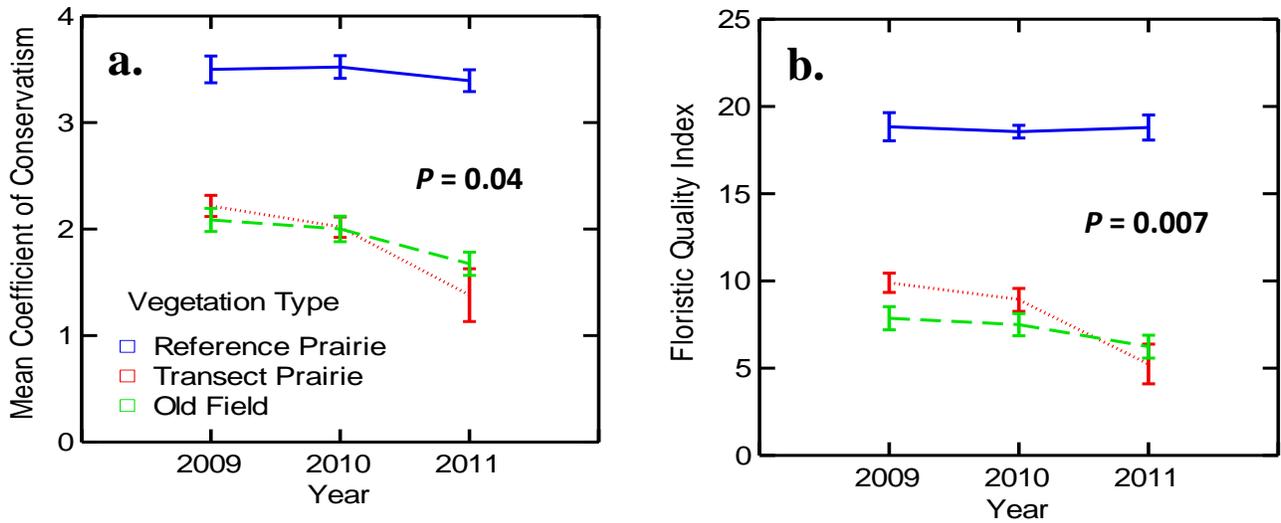


Figure 6. Comparative trends for Floristic Quality Assessment indices Mean C and FQI from the baseline 2009 to the 2011 samples between the old field, transect prairie, and reference prairie habitats at the North Chicago Wetland Mitigation Site in Lake County.  $P$  = probability results from Repeat Measures Analysis of Variance (within-subjects differences;  $\alpha = 0.025$  for Mean C and FQI attribute tests [Bonferroni adj.  $P = 0.05/2$ ]). The null expectation is no change over time. Legend is the same for each figure, but not shown for FQI. Error bars are standard error.

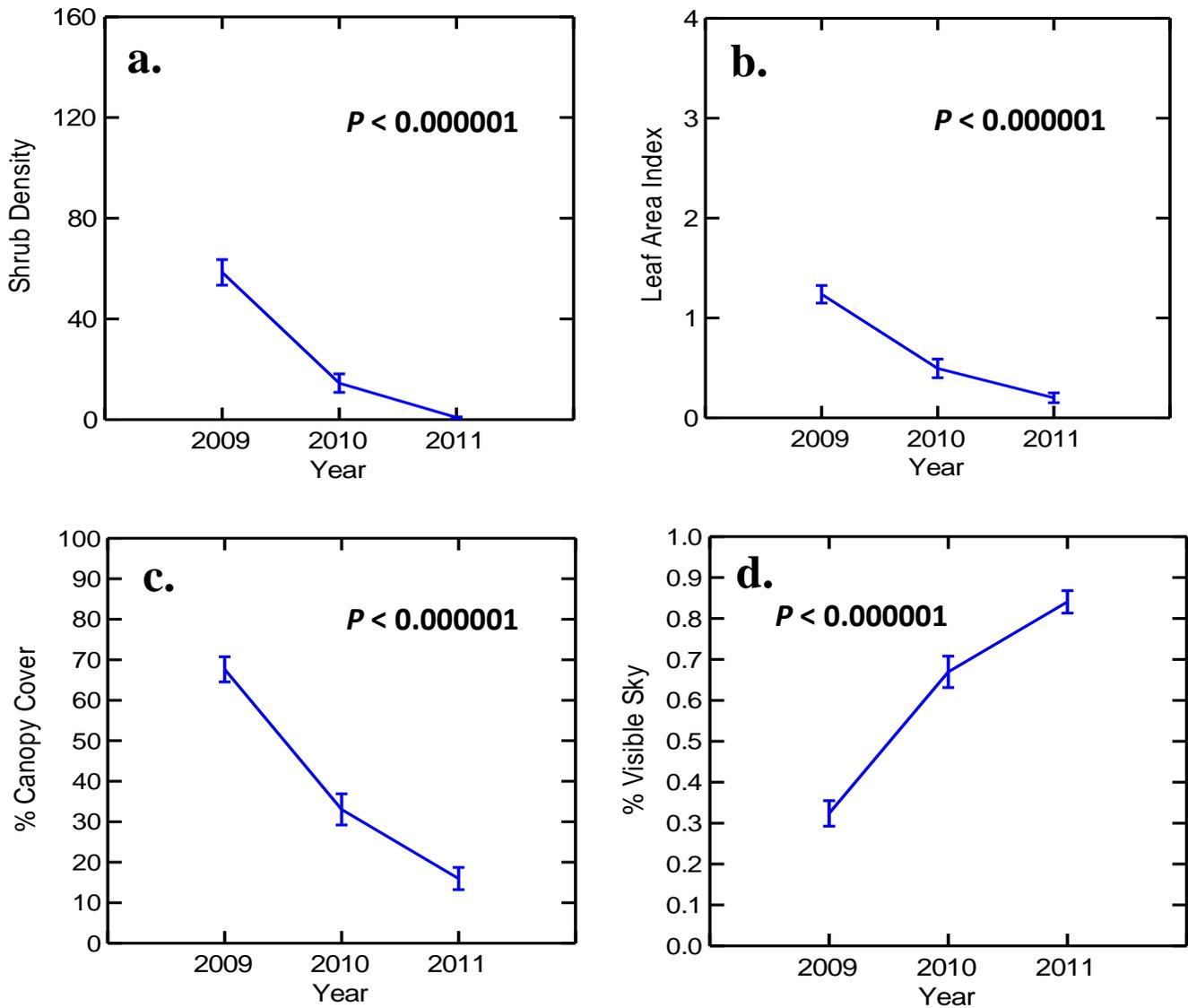


Figure 7. Overall changes in shrub density, leaf area index, % canopy cover, and the inverse measure, % visible sky, at the North Chicago Wetland Mitigation Site, Lake County, Illinois.  $P$  = probability results from Repeat Measures Analysis of Variance (within-subjects differences;  $\alpha = 0.025$  [Bonferroni adj.  $P = 0.05/2$ ]; % canopy cover, % visible sky, and LAI are highly correlated). The null expectation is no change over time. Error bars are standard error.

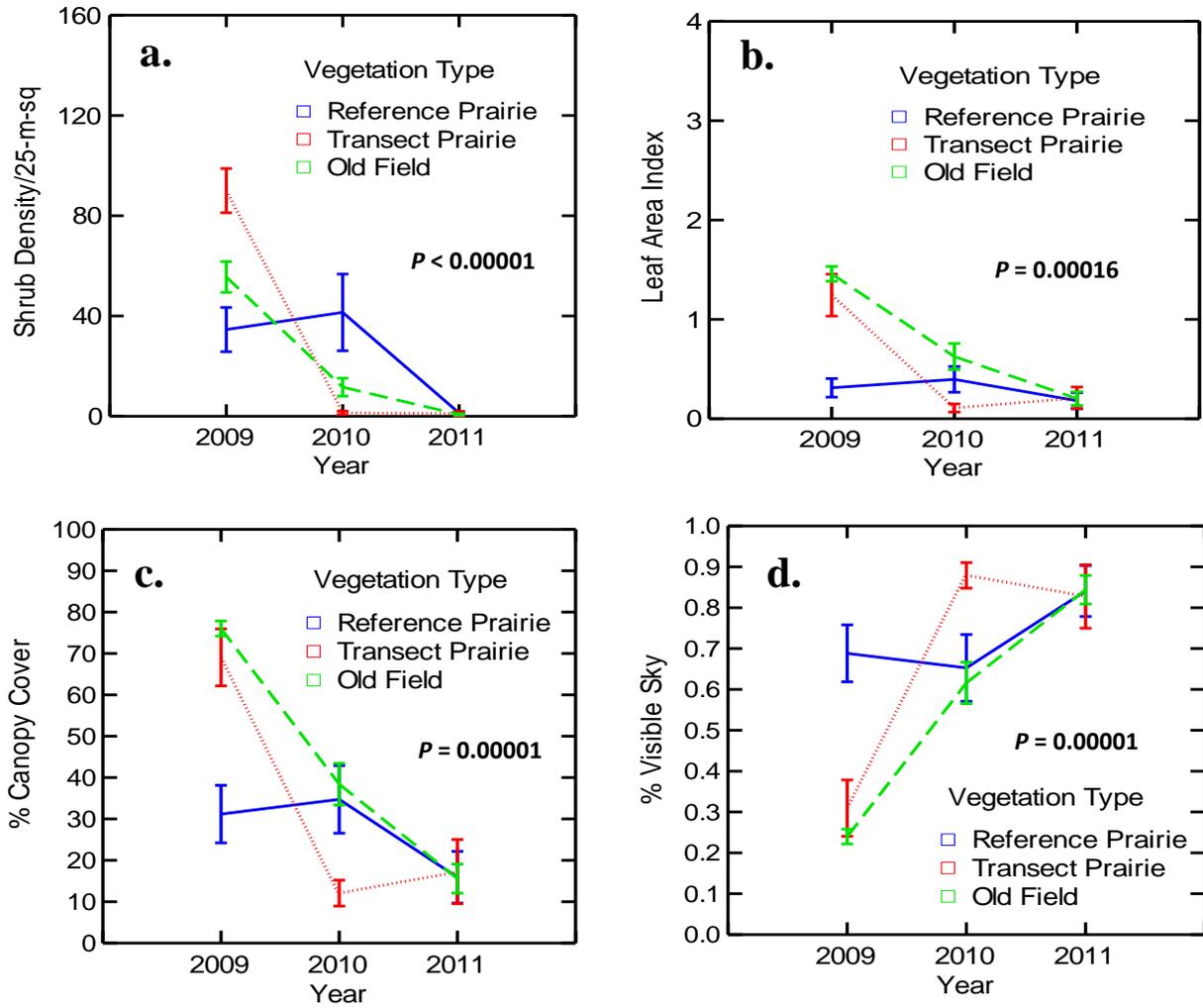


Figure 8. Trends for shrub density, Leaf Area Index, % canopy cover and its correlate % visible sky among old field, transect prairie, and reference prairie plots at the North Chicago Wetland Mitigation Site, Lake County, IL.  $P$  = probability results from Repeat Measures Analysis of Variance (within-subjects differences; alpha = 0.025 [Bonferroni adj.  $P = 0.05/2$ ]; LAI, % canopy cover, and % visible sky are highly correlated). The null expectation is no change over time. Error bars are standard error.

Appendix 1. Summary list of species recorded at the North Chicago Wetland Site, Lake County, IL showing 2011 data. Zero values are species recorded in previous years but absent in 2011. n= quadrat number; CC = coefficient of conservatism; WC = wetness coefficient; A = annual, B = biennial, P = perennial. IV200 is sum of relative frequency and relative cover.

|  | OVERALL              |            |           | OLD FIELD           |            |           | PRAIRIE             |         |           | ECOLOGY AND STRUCTURE |    |              |                  | COMMON NAME               |
|--|----------------------|------------|-----------|---------------------|------------|-----------|---------------------|---------|-----------|-----------------------|----|--------------|------------------|---------------------------|
|  | % Freq.<br>(n = 132) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 87) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 45) | % Cover | IV<br>200 | CC                    | WC | Wet-<br>ness | Physiog-<br>nomy |                           |
| <i>Acalypha rhomboidea</i> +               | 4.55                 | 0.023      | 0.23      | 7.93                | 0.034      | 0.41      | 0.00                | 0.000   | 0.00      | 0                     | 3  | FACU         | A-Forb           | Three-seeded Mercury      |
| <i>Acer negundo</i>                        | 3.03                 | 0.015      | 0.15      | 3.96                | 0.017      | 0.20      | 2.22                | 0.011   | 0.09      | 1                     | -2 | FACW-        | Tree             | Boxelder                  |
| <i>Acer saccharinum</i>                    | 0.76                 | 0.004      | 0.04      | 0.00                | 0.000      | 0.00      | 2.22                | 0.011   | 0.09      | 1                     | -3 | FACW         | Tree             | Silver Maple              |
| <i>Achillea millefolium</i>                | 24.24                | 1.148      | 2.01      | 6.61                | 0.224      | 0.52      | 60.00               | 2.933   | 3.90      | *                     | 3  | FACU         | P-Forb           | Common Milfoil            |
| <i>Agrimonia gryposepala</i>               | 3.03                 | 0.072      | 0.20      | 3.96                | 0.103      | 0.28      | 2.22                | 0.011   | 0.09      | 3                     | 2  | FACU+        | P-Forb           | Tall Agrimony             |
| <i>Agrostis alba</i>                       | 37.12                | 5.470      | 5.93      | 25.10               | 3.029      | 3.94      | 66.67               | 10.189  | 8.46      | 0                     | -3 | FACW         | P-Grass C3       | Red Top                   |
| <i>Agrostis alba</i> var. <i>palustris</i> | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 8                     | -3 | FACW         | P-Grass C3       | Creeping Bent Grass       |
| <i>Alliaria petiolata</i>                  | 3.79                 | 0.239      | 0.36      | 6.61                | 0.362      | 0.64      | 0.00                | 0.000   | 0.00      | *                     | 0  | FAC          | B-Forb           | Garlic Mustard            |
| <i>Allium canadense</i>                    | 2.27                 | 0.250      | 0.30      | 3.96                | 0.379      | 0.53      | 0.00                | 0.000   | 0.00      | 2                     | 3  | FACU         | P-Forb           | Wild Garlic               |
| <i>Allium cernuum</i>                      | 37.88                | 5.500      | 5.99      | 39.64               | 5.333      | 6.72      | 44.44               | 5.822   | 5.06      | 7                     | 5  | FACU         | P-Forb           | Nodding Onion             |
| <i>Amaranthus</i> sp.+                     | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | *                     |    |              | A-Forb           | Amaranth                  |
| <i>Ambrosia artemisiifolia</i>             | 8.33                 | 0.152      | 0.50      | 10.57               | 0.213      | 0.69      | 6.67                | 0.033   | 0.26      | 0                     | 3  | FACU         | A-Forb           | Common Ragweed            |
| <i>Amelanchier sanguinea</i>               | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 10                    | 5  | UPL          | Shrub            | Round-leaved Serviceberry |
| <i>Andropogon gerardii</i>                 | 13.64                | 3.678      | 3.46      | 10.57               | 0.213      | 0.69      | 22.22               | 10.378  | 6.97      | 5                     | 1  | FAC-         | P-Grass C4       | Big Bluestem              |
| <i>Anemone cylindrica</i>                  | 1.52                 | 0.008      | 0.08      | 2.64                | 0.011      | 0.14      | 0.00                | 0.000   | 0.00      | 8                     | 5  | UPL          | P-Forb           | Candle Anemone            |
| <i>Anemone virginiana</i>                  | 21.97                | 0.280      | 1.23      | 14.53               | 0.092      | 0.77      | 40.00               | 0.644   | 1.82      | 4                     | 5  | UPL          | P-Forb           | Tall Anemone              |
| <i>Antennaria neglecta</i>                 | 15.15                | 0.227      | 0.88      | 2.64                | 0.011      | 0.14      | 40.00               | 0.644   | 1.82      | 4                     | 5  | UPL          | P-Forb           | Cat's Foot                |
| <i>Apocynum androsaemifolium</i>           | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 6                     | 5  | UPL          | P-Forb           | Spreading Dogbane         |
| <i>Apocynum sibiricum</i>                  | 1.52                 | 0.008      | 0.08      | 2.64                | 0.011      | 0.14      | 0.00                | 0.000   | 0.00      | 2                     | -1 | FAC+         | P-Forb           | Indian Hemp               |
| <i>Aquilegia canadensis</i>                | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 5                     | 1  | FAC-         | P-Forb           | Columbine                 |
| <i>Arctium minus</i>                       | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | B-Forb           | Burdock                   |
| <i>Arisaema triphyllum</i>                 | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | -2 | FACW-        | P-Forb           | Indian Turnip             |
| <i>Asclepias incarnata</i>                 | 3.03                 | 0.072      | 0.20      | 3.96                | 0.103      | 0.28      | 2.22                | 0.011   | 0.09      | 4                     | -5 | OBL          | P-Forb           | Swamp Milkweed            |
| <i>Asclepias purpurascens</i>              | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 7                     | 3  | FACU         | P-Forb           | Purple Milkweed           |
| <i>Asclepias tuberosa</i>                  | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 5                     | 5  | UPL          | P-Forb           | Butterflyweed             |
| <i>Aster azureus</i>                       | 9.09                 | 0.288      | 0.64      | 0.00                | 0.000      | 0.00      | 26.67               | 0.844   | 1.46      | 7                     | 5  | UPL          | P-Forb           | Sky-blue Aster            |
| <i>Aster drummondii</i>                    | 21.97                | 0.451      | 1.37      | 21.14               | 0.523      | 1.48      | 28.89               | 0.311   | 1.22      | 3                     | 3  | FACU         | P-Forb           | Drummond's Aster          |
| <i>Aster ericoides</i>                     | 18.18                | 0.261      | 1.04      | 5.28                | 0.052      | 0.30      | 44.44               | 0.667   | 1.99      | 4                     | 4  | FACU-        | P-Forb           | Heath Aster               |
| <i>Aster lateriflorus</i>                  | 19.70                | 0.432      | 1.25      | 27.74               | 0.569      | 1.83      | 11.11               | 0.167   | 0.50      | 2                     | -2 | FACW-        | P-Forb           | Side-flowering Aster      |
| <i>Aster novae-angliae</i>                 | 0.76                 | 0.114      | 0.12      | 0.00                | 0.000      | 0.00      | 2.22                | 0.333   | 0.28      | 4                     | -3 | FACW         | P-Forb           | New England Aster         |
| <i>Aster pilosus</i>                       | 9.85                 | 0.087      | 0.52      | 11.89               | 0.109      | 0.66      | 8.89                | 0.044   | 0.35      | 0                     | 4  | FACU-        | P-Forb           | Hairy Aster               |
| <i>Aster praealtus</i>                     | 12.88                | 0.739      | 1.17      | 10.57               | 0.161      | 0.65      | 20.00               | 1.856   | 1.82      | 4                     | -5 | OBL          | P-Forb           | Willow Aster              |
| <i>Aster puniceus</i> +                    | 1.52                 | 0.008      | 0.08      | 2.64                | 0.011      | 0.14      | 0.00                | 0.000   | 0.00      | 7                     | -5 | OBL          | P-Forb           | Bristly Aster             |
| <i>Aster sagittifolius</i>                 | 2.27                 | 0.049      | 0.14      | 3.96                | 0.075      | 0.26      | 0.00                | 0.000   | 0.00      | 4                     | 5  | UPL          | P-Forb           | Arrow-leaved Aster        |
| <i>Aster simplex</i>                       | 2.27                 | 0.011      | 0.11      | 1.32                | 0.006      | 0.07      | 4.44                | 0.022   | 0.17      | 3                     | -5 | OBL          | P-Forb           | Panicled Aster            |
| Asteraceae seedling #1                     | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      |                       |    |              |                  |                           |
| Asteraceae seedling #2                     | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      |                       |    |              |                  |                           |

|                                   | OVERALL              |            |           | OLD FIELD           |            |           | PRAIRIE             |         |           | ECOLOGY AND STRUCTURE |    |              |                  | COMMON NAME                |
|-----------------------------------|----------------------|------------|-----------|---------------------|------------|-----------|---------------------|---------|-----------|-----------------------|----|--------------|------------------|----------------------------|
|                                   | % Freq.<br>(n = 132) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 87) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 45) | % Cover | IV<br>200 | CC                    | WC | Wet-<br>ness | Physiog-<br>nomy |                            |
| Asteraceae seedling #3            | 1.52                 | 0.008      | 0.08      | 0.00                | 0.000      | 0.00      | 4.44                | 0.022   | 0.17      |                       |    |              |                  |                            |
| <i>Avena sativa</i>               | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | A-Grass C3       | Oats                       |
| <i>Barbarea vulgaris</i>          | 5.30                 | 0.102      | 0.32      | 9.25                | 0.155      | 0.58      | 0.00                | 0.000   | 0.00      | *                     | 0  | FAC          | B-Forb           | Winter Cress               |
| <i>Bidens frondosa</i>            | 19.70                | 0.580      | 1.36      | 30.39               | 0.862      | 2.22      | 6.67                | 0.033   | 0.26      | 1                     | -3 | FACW         | A-Forb           | Common Beggar's Ticks      |
| <i>Botrychium dissectum</i>       | 0.76                 | 0.004      | 0.04      | 0.00                | 0.000      | 0.00      | 2.22                | 0.011   | 0.09      | 4                     | 0  | FAC          | Fern             | Bronze Fern                |
| <i>Bromus commutatus</i>          | 1.52                 | 0.027      | 0.09      | 0.00                | 0.000      | 0.00      | 4.44                | 0.078   | 0.21      | *                     | 5  | UPL          | A-Grass C3       | Hairy Brome                |
| <i>Bromus kalmii</i>              | 4.55                 | 0.227      | 0.39      | 0.00                | 0.000      | 0.00      | 13.33               | 0.667   | 0.88      | 10                    | 0  | FAC          | P-Grass C3       | Prairie Brome              |
| <i>Cacalia tuberosa</i>           | 0.76                 | 0.023      | 0.05      | 0.00                | 0.000      | 0.00      | 2.22                | 0.067   | 0.12      | 10                    | 0  | FAC          | P-Forb           | Prairie Indian Plantain    |
| <i>Calamagrostis canadensis</i>   | 1.52                 | 0.227      | 0.25      | 2.64                | 0.345      | 0.44      | 0.00                | 0.000   | 0.00      | 3                     | -5 | OBL          | P-Grass C3       | Blue Joint Grass           |
| <i>Calystegia sepium+</i>         | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 1                     | 0  | FAC          | P-Forb           | American Bindweed          |
| <i>Carduus nutans+</i>            | 1.52                 | 0.008      | 0.08      | 2.64                | 0.011      | 0.14      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | B-Forb           | Musk Bristle Thistle       |
| <i>Carex</i> (sect. Ouales)       | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      |                       |    |              |                  | Sedge                      |
| <i>Carex blanda</i>               | 2.27                 | 0.159      | 0.23      | 2.64                | 0.207      | 0.31      | 2.22                | 0.067   | 0.12      | 2                     | 0  | FAC          | P-Sedge          | Common Wood Sedge          |
| <i>Carex buxbaumii</i>            | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 9                     | -5 | OBL          | P-Sedge          | Dark-scaled Sedge          |
| <i>Carex brevior</i>              | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | 0  | FAC          | P-Sedge          | Plains Oval Sedge          |
| <i>Carex cf radiata</i> (sterile) | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 5                     | 5  | UPL          | P-Sedge          | Sedge                      |
| <i>Carex cristatella</i>          | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 3                     | -4 | FACW+        | P-Sedge          | Crested Oval Sedge         |
| <i>Carex granularis</i>           | 43.94                | 2.644      | 4.07      | 36.99               | 1.661      | 3.26      | 66.67               | 4.544   | 5.10      | 2                     | -4 | FACW+        | P-Sedge          | Pale Sedge                 |
| <i>Carex grisea</i>               | 0.76                 | 0.114      | 0.12      | 1.32                | 0.172      | 0.22      | 0.00                | 0.000   | 0.00      | 3                     | 5  | UPL          | P-Sedge          | Wood Grey Sedge            |
| <i>Carex hirsutella</i>           | 3.03                 | 0.163      | 0.27      | 1.32                | 0.006      | 0.07      | 6.67                | 0.467   | 0.52      | 5                     | 4  | FACU-        | P-Sedge          | Hairy Green Sedge          |
| <i>Carex pellita</i>              | 14.39                | 0.576      | 1.11      | 19.82               | 0.736      | 1.61      | 8.89                | 0.267   | 0.48      | 4                     | -5 | OBL          | P-Sedge          | Wooly Sedge                |
| <i>Carex pennsylvanica</i>        | 7.58                 | 0.133      | 0.45      | 2.64                | 0.040      | 0.16      | 17.78               | 0.311   | 0.82      | 5                     | 5  | UPL          | P-Sedge          | Oak Sedge                  |
| <i>Carex sp.</i> (sterile)        | 1.52                 | 0.008      | 0.08      | 1.32                | 0.006      | 0.07      | 2.22                | 0.011   | 0.09      |                       |    |              | P-Sedge          |                            |
| <i>Carex stricta</i>              | 4.55                 | 0.845      | 0.86      | 3.96                | 0.379      | 0.53      | 6.67                | 1.744   | 1.28      | 5                     | -5 | OBL          | P-Sedge          | Common Tussock Sedge       |
| <i>Carex tenera</i>               | 3.79                 | 0.186      | 0.32      | 5.28                | 0.276      | 0.50      | 2.22                | 0.011   | 0.09      | 5                     | -1 | FAC+         | P-Sedge          | Narrow-leaved Oval Sedge   |
| <i>Carex umbellata</i>            | 3.79                 | 0.167      | 0.30      | 6.61                | 0.253      | 0.54      | 0.00                | 0.000   | 0.00      | 6                     | 5  | UPL          | P-Sedge          | Early Oak Sedge            |
| <i>Castilleja coccinea</i>        | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 8                     | 0  | FAC          | A-Forb           | Indian Paintbrush          |
| <i>Centaureum pulchellum</i>      | 7.58                 | 0.038      | 0.38      | 9.25                | 0.040      | 0.48      | 6.67                | 0.033   | 0.26      | *                     | 4  | FACU-        | A-Forb           | Showy Centaury             |
| <i>Cephalanthus occidentalis+</i> | 0.76                 | 0.114      | 0.12      | 0.00                | 0.000      | 0.00      | 2.22                | 0.333   | 0.28      | 4                     | -5 | OBL          | Shrub            | Buttonbush                 |
| <i>Cerastium vulgatum</i>         | 11.36                | 0.076      | 0.59      | 6.61                | 0.029      | 0.34      | 22.22               | 0.167   | 0.90      | *                     | 3  | FACU         | P-Forb           | Common Mouse-ear Chickweed |
| <i>Chemopodium album</i>          | 9.09                 | 0.102      | 0.50      | 15.85               | 0.155      | 0.89      | 0.00                | 0.000   | 0.00      | *                     | 1  | FAC-         | A-Forb           | Lamb's Quarters            |
| <i>Cicuta maculata</i>            | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | -5 | OBL          | B-Forb           | Water Hemlock              |
| <i>Circaea lutetiana</i>          | 3.79                 | 0.019      | 0.19      | 6.61                | 0.029      | 0.34      | 0.00                | 0.000   | 0.00      | 2                     | 3  | FACU         | P-Forb           | Enchanter's Nightshade     |
| <i>Cirsium arvense</i>            | 14.39                | 1.027      | 1.46      | 25.10               | 1.557      | 2.60      | 0.00                | 0.000   | 0.00      | *                     | 3  | FACU         | P-Forb           | Field Thistle              |
| <i>Cirsium discolor</i>           | 3.03                 | 0.015      | 0.15      | 1.32                | 0.006      | 0.07      | 6.67                | 0.033   | 0.26      | 3                     | 5  | UPL          | B-Forb           | Pasture Thistle            |
| <i>Cirsium vulgare</i>            | 6.06                 | 0.068      | 0.33      | 10.57               | 0.103      | 0.60      | 0.00                | 0.000   | 0.00      | *                     | 4  | FACU-        | B-Forb           | Bull Thistle               |
| <i>Comandra umbellata</i>         | 5.30                 | 0.083      | 0.31      | 1.32                | 0.006      | 0.07      | 13.33               | 0.233   | 0.62      | 6                     | 3  | FACU         | P-Forb, Hemi     | Bastard Toad-flax          |
| <i>Conyza canadensis+</i>         | 4.55                 | 0.023      | 0.23      | 7.93                | 0.034      | 0.41      | 0.00                | 0.000   | 0.00      | 0                     | 1  | FAC-         | A-Forb           | Horseweed                  |
| <i>Cornus alternifolia</i>        | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 7                     | 5  | UPL          | Tree             | Alternate-leaved Dogwood   |
| <i>Cornus obliqua</i>             | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | -5 | OBL          | Shrub            | Pale Dogwood               |
| <i>Cornus racemosa</i>            | 40.91                | 1.932      | 3.38      | 33.03               | 1.500      | 2.93      | 64.44               | 2.767   | 3.96      | 2                     | -2 | FACW-        | Shrub            | Gray Dogwood               |

|                                    | OVERALL              |            |           | OLD FIELD           |            |           | PRAIRIE             |         |           | ECOLOGY AND STRUCTURE |    |              |                  | COMMON NAME              |
|------------------------------------|----------------------|------------|-----------|---------------------|------------|-----------|---------------------|---------|-----------|-----------------------|----|--------------|------------------|--------------------------|
|                                    | % Freq.<br>(n = 132) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 87) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 45) | % Cover | IV<br>200 | CC                    | WC | Wet-<br>ness | Physiog-<br>nomy |                          |
| <i>Corylus americana</i>           | 0.76                 | 0.288      | 0.26      | 0.00                | 0.000      | 0.00      | 2.22                | 0.844   | 0.58      | 4                     | 0  | FAC          | Shrub            | American Filbert         |
| <i>Crataegus cf. coccinea</i>      | 7.58                 | 0.076      | 0.41      | 3.96                | 0.046      | 0.23      | 15.56               | 0.133   | 0.64      | 5                     | 5  | UPL          | Tree             | Scarlet Hawthorn         |
| <i>Crataegus cf. pruinosa</i>      | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 3                     | 5  | UPL          | Tree             | Frosted Hawthorn         |
| <i>Crataegus crus-galli</i>        | 4.55                 | 0.042      | 0.24      | 2.64                | 0.040      | 0.16      | 8.89                | 0.044   | 0.35      | 2                     | 0  | FAC          | Tree             | Cock-spur Hawthorn       |
| <i>Crataegus mollis</i>            | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 2                     | -2 | FACW-        | Tree             | Downy Hawthorn           |
| <i>Crataegus sp. (seedlings)</i>   | 6.82                 | 0.072      | 0.37      | 2.64                | 0.011      | 0.14      | 15.56               | 0.189   | 0.67      |                       |    |              | Tree             | Hawthorn                 |
| <i>Cuscuta sp.</i>                 | 1.52                 | 0.008      | 0.08      | 0.00                | 0.000      | 0.00      | 4.44                | 0.022   | 0.17      |                       | -3 | FACW         | A-Forb           | Dodder                   |
| <i>Dactylus glommerata</i>         | 0.76                 | 0.023      | 0.05      | 1.32                | 0.034      | 0.09      | 0.00                | 0.000   | 0.00      | *                     | 3  | FACU         | P-Grass C3       | Orchard Grass            |
| <i>Danthonia spicata</i>           | 1.52                 | 0.402      | 0.38      | 2.64                | 0.609      | 0.68      | 0.00                | 0.000   | 0.00      | 3                     | 5  | UPL          | P-Grass C3       | Poverty Oat Grass        |
| <i>Daucus carota</i>               | 25.00                | 0.697      | 1.70      | 17.18               | 0.523      | 1.29      | 44.44               | 1.033   | 2.21      | *                     | 4  | FACU-        | B-Forb           | Queen Anne's Lace        |
| <i>Dianthus armeria</i>            | 1.52                 | 0.008      | 0.08      | 0.00                | 0.000      | 0.00      | 4.44                | 0.022   | 0.17      | *                     | 5  | UPL          | A-Forb           | Deptford Pink            |
| <i>Dichanthelium implicatum</i>    | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 2                     | 0  | FAC          | P-Grass C3       | Old Field Panic Grass    |
| <i>Dichanthelium oligosanthes</i>  | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 3                     | 3  | FACU         | P-Grass C3       | Scribner's Panic Grass   |
| <i>Dichanthelium villosissimum</i> | 43.94                | 1.402      | 3.12      | 47.56               | 1.885      | 3.97      | 48.89               | 0.467   | 2.03      | 5                     | 5  | UPL          | P-Grass C3       | White-haired Panic Grass |
| Dicot 1 (seedling 3B+)             | 3.79                 | 0.038      | 0.20      | 6.61                | 0.057      | 0.37      | 0.00                | 0.000   | 0.00      |                       |    |              |                  |                          |
| <i>Digitaria ischaemum+</i>        | 4.55                 | 0.754      | 0.79      | 7.93                | 1.144      | 1.41      | 0.00                | 0.000   | 0.00      | *                     | 3  | FACU         | A-Grass          | Smooth Crab Grass        |
| <i>Dipsacus laciniatus</i>         | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | B-Forb           | Cut-leaved Teasel        |
| <i>Echinacea pallida+</i>          | 4.55                 | 0.023      | 0.23      | 7.93                | 0.034      | 0.41      | 0.00                | 0.000   | 0.00      | 7                     | 5  | UPL          | P-Forb           | Pale Purple Coneflower   |
| <i>Echinochloa sp. (seedling)+</i> | 2.27                 | 0.140      | 0.21      | 3.96                | 0.213      | 0.38      | 0.00                | 0.000   | 0.00      | *                     | -3 | FACW         | A-Grass          | Barnyard Grass           |
| <i>Eleocharis erythropodia+</i>    | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 3                     | -5 | OBL          | P-Sedge          | Red-rooted Spike Rush    |
| <i>Eleusine indica</i>             | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | *                     | 3  | FACU         | A-Grass C4       | Goosegrass               |
| <i>Elymus trachycaulus</i>         | 4.55                 | 0.080      | 0.27      | 2.64                | 0.040      | 0.16      | 8.89                | 0.156   | 0.41      | 8                     | 3  | FACU         | P-Grass C3       | Bearded Wheat Grass      |
| <i>Elymus virginiana</i>           | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | -2 | FACW-        | P-Grass C3       | Virginia Wild Rye        |
| <i>Epilobium coloratum</i>         | 6.82                 | 0.034      | 0.34      | 11.89               | 0.052      | 0.61      | 0.00                | 0.000   | 0.00      | 3                     | -5 | OBL          | P-Forb           | Cinnamon Willow Herb     |
| <i>Equisetum arvense</i>           | 7.58                 | 0.095      | 0.42      | 10.57               | 0.132      | 0.62      | 4.44                | 0.022   | 0.17      | 0                     | 0  | FAC          | Fern             | Common Horsetail         |
| <i>Eragrostis cf. pectinata</i>    | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 0                     | 0  | FAC          | A-Grass C4       | Love Grass               |
| <i>Erechtites hieracifolia+</i>    | 28.79                | 0.496      | 1.72      | 47.56               | 0.741      | 2.93      | 4.44                | 0.022   | 0.17      | 2                     | 3  | FACU         | A-Forb           | Fireweed                 |
| <i>Erigeron annuus</i>             | 17.42                | 0.163      | 0.93      | 17.18               | 0.075      | 0.88      | 22.22               | 0.333   | 1.00      | 1                     | 1  | FAC-         | B-Forb           | Annual Fleabane          |
| <i>Erigeron philadelphicus</i>     | 3.03                 | 0.144      | 0.25      | 5.28                | 0.218      | 0.45      | 0.00                | 0.000   | 0.00      | 3                     | -3 | FACW         | P-Forb           | Marsh Fleabane           |
| <i>Erigeron strigosus</i>          | 13.64                | 0.848      | 1.29      | 10.57               | 0.103      | 0.60      | 22.22               | 2.289   | 2.16      | 2                     | 1  | FAC-         | P-Forb           | Daisy Fleabane           |
| <i>Eryngium yuccifolium+</i>       | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 7                     | -1 | FAC+         | P-Forb           | Rattlesnake Master       |
| <i>Eupatorium altissimum</i>       | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 2                     | 3  | FACU         | P-Forb           | Tall Boneset             |
| <i>Eupatorium maculatum+</i>       | 4.55                 | 0.023      | 0.23      | 7.93                | 0.034      | 0.41      | 0.00                | 0.000   | 0.00      | 5                     | -5 | OBL          | P-Forb           | Spotted Joe Pye Weed     |
| <i>Eupatorium perfoliatum</i>      | 2.27                 | 0.140      | 0.21      | 1.32                | 0.006      | 0.07      | 4.44                | 0.400   | 0.40      | 4                     | -4 | FACW+        | P-Forb           | Common Boneset           |
| <i>Eupatorium rugosum</i>          | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 2                     | 3  | FACU         | P-Forb           | White Snakeroot          |
| <i>Eupatorium serotinum+</i>       | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 1                     | -1 | FAC+         | P-Forb           | Late Boneset             |
| <i>Euphorbia corollata</i>         | 2.27                 | 0.011      | 0.11      | 0.00                | 0.000      | 0.00      | 6.67                | 0.033   | 0.26      | 3                     | 5  | UPL          | P-Forb           | Flowering Spurge         |
| <i>Euphorbia escula+</i>           | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | P-Forb           | Leafy Spurge             |
| <i>Euthamia graminifolia</i>       | 9.85                 | 0.667      | 0.97      | 9.25                | 0.724      | 1.10      | 13.33               | 0.556   | 0.81      | 3                     | -2 | FACW-        | P-Forb           | Grass-leaved Goldenrod   |
| <i>Festuca pratensis+</i>          | 1.52                 | 0.027      | 0.09      | 0.00                | 0.000      | 0.00      | 4.44                | 0.078   | 0.21      | *                     | 4  | FACU-        | P-Grass          | Meadow Fescue            |
| <i>Fragaria virginiana</i>         | 44.70                | 1.424      | 3.17      | 44.92               | 1.615      | 3.60      | 55.56               | 1.056   | 2.62      | 2                     | 1  | FAC-         | P-Forb           | Wild Strawberry          |

|   | OVERALL              |            |           | OLD FIELD           |            |           | PRAIRIE             |         |           | ECOLOGY AND STRUCTURE |    |              |                  | COMMON NAME              |
|---|----------------------|------------|-----------|---------------------|------------|-----------|---------------------|---------|-----------|-----------------------|----|--------------|------------------|--------------------------|
|   | % Freq.<br>(n = 132) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 87) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 45) | % Cover | IV<br>200 | CC                    | WC | Wet-<br>ness | Physiog-<br>nomy |                          |
| <i>Fraxinus pennsylvanica</i> var.<br><i>subintegerrima</i> | 5.30                 | 0.045      | 0.28      | 5.28                | 0.052      | 0.30      | 6.67                | 0.033   | 0.26      | 2                     | -3 | FACW         | Tree             | Green Ash                |
| <i>Galium obtusum</i>                                       | 1.52                 | 0.008      | 0.08      | 0.00                | 0.000      | 0.00      | 4.44                | 0.022   | 0.17      | 5                     | -4 | FACW+        | P-Forb           | Wild Madder              |
| <i>Galium triflorum</i>                                     | 5.30                 | 0.064      | 0.30      | 3.96                | 0.017      | 0.20      | 8.89                | 0.156   | 0.41      | 4                     | 2  | FACU+        | P-Forb           | Sweet-scented Bedstraw   |
| <i>Gaura biennis</i>  | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 2                     | 4  | FACU-        | B-Forb           | Biennial Gaura           |
| <i>Gentiana alba</i>  | 6.06                 | 0.216      | 0.45      | 6.61                | 0.253      | 0.54      | 6.67                | 0.144   | 0.33      | 9                     | 3  | FACU         | P-Forb           | Pale Gentian             |
| <i>Gentiana andrewsii</i>                                   | 3.03                 | 0.273      | 0.35      | 0.00                | 0.000      | 0.00      | 8.89                | 0.800   | 0.80      | 7                     | -3 | FACW         | P-Forb           | Closed Gentian           |
| <i>Gentianella quinquefolia</i>                             | 1.52                 | 0.008      | 0.08      | 0.00                | 0.000      | 0.00      | 4.44                | 0.022   | 0.17      | 7                     | 0  | FAC          | A-Forb           | Stiff Gentian            |
| <i>Geum aleppicum</i>                                       | 9.09                 | 0.064      | 0.47      | 11.89               | 0.080      | 0.64      | 6.67                | 0.033   | 0.26      | 6                     | -1 | FAC+         | P-Forb           | Yellow Avens             |
| <i>Geum canadense</i>                                       | 5.30                 | 0.045      | 0.28      | 3.96                | 0.046      | 0.23      | 8.89                | 0.044   | 0.35      | 2                     | 0  | FAC          | P-Forb           | White Avens              |
| <i>Geum</i> sp. (rosette)                                   | 4.55                 | 0.042      | 0.24      | 2.64                | 0.011      | 0.14      | 8.89                | 0.100   | 0.38      | 2                     | 0  | FAC          | P-Forb           | Avens                    |
| <i>Glyceria striata</i>                                     | 3.03                 | 0.273      | 0.35      | 3.96                | 0.379      | 0.53      | 2.22                | 0.067   | 0.12      | 4                     | -5 | OBL          | P-Grass C3       | Fowl Manna Grass         |
| <i>Hackelia virginiana</i>                                  | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 1                     | 1  | FAC-         | P-Forb           | Stickseed                |
| <i>Helianthus grosseserratus</i>                            | 13.64                | 0.848      | 1.29      | 17.18               | 1.063      | 1.78      | 11.11               | 0.433   | 0.66      | 2                     | -2 | FACW-        | P-Forb           | Sawtooth Sunflower       |
| <i>Helianthus rigidus</i>                                   | 9.85                 | 0.602      | 0.92      | 0.00                | 0.000      | 0.00      | 28.89               | 1.767   | 2.09      | 6                     | 5  | UPL          | P-Forb           | Prairie Sunflower        |
| <i>Helianthus strumosus</i>                                 | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 3                     | 5  | UPL          | P-Forb           | Pale-leaved Sunflower    |
| <i>Hieracium caespitosum</i>                                | 18.18                | 0.356      | 1.12      | 9.25                | 0.126      | 0.55      | 37.78               | 0.800   | 1.83      | *                     | 5  | UPL          | P-Forb           | Field Hawkweed           |
| <i>Hieracium canadense</i>                                  | 0.76                 | 0.023      | 0.05      | 0.00                | 0.000      | 0.00      | 2.22                | 0.067   | 0.12      | 5                     | 5  | UPL          | P-Forb           | Canada Hawkweed          |
| <i>Hierochloa odorata</i>                                   | 0.76                 | 0.023      | 0.05      | 1.32                | 0.034      | 0.09      | 0.00                | 0.000   | 0.00      | 7                     | -3 | FACW         | P-Grass C3       | Sweet Grass              |
| <i>Hypericum perforatum</i>                                 | 7.58                 | 0.038      | 0.38      | 3.96                | 0.017      | 0.20      | 15.56               | 0.078   | 0.61      | *                     | 5  | UPL          | P-Forb           | Common St. John's Wort   |
| <i>Hypericum punctatum</i>                                  | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 3                     | -1 | FAC+         | P-Forb           | Spotted St. John's Wort  |
| <i>Hypoxis hirsuta</i>                                      | 9.09                 | 0.250      | 0.61      | 3.96                | 0.046      | 0.23      | 20.00               | 0.644   | 1.10      | 6                     | 0  | FAC          | P-Forb           | Yellow Star Grass        |
| <i>Impatiens capensis</i>                                   | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 2                     | -3 | FACW         | A-Forb           | Spotted Touch-Me-Not     |
| <i>Juncus dudleyi</i>                                       | 3.03                 | 0.273      | 0.35      | 3.96                | 0.379      | 0.53      | 2.22                | 0.067   | 0.12      | 4                     | 0  | FAC          | P-Forb           | Dudley's Rush            |
| <i>Juncus interior</i>                                      | 3.03                 | 0.072      | 0.20      | 2.64                | 0.069      | 0.19      | 4.44                | 0.078   | 0.21      | 3                     | -1 | FAC+         | P-Forb           | Inland Rush              |
| <i>Juncus tenuis</i>  | 20.45                | 0.788      | 1.55      | 19.82               | 0.316      | 1.23      | 26.67               | 1.700   | 1.97      | 0                     | 0  | FAC          | P-Forb           | Path Rush                |
| <i>Juniperis virginiana</i>                                 | 1.52                 | 0.008      | 0.08      | 1.32                | 0.006      | 0.07      | 2.22                | 0.011   | 0.09      | 1                     | 3  | FACU         | Tree             | Eastern Red Cedar        |
| <i>Krigia biflora</i>                                       | 9.09                 | 0.159      | 0.54      | 1.32                | 0.034      | 0.09      | 24.44               | 0.400   | 1.12      | 5                     | 3  | FACU         | P-Forb           | False Dandelion          |
| <i>Lactuca canadensis</i>                                   | 7.58                 | 0.076      | 0.41      | 11.89               | 0.109      | 0.66      | 2.22                | 0.011   | 0.09      | 1                     | 2  | FACU+        | B-Forb           | Glaucous White Lettuce   |
| <i>Lactuca serriola</i>                                     | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | *                     | 0  | FAC          | B-Forb           | Prickly Lettuce          |
| <i>Lactuca</i> sp.  | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      |                       |    |              | B-Forb           | Lettuce                  |
| <i>Laythrus palustris</i>                                   | 0.76                 | 0.023      | 0.05      | 0.00                | 0.000      | 0.00      | 2.22                | 0.067   | 0.12      | 7                     | -5 | OBL          | P-Forb           | Marsh Vetchling          |
| <i>Leersia oryzoides+</i>                                   | 0.76                 | 0.023      | 0.05      | 1.32                | 0.034      | 0.09      | 0.00                | 0.000   | 0.00      | 3                     | -5 | OBL          | P-Grass          | Rice Cut-Grass           |
| <i>Lespedeza capitata</i>                                   | 4.55                 | 0.280      | 0.43      | 0.00                | 0.000      | 0.00      | 13.33               | 0.822   | 0.97      | 4                     | 3  | FACU         | P-Forb N2        | Round-headed Bush Clover |
| <i>Leucanthemum vulgare</i>                                 | 34.85                | 2.076      | 3.21      | 25.10               | 1.989      | 3.00      | 60.00               | 2.244   | 3.49      | *                     | 5  | UPL          | P-Forb           | Ox-eye Daisy             |
| <i>Liatris aspera</i>                                       | 3.03                 | 0.053      | 0.18      | 0.00                | 0.000      | 0.00      | 8.89                | 0.156   | 0.41      | 7                     | 5  | UPL          | P-Forb           | Rough Blazing Star       |
| <i>Liatris</i> cf <i>spicata</i>                            | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 7                     | 0  | FAC          | P-Forb           | Marsh Blazing Star       |
| <i>Liatris pycnostachya</i>                                 | 9.85                 | 0.383      | 0.75      | 0.00                | 0.000      | 0.00      | 28.89               | 1.122   | 1.71      | 6                     | 1  | FAC-         | P-Forb           | Prairie Blazine Star     |
| <i>Liatris</i> sp. (seedling)                               | 2.27                 | 0.011      | 0.11      | 3.96                | 0.017      | 0.20      | 0.00                | 0.000   | 0.00      | 6                     | 1  | FAC-         | P-Forb           | Blazing Star             |
| <i>Lilium michiganense</i>                                  | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 6                     | -1 | FAC+         | P-Forb           | Michigan Lily            |
| <i>Lithospermum canescens</i>                               | 6.06                 | 0.087      | 0.35      | 0.00                | 0.000      | 0.00      | 17.78               | 0.256   | 0.79      | 6                     | 5  | UPL          | P-Forb           | Hoary Puccoon            |

|                                    | OVERALL              |            |           | OLD FIELD           |            |           | PRAIRIE             |         |           | ECOLOGY AND STRUCTURE |    |              |                  | COMMON NAME               |
|------------------------------------|----------------------|------------|-----------|---------------------|------------|-----------|---------------------|---------|-----------|-----------------------|----|--------------|------------------|---------------------------|
|                                    | % Freq.<br>(n = 132) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 87) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 45) | % Cover | IV<br>200 | CC                    | WC | Wet-<br>ness | Physiog-<br>nomy |                           |
| <i>Lobelia spicata</i>             | 23.48                | 0.155      | 1.21      | 21.14               | 0.149      | 1.14      | 33.33               | 0.167   | 1.30      | 4                     | 0  | FAC          | P-Forb           | Pale Spiked Lobelia       |
| <i>Lolium multiflorum</i> +        | 72.73                | 31.015     | 27.24     | 97.77               | 39.224     | 40.22     | 48.89               | 15.144  | 10.77     | *                     | 5  | UPL          | A-Grass          | Italian Rye Grass         |
| <i>Lonicera X bella</i>            | 28.79                | 1.625      | 2.59      | 31.71               | 1.799      | 3.14      | 31.11               | 1.289   | 1.88      | *                     | 3  | FACU         | Shrub            | Showy Fly Honeysuckle     |
| <i>Lotus corniculatus</i> +        | 3.03                 | 0.015      | 0.15      | 5.28                | 0.023      | 0.27      | 0.00                | 0.000   | 0.00      | *                     | 1  | FAC-         | P-Forb           | Birdsfoot Trefoil         |
| <i>Lycopus americanus</i>          | 5.30                 | 0.174      | 0.38      | 7.93                | 0.259      | 0.61      | 2.22                | 0.011   | 0.09      | 3                     | -5 | OBL          | P-Forb           | Common Water Horehound    |
| <i>Lycopus uniflorus</i>           | 3.03                 | 0.015      | 0.15      | 3.96                | 0.017      | 0.20      | 2.22                | 0.011   | 0.09      | 7                     | -5 | OBL          | P-Forb           | Nothern Bugle Weed        |
| <i>Lysmachia quadriflora</i> +     | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 8                     | -5 | OBL          | P-Forb           | Narrow-leaved Loosestrife |
| <i>Lythrum alatum</i>              | 6.06                 | 0.087      | 0.35      | 6.61                | 0.115      | 0.42      | 6.67                | 0.033   | 0.26      | 5                     | -5 | OBL          | P-Forb           | Winged Loosestrife        |
| <i>Lythrum salicaria</i>           | 8.33                 | 0.155      | 0.51      | 9.25                | 0.155      | 0.58      | 8.89                | 0.156   | 0.41      | *                     | -5 | OBL          | P-Forb           | Purple Loosestrife        |
| <i>Malus pumila</i>                | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | Tree             | Apple                     |
| <i>Medicago lupulina</i>           | 9.09                 | 0.121      | 0.51      | 9.25                | 0.126      | 0.55      | 11.11               | 0.111   | 0.47      | *                     | 1  | FAC-         | A-Forb N2        | Black Medick              |
| <i>Melilotus alba</i>              | 9.09                 | 0.121      | 0.51      | 3.96                | 0.075      | 0.26      | 20.00               | 0.211   | 0.84      | *                     | 3  | FACU         | B-Forb N2        | White Sweet Clover        |
| <i>Monarda fistulosa</i>           | 21.21                | 0.553      | 1.41      | 7.93                | 0.259      | 0.61      | 48.89               | 1.122   | 2.42      | 4                     | 3  | FACU         | P-Forb           | Wild Bergamot             |
| <i>Morus alba</i>                  | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | *                     | 0  | FAC          | Tree             | White Mulberry            |
| <i>Oenothera biennis</i>           | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 1                     | 3  | FACU         | B-Forb           | Common Evening Primrose   |
| <i>Oenothera perennis</i>          | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 8                     | 0  | FAC          | P-Forb           | Small Sundrops            |
| <i>Oenothera pilosella</i> +       | 0.76                 | 0.004      | 0.04      | 0.00                | 0.000      | 0.00      | 2.22                | 0.011   | 0.09      | 6                     | 1  | FAC-         | P-Forb           | Prairie Sundrops          |
| <i>Osmorhiza claytonii</i>         | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 3                     | 4  | FACU-        | P-Forb           | Hairy Sweet Cicely        |
| <i>Oxalis stricta</i>              | 46.97                | 0.625      | 2.66      | 70.02               | 0.897      | 4.14      | 20.00               | 0.100   | 0.78      | 0                     | 3  | FACU         | P-Forb           | Tall Wood Sorrel          |
| <i>Oxypolis rigidor</i>            | 3.03                 | 0.053      | 0.18      | 5.28                | 0.080      | 0.32      | 0.00                | 0.000   | 0.00      | 7                     | -5 | OBL          | P-Forb           | Cowbane                   |
| <i>Panicum capillare</i> +         | 3.03                 | 0.254      | 0.34      | 5.28                | 0.385      | 0.60      | 0.00                | 0.000   | 0.00      | 0                     | 0  | FAC          | A-Grass          | Old Witch Grass           |
| <i>Parthenium integrifolium</i>    | 12.12                | 3.182      | 3.01      | 1.32                | 0.006      | 0.07      | 33.33               | 9.322   | 6.74      | 8                     | 5  | UPL          | P-Forb           | Wild Quinine              |
| <i>Parthenocissus quinquefolia</i> | 5.30                 | 0.193      | 0.39      | 7.93                | 0.259      | 0.61      | 2.22                | 0.067   | 0.12      | 2                     | 1  | FAC-         | W-Vine           | Virginia Creeper          |
| <i>Pedicularis canadensis</i> +    | 0.76                 | 0.004      | 0.04      | 0.00                | 0.000      | 0.00      | 2.22                | 0.011   | 0.09      | 7                     | 2  | FACU+        | P-Forb           | Wood Betany               |
| <i>Penstemon digitalis</i>         | 0.76                 | 0.004      | 0.04      | 0.00                | 0.000      | 0.00      | 2.22                | 0.011   | 0.09      | 4                     | 1  | FAC-         | P-Forb           | Foxglove Beard Tongue     |
| <i>Phalaris arundinacea</i>        | 3.79                 | 0.451      | 0.52      | 5.28                | 0.678      | 0.87      | 2.22                | 0.011   | 0.09      | *                     | -4 | FACW+        | P-Grass C3       | Reed Canary Grass         |
| <i>Phleum pratense</i>             | 2.27                 | 0.049      | 0.14      | 1.32                | 0.034      | 0.09      | 4.44                | 0.078   | 0.21      | *                     | 3  | FACU         | P-Grass C3       | Timothy                   |
| <i>Phlox glaberrima</i>            | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 6                     | -3 | FACW         | P-Forb           | Smooth Phlox              |
| <i>Phlox pilosa</i>                | 0.76                 | 0.004      | 0.04      | 0.00                | 0.000      | 0.00      | 2.22                | 0.011   | 0.09      | 7                     | 1  | FAC-         | P-Forb           | Sand Prairie Phlox        |
| <i>Phryma leptostachya</i>         | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | 5  | UPL          | P-Forb           | Lopseed                   |
| <i>Physalis subglabrata</i> +      | 4.55                 | 0.061      | 0.26      | 7.93                | 0.092      | 0.46      | 0.00                | 0.000   | 0.00      | 0                     | 5  | UPL          | P-Forb           | Smooth Ground Cherry      |
| <i>Plantago rugelii</i>            | 12.88                | 0.178      | 0.73      | 17.18               | 0.190      | 0.99      | 8.89                | 0.156   | 0.41      | 0                     | 0  | FAC          | A-Forb           | Red-stalked Plantain      |
| <i>Platanthera sp.</i> +           | 1.52                 | 0.008      | 0.08      | 0.00                | 0.000      | 0.00      | 4.44                | 0.022   | 0.17      | 9                     | -3 | FACW         | P-Forb           | Orchid (basal leaf)       |
| <i>Poa bulbosa</i>                 | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | P-Grass C3       | Bulbous Blue Grass        |
| <i>Poa compressa</i>               | 36.36                | 3.602      | 4.46      | 38.31               | 3.805      | 5.27      | 42.22               | 3.211   | 3.43      | *                     | 2  | FACU+        | P-Grass C3       | Canadian Blue Grass       |
| <i>Poa pratensis</i>               | 40.91                | 3.920      | 4.91      | 34.35               | 2.483      | 3.88      | 62.22               | 6.700   | 6.22      | *                     | 1  | FAC-         | P-Grass C3       | Kentucky Blue Grass       |
| <i>Poa trivialis</i> +             | 4.55                 | 0.042      | 0.24      | 7.93                | 0.063      | 0.43      | 0.00                | 0.000   | 0.00      | *                     | -3 | FACW         | P-Grass          | Meadow Grass              |
| Poaceae seedling # 1               | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      |                       |    |              | P-Grass C3       |                           |
| Poaceae seedling # 2               | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      |                       |    |              | P-Grass C3       |                           |
| <i>Polygala verticillata</i>       | 1.52                 | 0.008      | 0.08      | 1.32                | 0.006      | 0.07      | 2.22                | 0.011   | 0.09      | 5                     | 5  | UPL          | A-Forb           | Whorled Milkwort          |
| <i>Polygonum caespitosum</i> +     | 3.03                 | 0.034      | 0.17      | 3.96                | 0.046      | 0.23      | 2.22                | 0.011   | 0.09      | *                     | 5  | UPL          | A-Forb           | Creeping Smartweed        |

|  | OVERALL              |            |           | OLD FIELD           |            |           | PRAIRIE             |         |           | ECOLOGY AND STRUCTURE |    |              |                  | COMMON NAME              |
|--|----------------------|------------|-----------|---------------------|------------|-----------|---------------------|---------|-----------|-----------------------|----|--------------|------------------|--------------------------|
|  | % Freq.<br>(n = 132) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 87) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 45) | % Cover | IV<br>200 | CC                    | WC | Wet-<br>ness | Physiog-<br>nomy |                          |
| <i>Polygonatum commutatum</i>          | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 4                     | 3  | FACU         | P-Forb           | Great Solomon Seal       |
| <i>Polygonum arenastrum+</i>           | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | A-Forb           | Sidewalk Knotweed        |
| <i>Polygonum hydropiperoides+</i>      | 0.76                 | 0.023      | 0.05      | 1.32                | 0.034      | 0.09      | 0.00                | 0.000   | 0.00      | 4                     | -5 | OBL          | P-Forb           | Creeping Smartweed       |
| <i>Populus deltoides</i>               | 1.52                 | 0.008      | 0.08      | 2.64                | 0.011      | 0.14      | 0.00                | 0.000   | 0.00      | 2                     | -1 | FAC+         | Tree             | Cottonwood               |
| <i>Populus tremuloides</i>             | 2.27                 | 0.121      | 0.20      | 2.64                | 0.178      | 0.29      | 2.22                | 0.011   | 0.09      | 3                     | 0  | FAC          | Tree             | Quaking Aspen            |
| <i>Portulaca oleracea+</i>             | 0.76                 | 0.114      | 0.12      | 1.32                | 0.172      | 0.22      | 0.00                | 0.000   | 0.00      | *                     | 1  | FAC-         | A-Forb           | Purslane                 |
| <i>Potentilla arguta</i>               | 1.52                 | 0.027      | 0.09      | 0.00                | 0.000      | 0.00      | 4.44                | 0.078   | 0.21      | 10                    | 4  | FACU-        | P-Forb           | Prairie Cinquefoil       |
| <i>Potentilla norvegica+</i>           | 0.76                 | 0.114      | 0.12      | 1.32                | 0.172      | 0.22      | 0.00                | 0.000   | 0.00      | 0                     | 0  | FAC          | A-Forb           | Rough Cinquefoil         |
| <i>Potentilla recta</i>                | 0.76                 | 0.004      | 0.04      | 0.00                | 0.000      | 0.00      | 2.22                | 0.011   | 0.09      | *                     | 5  | UPL          | P-Forb           | Sulfur Cinquefoil        |
| <i>Potentilla simplex</i>              | 27.27                | 1.193      | 2.18      | 29.07               | 1.333      | 2.59      | 31.11               | 0.922   | 1.67      | 3                     | 4  | FACU-        | P-Forb           | Common Cinquefoil        |
| <i>Prunella vulgaris var. elongata</i> | 48.48                | 2.045      | 3.82      | 51.53               | 2.563      | 4.77      | 55.56               | 1.044   | 2.62      | 1                     | 0  | FAC          | P-Forb           | Self-heal                |
| <i>Prunus americana</i>                | 6.82                 | 0.091      | 0.39      | 2.64                | 0.011      | 0.14      | 15.56               | 0.244   | 0.70      | 3                     | 5  | UPL          | Tree             | American Plum            |
| <i>Prunus serotina</i>                 | 5.30                 | 0.045      | 0.28      | 3.96                | 0.017      | 0.20      | 8.89                | 0.100   | 0.38      | 1                     | 3  | FACU         | Tree             | Wild Black Cherry        |
| <i>Prunus virginiana</i>               | 1.52                 | 0.008      | 0.08      | 1.32                | 0.006      | 0.07      | 2.22                | 0.011   | 0.09      | 3                     | 1  | FAC-         | Shrub            | Common Choke Cherry      |
| <i>Pycnanthemum tenuifolia</i>         | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | 0  | FAC          | P-Forb           | Slender Mountain Mint    |
| <i>Pycnanthemum virginianum</i>        | 12.12                | 0.659      | 1.07      | 10.57               | 0.868      | 1.29      | 17.78               | 0.256   | 0.79      | 5                     | -4 | FACW+        | P-Forb           | Common Mountain Mint     |
| <i>Quercus macrocarpa</i>              | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 5                     | 1  | FAC-         | Tree             | Burr Oak                 |
| <i>Quercus palustris</i>               | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | -3 | FACW         | Tree             | Pin Oak                  |
| <i>Quercus rubra</i>                   | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 5                     | 3  | FACU         | Tree             | Red Oak                  |
| <i>Quercus velutina</i>                | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 5                     | 5  | UPL          | Tree             | Black Oak                |
| <i>Ranunculus abortivus</i>            | 2.27                 | 0.011      | 0.11      | 3.96                | 0.017      | 0.20      | 0.00                | 0.000   | 0.00      | 1                     | -2 | FACW-        | A-Forb           | Little-leaf Buttercup    |
| <i>Ranunculus recurvatus</i>           | 3.03                 | 0.299      | 0.37      | 5.28                | 0.454      | 0.66      | 0.00                | 0.000   | 0.00      | 5                     | -3 | FACW         | A-Forb           | Hooked Buttercup         |
| <i>Ratibida pinnata</i>                | 43.18                | 1.148      | 2.89      | 43.60               | 0.678      | 2.68      | 53.33               | 2.056   | 3.14      | 4                     | 5  | UPL          | P-Forb           | Yellow Coneflower        |
| <i>Rhamnus cathartica</i>              | 84.09                | 9.689      | 11.35     | 93.80               | 6.920      | 10.73     | 88.89               | 15.044  | 12.14     | *                     | 3  | FACU         | Shrub            | Common Buckthorn         |
| <i>Rhamnus frangula</i>                | 30.30                | 0.466      | 1.76      | 27.74               | 0.374      | 1.66      | 42.22               | 0.644   | 1.90      | *                     | -1 | FAC+         | Shrub            | Glossy Buckthorn         |
| <i>Rhus glabra</i>                     | 2.27                 | 0.068      | 0.16      | 1.32                | 0.034      | 0.09      | 4.44                | 0.133   | 0.24      | 1                     | 5  | UPL          | Shrub            | Smooth Sumac             |
| <i>Rosa blanda</i>                     | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 4                     | 3  | FACU         | Shrub            | Early Wild Rose          |
| <i>Rosa carolina</i>                   | 9.09                 | 0.197      | 0.57      | 6.61                | 0.086      | 0.39      | 15.56               | 0.411   | 0.80      | 4                     | 4  | FACU-        | Shrub            | Pasture Rose             |
| <i>Rosa multiflora</i>                 | 2.27                 | 0.140      | 0.21      | 2.64                | 0.207      | 0.31      | 2.22                | 0.011   | 0.09      | *                     | 3  | FACU         | Shrub            | Japanese Rose            |
| <i>Rubus flagellaris</i>               | 2.27                 | 0.250      | 0.30      | 2.64                | 0.207      | 0.31      | 2.22                | 0.333   | 0.28      | 2                     | 4  | FACU-        | Shrub            | Common Dewberry          |
| <i>Rubus occidentalis/idaeus</i>       | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 2                     | 3  | FACU         | Shrub            | Black Raspberry          |
| <i>Rubus pensilvanicus</i>             | 12.88                | 0.875      | 1.27      | 6.61                | 0.253      | 0.54      | 26.67               | 2.078   | 2.19      | 2                     | 1  | FAC-         | Shrub            | Yankee Blackberry        |
| <i>Rubus sp. (veg.)</i>                | 3.79                 | 0.038      | 0.20      | 3.96                | 0.017      | 0.20      | 4.44                | 0.078   | 0.21      |                       |    |              | Shrub            | Blackberry               |
| <i>Rudbeckia hirta</i>                 | 71.21                | 1.417      | 4.39      | 80.59               | 1.310      | 5.01      | 73.33               | 1.622   | 3.60      | 2                     | 3  | FACU         | P-Forb           | Black-eyed Susan         |
| <i>Rudbeckia subtomentosa</i>          | 0.76                 | 0.004      | 0.04      | 0.00                | 0.000      | 0.00      | 2.22                | 0.011   | 0.09      | 5                     | -3 | FACW         | P-Forb           | Sweet Black-Eyed Susan   |
| <i>Rumex crispus+</i>                  | 4.55                 | 0.436      | 0.55      | 6.61                | 0.655      | 0.91      | 2.22                | 0.011   | 0.09      | *                     | -1 | FAC+         | P-Forb           | Curly Dock               |
| <i>Rumex verticillatus</i>             | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 5                     | -5 | OBL          | P-Forb           | Dock                     |
| <i>Salix rigida+</i>                   | 1.52                 | 0.027      | 0.09      | 2.64                | 0.040      | 0.16      | 0.00                | 0.000   | 0.00      | 5                     | -4 | FACW+        | Shrub            | Heart-leaved Willow      |
| <i>Sanicula canadensis</i>             | 13.64                | 0.106      | 0.71      | 19.82               | 0.144      | 1.07      | 6.67                | 0.033   | 0.26      | 4                     | 2  | FACU+        | B-Forb           | Canadian Black Snakeroot |
| <i>Schizachyrium scoparium</i>         | 11.36                | 2.333      | 2.32      | 0.00                | 0.000      | 0.00      | 33.33               | 6.844   | 5.27      | 5                     | 4  | FACU-        | P-Grass C4       | Little Bluestem          |
| <i>Scirpus cyperinus+</i>              | 0.76                 | 0.023      | 0.05      | 1.32                | 0.034      | 0.09      | 0.00                | 0.000   | 0.00      | 5                     | -5 | OBL          | P-Sedge          | Wool Grass               |

|                                   | OVERALL              |            |           | OLD FIELD           |            |           | PRAIRIE             |         |           | ECOLOGY AND STRUCTURE |    |              |                  | COMMON NAME             |
|-----------------------------------|----------------------|------------|-----------|---------------------|------------|-----------|---------------------|---------|-----------|-----------------------|----|--------------|------------------|-------------------------|
|                                   | % Freq.<br>(n = 132) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 87) | %<br>Cover | IV<br>200 | % Freq.<br>(n = 45) | % Cover | IV<br>200 | CC                    | WC | Wet-<br>ness | Physiog-<br>nomy |                         |
| <i>Scirpus pendulus</i>           | 6.06                 | 1.064      | 1.10      | 3.96                | 0.075      | 0.26      | 11.11               | 2.978   | 2.17      | 3                     | -5 | OBL          | P-Sedge          | Red Bulrush             |
| <i>Scutellaria leonardii</i>      | 2.27                 | 0.011      | 0.11      | 1.32                | 0.006      | 0.07      | 4.44                | 0.022   | 0.17      | 5                     | 3  | FACU         | P-Forb           | Small Skullcap          |
| <i>Senecio paperculus</i>         | 13.64                | 0.364      | 0.91      | 18.50               | 0.500      | 1.33      | 8.89                | 0.100   | 0.38      | 3                     | -1 | FAC+         | P-Forb           | Balsam Ragwort          |
| <i>Senecio aureus+</i>            | 1.52                 | 0.117      | 0.16      | 2.64                | 0.178      | 0.29      | 0.00                | 0.000   | 0.00      | 4                     | -3 | FACW         | P-Forb           | Golden Ragwort          |
| <i>Senecio vulgaris+</i>          | 0.76                 | 0.023      | 0.05      | 1.32                | 0.034      | 0.09      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | A-Forb           | Common Groundsel        |
| <i>Setaria glauca+</i>            | 9.09                 | 0.212      | 0.58      | 14.53               | 0.316      | 0.98      | 2.22                | 0.011   | 0.09      | *                     | 0  | FAC          | A-Grass          | Pigeon Grass            |
| <i>Silphium integrifolium</i>     | 2.27                 | 0.049      | 0.14      | 1.32                | 0.034      | 0.09      | 4.44                | 0.078   | 0.21      | 5                     | 5  | UPL          | P-Forb           | Rosin Weed              |
| <i>Silphium laciniatum+</i>       | 1.52                 | 0.008      | 0.08      | 2.64                | 0.011      | 0.14      | 0.00                | 0.000   | 0.00      | 5                     | 4  | FACU-        | P-Forb           | Compass Plant           |
| <i>Silphium terebinthinaceum</i>  | 11.36                | 1.932      | 2.01      | 0.00                | 0.000      | 0.00      | 33.33               | 5.667   | 4.57      | 4                     | 1  | FAC-         | P-Forb           | Prairie Dock            |
| <i>Sisymbrium officinale+</i>     | 0.76                 | 0.023      | 0.05      | 1.32                | 0.034      | 0.09      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | A-Forb           | Hedge Mustard           |
| <i>Sisyrinchium albidum</i>       | 3.03                 | 0.015      | 0.15      | 1.32                | 0.006      | 0.07      | 6.67                | 0.033   | 0.26      | 4                     | 3  | FACU         | P-Forb           | Common Blue-eyed Grass  |
| <i>Sisyrinchium campestre</i>     | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | 6                     | 5  | UPL          | P-Forb           | Prairie Blue-eyed Grass |
| <i>Sisyrinchium sp. (sterile)</i> | 0.76                 | 0.023      | 0.05      | 0.00                | 0.000      | 0.00      | 2.22                | 0.067   | 0.12      |                       |    |              | P-Forb           | Blue-Eyed Grass         |
| <i>Smilax ecirrhata</i>           | 3.03                 | 0.034      | 0.17      | 3.96                | 0.046      | 0.23      | 2.22                | 0.011   | 0.09      | 5                     | 5  | UPL          | P-Forb           | Upright Carrion Flower  |
| <i>Solanum dulcamara</i>          | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | *                     | 0  | FAC          | W-Vine           | Bittersweet Nightshade  |
| <i>Solanum ptycanthum</i>         | 5.30                 | 0.064      | 0.30      | 9.25                | 0.098      | 0.53      | 0.00                | 0.000   | 0.00      | 0                     | 4  | FACU-        | A-Forb           | Black Nightshade        |
| <i>Solidago canadensis</i>        | 25.00                | 1.110      | 2.01      | 23.78               | 1.121      | 2.15      | 33.33               | 1.089   | 1.85      | 1                     | 3  | FACU         | P-Forb           | Canada Goldenrod        |
| <i>Solidago gigantea</i>          | 5.30                 | 0.394      | 0.55      | 7.93                | 0.592      | 0.91      | 2.22                | 0.011   | 0.09      | 3                     | -3 | FACW         | P-Forb           | Late Goldenrod          |
| <i>Solidago juncea</i>            | 26.52                | 1.098      | 2.07      | 15.85               | 0.661      | 1.35      | 51.11               | 1.944   | 2.99      | 4                     | 5  | UPL          | P-Forb           | Early Goldenrod         |
| <i>Solidago missouriensis</i>     | 6.82                 | 0.292      | 0.54      | 0.00                | 0.000      | 0.00      | 20.00               | 0.856   | 1.23      | 4                     | 5  | UPL          | P-Forb           | Missouri Goldenrod      |
| <i>Solidago nemoralis</i>         | 11.36                | 0.409      | 0.84      | 5.28                | 0.247      | 0.47      | 24.44               | 0.722   | 1.31      | 3                     | 5  | UPL          | P-Forb           | Old Field Goldenrod     |
| <i>Solidago riddellii</i>         | 1.52                 | 0.027      | 0.09      | 2.64                | 0.040      | 0.16      | 0.00                | 0.000   | 0.00      | 7                     | -5 | OBL          | P-Forb           | Riddell's Goldenrod     |
| <i>Solidago rigida</i>            | 13.64                | 0.587      | 1.08      | 3.96                | 0.103      | 0.28      | 33.33               | 1.522   | 2.10      | 4                     | 4  | FACU-        | P-Forb           | Rigid Goldenrod         |
| <i>Sonchus oleracea+</i>          | 4.55                 | 0.061      | 0.26      | 7.93                | 0.092      | 0.46      | 0.00                | 0.000   | 0.00      | *                     | 3  | FACU         | A-Forb           | Common Sow Thistle      |
| <i>Sorghastrum nutans</i>         | 8.33                 | 3.644      | 3.19      | 0.00                | 0.000      | 0.00      | 24.44               | 10.689  | 7.24      | 4                     | 2  | FACU+        | P-Grass C4       | Indian Grass            |
| <i>Spartina pectinata</i>         | 4.55                 | 0.773      | 0.81      | 3.96                | 0.241      | 0.41      | 6.67                | 1.800   | 1.31      | 4                     | -4 | FACW+        | P-Grass C4       | Prairie Cord Grass      |
| <i>Sphenopholis intermedia</i>    | 3.03                 | 0.254      | 0.34      | 5.28                | 0.385      | 0.60      | 0.00                | 0.000   | 0.00      | 5                     | 0  | FAC          | P-Grass C3       | Prairie Wedge Grass     |
| <i>Spiraea alba</i>               | 1.52                 | 0.008      | 0.08      | 2.64                | 0.011      | 0.14      | 0.00                | 0.000   | 0.00      | 6                     | -4 | FACW+        | Shrub            | Meadowsweet             |
| <i>Taraxacum officinale</i>       | 27.27                | 0.269      | 1.47      | 35.67               | 0.328      | 1.99      | 20.00               | 0.156   | 0.81      | *                     | 3  | FACU         | P-Forb           | Common Dandelion        |
| <i>Thalictrum dasycarpum</i>      | 1.52                 | 0.008      | 0.08      | 2.64                | 0.011      | 0.14      | 0.00                | 0.000   | 0.00      | 5                     | -2 | FACW-        | P-Forb           | Purple Meadow Rue       |
| <i>Thalictrum revolutum</i>       | 2.27                 | 0.049      | 0.14      | 0.00                | 0.000      | 0.00      | 6.67                | 0.144   | 0.33      | 5                     | 0  | FAC          | P-Forb           | Waxy Meadow Rue         |
| <i>Toxicodendron radicans</i>     | 2.27                 | 0.068      | 0.16      | 3.96                | 0.103      | 0.28      | 0.00                | 0.000   | 0.00      | 1                     | 3  | FACU         | W-Vine           | Poison Ivy              |
| <i>Tradescantia ohioensis</i>     | 5.30                 | 0.102      | 0.32      | 2.64                | 0.040      | 0.16      | 11.11               | 0.222   | 0.53      | 3                     | 2  | FACU+        | P-Forb           | Common Spiderwort       |
| <i>Tridens flavus+</i>            | 0.76                 | 0.004      | 0.04      | 1.32                | 0.006      | 0.07      | 0.00                | 0.000   | 0.00      | 1                     | 5  | UPL          | P-Grass          | Common Purpletop        |
| <i>Trifolium hybridum</i>         | 2.27                 | 0.011      | 0.11      | 3.96                | 0.017      | 0.20      | 0.00                | 0.000   | 0.00      | *                     | 1  | FAC-         | P-Forb N2        | Alsike Clover           |
| <i>Trifolium pratense</i>         | 0.00                 | 0.000      | 0.00      | 0.00                | 0.000      | 0.00      | 0.00                | 0.000   | 0.00      | *                     | 2  | FACU+        | P-Forb N2        | Red Clover              |
| <i>Trifolium repens</i>           | 3.79                 | 0.019      | 0.19      | 3.96                | 0.017      | 0.20      | 4.44                | 0.022   | 0.17      | *                     | 2  | FACU+        | P-Forb N2        | White Clover            |
| <i>Triticum aestivum+</i>         | 13.64                | 0.125      | 0.73      | 13.21               | 0.115      | 0.73      | 17.78               | 0.144   | 0.72      | *                     | 5  | UPL          | A-Grass          | Wheat                   |
| <i>Typha angustifolia</i>         | 2.27                 | 0.424      | 0.43      | 2.64                | 0.471      | 0.55      | 2.22                | 0.333   | 0.28      | *                     | -5 | OBL          | P-Forb           | Narrow-leaved Cattail   |
| <i>Ulmus americana</i>            | 2.27                 | 0.030      | 0.13      | 1.32                | 0.006      | 0.07      | 4.44                | 0.078   | 0.21      | 5                     | -2 | FACW-        | Tree             | American Elm            |
| <i>Verbascum thapsus+</i>         | 1.52                 | 0.027      | 0.09      | 2.64                | 0.040      | 0.16      | 0.00                | 0.000   | 0.00      | *                     | 5  | UPL          | B-Forb           | Woolly Mullein          |

|                                 | OVERALL              |               |               | OLD FIELD           |               |               | PRAIRIE             |               |               | ECOLOGY AND STRUCTURE |    |              |                  | COMMON NAME                  |
|---------------------------------|----------------------|---------------|---------------|---------------------|---------------|---------------|---------------------|---------------|---------------|-----------------------|----|--------------|------------------|------------------------------|
|                                 | % Freq.<br>(n = 132) | %<br>Cover    | IV<br>200     | % Freq.<br>(n = 87) | %<br>Cover    | IV<br>200     | % Freq.<br>(n = 45) | % Cover       | IV<br>200     | CC                    | WC | Wet-<br>ness | Physiog-<br>nomy |                              |
| <i>Verbena hastata</i>          | 9.85                 | 0.326         | 0.71          | 13.21               | 0.477         | 1.06          | 6.67                | 0.033         | 0.26          | 3                     | -4 | FACW+        | P-Forb           | Blue Vervain                 |
| <i>Veronica serpyllifolia+</i>  | 1.52                 | 0.008         | 0.08          | 2.64                | 0.011         | 0.14          | 0.00                | 0.000         | 0.00          | *                     | -3 | FACW         | P-Forb           | Thyme-leaved Speedwell       |
| <i>Veronicastrum virginicum</i> | 0.76                 | 0.004         | 0.04          | 1.32                | 0.006         | 0.07          | 0.00                | 0.000         | 0.00          | 6                     | 0  | FAC          | P-Forb           | Culver's Root                |
| <i>Viburnum lentago</i>         | 18.94                | 1.015         | 1.66          | 25.10               | 1.253         | 2.33          | 13.33               | 0.556         | 0.81          | 4                     | -1 | FAC+         | Shrub            | Nannyberry                   |
| <i>Viburnum opulus</i>          | 0.00                 | 0.000         | 0.00          | 0.00                | 0.000         | 0.00          | 0.00                | 0.000         | 0.00          | *                     | 0  | FAC          | Shrub            | European High-bush Cranberry |
| <i>Viburnum prunifolium</i>     | 0.00                 | 0.000         | 0.00          | 0.00                | 0.000         | 0.00          | 0.00                | 0.000         | 0.00          | 4                     | 3  | FACU         | Shrub            | Black Haw                    |
| <i>Viburnum recognitum</i>      | 3.79                 | 0.095         | 0.25          | 0.00                | 0.000         | 0.00          | 11.11               | 0.278         | 0.56          | 6                     | -2 | FACW-        | Shrub            | Smooth Arrowwood             |
| <i>Vicia americana</i>          | 8.33                 | 0.265         | 0.59          | 0.00                | 0.000         | 0.00          | 24.44               | 0.778         | 1.34          | 6                     | 5  | UPL          | P-Forb           | American Vetch               |
| <i>Viola missouriensiss</i>     | 0.00                 | 0.000         | 0.00          | 0.00                | 0.000         | 0.00          | 0.00                | 0.000         | 0.00          | 4                     | -3 | FACW         | P-Forb           | Missouri Violet              |
| <i>Viola pedtifida</i>          | 9.85                 | 0.068         | 0.51          | 5.28                | 0.023         | 0.27          | 20.00               | 0.156         | 0.81          | 9                     | 4  | FACU-        | P-Forb           | Prairie Violet               |
| <i>Viola pratincola</i>         | 40.91                | 0.280         | 2.11          | 43.60               | 0.247         | 2.29          | 46.67               | 0.344         | 1.88          | 1                     | 0  | FAC          | P-Forb           | Common Blue Violet           |
| <i>Viola sororia</i>            | 0.00                 | 0.000         | 0.00          | 0.00                | 0.000         | 0.00          | 0.00                | 0.000         | 0.00          | 3                     | 1  | FAC-         | P-Forb           | Woolly Blue Violet           |
| <i>Vitis riparia</i>            | 24.24                | 0.254         | 1.32          | 27.74               | 0.264         | 1.56          | 24.44               | 0.233         | 1.02          | 2                     | -2 | FACW-        | W-Vine           | Rivervbank Grape             |
| <i>Zanthoxylum americanum</i>   | 0.76                 | 0.023         | 0.05          | 0.00                | 0.000         | 0.00          | 2.22                | 0.067         | 0.12          | 4                     | 5  | UPL          | Shrub            | Prickly Ash                  |
| <i>Zizia aptera</i>             | 9.09                 | 0.159         | 0.54          | 7.93                | 0.121         | 0.49          | 13.33               | 0.233         | 0.62          | 9                     | 3  | FACU         | P-Forb           | Heart-leaved Meadow Parsnip  |
| <i>Zizia aurea</i>              | 10.61                | 0.072         | 0.55          | 10.57               | 0.046         | 0.54          | 13.33               | 0.122         | 0.55          | 6                     | -1 | FAC+         | P-Forb           | Golden Alexanders            |
| <b>SUMMARY</b>                  | <b>248</b>           | <b>129.97</b> | <b>200.00</b> | <b>207</b>          | <b>110.23</b> | <b>200.00</b> | <b>167</b>          | <b>168.12</b> | <b>200.00</b> |                       |    |              |                  |                              |